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*Information is correct at the time of printing. For the latest updates, please visit the NTU website.
Welcome from President

We are pleased that employers think highly of NTU graduates and each graduating class has enjoyed high employment, with fresh graduates getting multiple job offers, being offered jobs while on internships, taking on careers overseas and some even becoming entrepreneurs and creating jobs for others.

NTU is ranked fifth in the world for its international profile. Here, you can meet and mingle with students and professors from 90 countries. A number of our undergraduate and graduate programmes are conducted with top overseas universities. NTU is also the partner of choice of global industry leaders. In fact, leading technology-based institutions such as Thales, Rolls-Royce, Microvision and Toray Industries Inc have chosen to set up joint laboratories with us. Students who work in these laboratories gain early exposure to the industry and enhance their employability in economically strategic sectors.

In recent years, we have attracted a record number of internationally-acclaimed scientists. Come to NTU if you want to be inspired and mentored by the leading lights of science and technology. The university is now building on its strengths and implementing a bold five-year plan to achieve new peaks of excellence in areas of global importance such as sustainability, healthcare, new media, innovation and East-West research. Many of our professors and researchers have helped to put Singapore on the world map through their cutting-edge work in these interdisciplinary spheres.

NTU's 200-hectare garden campus is the largest university campus in Singapore, with sports and recreational facilities that were upgraded to international gaming standards for the participants of the world's first Youth Olympic Games.

Under our campus master plan guided by sustainability principles, the main NTU campus will be transformed into a sustainable "univer-city" with refreshing social spaces that promote interaction. Coming soon: two learning hubs, an experimental medicine building, nine new halls of residence and new faculty housing. Construction of a clinical sciences building for the medical school has also begun at our Novena campus.

I warmly invite you to come and share in these exciting times, and to seize opportunities to make a difference while you are here. Whether as a budding scientist on the brink of a life-changing breakthrough, a student entrepreneur with an out-of-the-box innovation, or a driver of a social enterprise that brings hope to those in need, the sky's the limit. See you soon!

Prof Bertil Andersson
President
Nanyang Technological University

NTU is the fastest-rising university in the world's top 50, ranked 47th in the QS World University Rankings. It is also placed 4th globally among young elite universities. NTU is a vibrant hub for learning and a hotbed for research at the confluence of the most important disciplines. As the President of this university, I cannot imagine a more exciting place to be.

With a wide range of disciplines offered by 12 schools in the colleges of engineering, business, science, and humanities, arts and social sciences; two graduate schools; and a national institute of education, students can create their own unique combinations of knowledge in fresh and exciting ways. NTU's engineering college is the 5th most cited in the world with a research output among the top three universities globally, and we have one of the best business schools in Asia. Our new medical school, set up jointly with Imperial College London, one of the world's best universities, will welcome its first students in 2013. At the new interdisciplinary graduate school, the first of its kind in Asia, the walls between disciplines come down as researchers and students from different backgrounds work to find vital breakthroughs and innovations.

To excel in the fast-changing global workplace, one needs to be versatile, creative, socially competent and at ease with different cultures. NTU nurtures these qualities through a flexible, broad-based curriculum, coupled with an enriching campus life, leadership opportunities and exposure to international environments. Lessons are conducted in a 21st century IT-enabled environment that promotes critical thinking and communication skills.
Introduction

About Nanyang Technological University
A research-intensive public university, Nanyang Technological University (NTU) has 33,500 undergraduate and postgraduate students in the colleges of Engineering, Business, Science, and Humanities, Arts, & Social Sciences. In 2013, NTU will enrol the first batch of students at its new medical school, the Lee Kong Chian School of Medicine, which is set up jointly with Imperial College London.

NTU is also home to four world-class autonomous institutes – the National Institute of Education, S Rajaratnam School of International Studies, Earth Observatory of Singapore, and Singapore Centre on Environmental Life Sciences Engineering – and various leading research centres such as the Nanyang Environment & Water Research Institute (NEWRI), Energy Research Institute @ NTU (ERI@N) and the Institute of Asian Consumer Insight.

A fast-growing university with an international outlook, NTU is putting its global stamp on Five Peaks of Excellence: Sustainable Earth, Future Healthcare, New Media, New Silk Road, and Innovation Asia.

Besides the main Yunnan Garden campus, NTU also has a satellite campus in Singapore’s science and tech hub, one-north, and is setting up a third campus in Novena, Singapore’s medical district.

Achievements
In September 2012, NTU leapt to 47th place in the Quacquarelli Symonds (QS) ranking of the world’s top 100 universities. NTU’s quantum leap of 27 places over two years makes it the fastest-rising university in the global top 50. In October 2012, NTU also shot into the Times Higher Education World University Rankings’ top 100 list, making a phenomenal jump of 83 places from the previous year.

According to Essential Science Indicators (January 2012), the research output from our College of Engineering is among the top three universities globally and the fifth most cited worldwide.

Our Nanyang Business School (College of Business) is the leading business school in Singapore and takes its place among the top business schools in Asia. The Nanyang MBA programme has been consistently ranked among the top 100 MBA programmes in the world by The Economist since 2004, and is ranked ahead of other Singapore business schools. The Nanyang MBA is also consistently ranked in the top 35 in the Financial Times (FT) Global MBA rankings. The Nanyang Business School is one of only three in Asia to be awarded both the EQUIS (European Quality Improvement System) and AACSB (Association to Advance Collegiate Schools of Business) accreditations - international hallmarks of quality.

Our College of Science is known for its award-winning faculty and world class laboratories and has secured substantial research funding and grants. Our College of Humanities, Arts & Social Sciences is home to a top journalism and media school in Asia, a fast-growing humanities and social sciences school with distinctive niches of excellence and Singapore’s first professional art school offering degree courses in art, design and interactive digital media.

NTU is also the first university in Asia to receive the maximum five stars under the QS Stars evaluation system. Other universities with the same five-star rating include University of Cambridge, Stanford University and Massachusetts Institute of Technology.

Vision and Mission
A great global university founded on science and technology, nurturing creative and entrepreneurial leaders through a broad education in diverse disciplines.

University Governance
The NTU Board of Trustees sets the broad strategic directions of NTU and oversees its affairs and business. The President of the University is its Chief Executive Officer.

Academic Council
The Academic Council, comprising all tenure-track faculty of the University, provides input on academic matters through the Senate and its committees, as well as the Advisory Board. The President of NTU chairs the Academic Council and delivers the State of the University Address during its annual meetings.

Senate
The Senate is formed by 50 Academic Council members elected from the various Colleges, Lee Kong Chian School of Medicine, NIE and RSIS. The President, the Provost and other key members of the University Administration are ex-officio members. The Senate acts on behalf of the Academic Council as its elected representative body. Its key responsibility is to consider recommendations from Academic Council committees on relevant matters.
The Senate, in turn, elects a Senate Steering Committee from among its members to facilitate its work. The President and the Provost are ex-officio members of this Committee, whose key role is to identify subjects for study and discussion by the Senate, i.e. it sets the agenda for Senate meetings. The other standing committees of the Senate are the Committee on Committees, which is responsible for setting up committees as required from time to time, and the Committee of Tellers, which ensures that Senate and Advisory Board elections are conducted in an open and fair manner.

**Advisory Board**

The Advisory Board comprises nine members elected from among Academic Council members who are tenured full professors. It provides advice on matters that the President or the Provost may refer to it. Such matters may include faculty appointments, promotions and tenure review, as well as the creation of new academic programmes.

1 All faculty members who are tenured to age 65 and those who are eligible for nomination or re-nomination to be tenured to age 65

**Colleges, Schools and Administrative Departments**

Under a four-college structure of 12 schools as listed below, NTU provides comprehensive programmes of various disciplines to more than 33,500 undergraduates and graduate students.

NTU also has one autonomous school, Lee Kong Chian School of Medicine, and four autonomous entities, namely the National Institute of Education, S. Rajaratnam School of International Studies, the Earth Observatory of Singapore, and the Singapore Centre on Environmental Life Sciences Engineering, which are leading authorities in their respective fields of education, strategic studies and security research, hazards-related earth sciences, and water and environmental sustainability.

**College of Business**

(Nanyang Business School)

The Nanyang Business School (NBS) is a leading business school committed to nurturing leaders for a sustainable world through academically rigorous curricula that are relevant to business practice.

NBS is one of Asia’s largest business schools, offering a comprehensive array of undergraduate and graduate programmes in accountancy and business. Drawing on a 50-year heritage of educating the region’s business leaders, NBS provides an outstanding learning environment with state-of-the-art facilities and world-class research centres.

NBS is the first business school in Singapore, and the third in Asia, to be accredited by both the European Quality Improvement System and Association of Advance Collegiate Schools of Business (AACSB). It is one of only nine business schools outside of the United States to be accredited by both Business and Accounting. Both these accreditations are the most recognised quality assurance standards for accounting and business education.

We have also been conferred full EQUIS accreditation since 2004. The EQUIS quality assurance scheme is a leading international system of quality assessment, improvement, and accreditation of higher education institutions in management and business administration. EQUIS – accredited business schools possess. This is an attestation of our attainment of a) high international standards of quality for mission, governance, student and programme quality, faculty and research, corporate and international connections and management of resources; b) a significant level of internationalization and c) a strong corporate orientation in programmes, activities and processes.

The Nanyang MBA programme has been consistently ranked among the best in the Asia-Pacific. The full-time programme was ranked 34th in The Financial Times’ latest global MBA rankings, and is placed 69th worldwide in The Economist’s top 100 MBA list, the best showing by a Singapore business school.

To leverage the strengths of world-class institutions, NBS has established many strategic partnerships and collaborations with the business schools of many internationally renowned universities. These include the Massachusetts Institute of Technology (MIT); Carnegie Mellon University; Cornell University; University of California, Berkeley; University of Illinois at Urbana-Champaign; Essec Business School; University of St Gallen; Waseda University, and the Shanghai Jiaotong University.

**College of Engineering**

The College of Engineering (CoE) was established to catalyse synergy and best practices among the six Engineering Schools by promoting collaboration and sharing of resources within and outside of the constituent Schools and the University. With exciting new knowledge and innovations developed through collaborations across disciplines, the College actively pursues strategic alliances with reputable peer institutions and industries locally and internationally to achieve excellence in education and research.

As one of the largest Engineering Colleges in the world, with a tradition of excellence in engineering, the undergraduate programmes at the College have been designed to provide a complete education and diverse opportunities to harness the varied talents and interests of students. Through an integrated and interdisciplinary educational approach, our broad-based and flexible curricula are infused with research exposure, professional engineering experience, personal development opportunities and global dimensions. Apart from a strong grounding in engineering fundamentals, students are also broadly educated in arts, humanities, business and sciences, and trained in critical soft skills.

Towards fostering industry relevance, the College works closely with the business sectors and government agencies to expand choices and scholarships in learning, and to enhance graduates’ employability. With a host of interdisciplinary programmes and specialisations offered by the six Engineering Schools, the College is committed to train graduates to be creative, well-rounded engineering leaders, mobile among a variety of careers and disciplines locally and globally.

**Mission**

To nurture creative and entrepreneurial leaders through broad-based, research-infused engineering education and to advance knowledge and create innovative and sustainable solutions for the benefit of industry and society.

**Vision**

A great global engineering college for education, research and innovation.
The six Engineering Schools in the College are:

- **School of Chemical and Biomedical Engineering**
  The School, comprising the Division of Chemical and Biomolecular Engineering and the Division of Bioengineering, aims to train a new generation of engineers through a rigorous curriculum that integrates engineering principles with the fundamentals of life and chemical sciences.

  Academic Programmes Offered by the School Includes:
  - Bachelor of Engineering (Chemical and Biomolecular Engineering)
  - Bachelor of Engineering (Bioengineering)
  - Bachelor of Engineering (Chemical & Biomolecular Engineering) With Minor in Business
  - Bachelor of Engineering (Bioengineering) With Minor in Business
  - Double Degree in Chemical & Biomolecular Engineering and Economics
  - Double Degree in Bioengineering and Economics
  - Master of Science (Biomedical Engineering)
  - Master of Engineering (Chemical and Biomolecular Engineering)
  - Master of Engineering (Bioengineering)
  - Doctor of Philosophy (Chemical and Biomolecular Engineering)
  - Doctor of Philosophy (Bioengineering)

- **Goals and Missions**
  The School aims to provide educational training and experiences that facilitate students to:
  - Gain a thorough understanding of the fundamentals of life and chemical sciences.
  - Deftly solve challenging problems in chemical and biomedical engineering and related areas while understanding the implications of such solutions on the society.
  - Develop good communication and management skills through team work in the execution of experimental and design projects.

- **School of Civil and Environmental Engineering**
  The School of Civil and Environmental Engineering (CEE) was one of the initial three engineering schools when the University started out as NTI back in 1982. It was then called the School of Civil and Structural Engineering (CSE). In 2002, it was renamed School of Civil and Environmental Engineering due to increasing emphasis on the environment and the significant strength of the school had gained in this area. Thereafter, the Bachelor of Environmental Engineering programme was introduced in 2003. In 2004, in addition to the existing Civil Engineering and Environmental Engineering programmes, a new undergraduate programme in Maritime Studies was launched.

  **Mission**
  To nurture students to be responsible leaders capable of realising their maximum potential in their profession and community. To provide a collegiate environment for faculty to excel in education and research for sustainable development. To advance knowledge for the practice of civil and environmental engineering and maritime professions.

  We train and educate professional civil and environmental engineers, and advance the state of knowledge in important civil and environmental engineering fields. The Civil Engineering curriculum equips its students with the professional knowledge and skills needed to excel in a challenging career as a civil engineer, while the Environmental Engineering curriculum imparts knowledge, skills and capabilities in a wide variety of environmental engineering topics to further research and know-how in building and maintaining sustainable living environments. Through the maritime studies programme, we also build up the expertise of the local shipping industry as well as working towards establishing Singapore as a centre of excellence for shipping business, research and development. The Maritime Studies curriculum equips its students with the necessary expertise in shipping, business and management, and maritime science and technology to meet the new challenges in the maritime industry.

  State-of-the-art facilities in both hardware and software are incorporated to provide a professionally-oriented education and a highly advanced environment for research, development and collaborations with the industry and overseas universities. We have well-equipped laboratories with highly developed facilities to support teaching and intensive research, namely:
  - Computer-Aided Design & Drafting (CADD) laboratory
  - Environment laboratory
  - Geotechnics laboratory
  - Hydraulics laboratory
  - Protective Engineering and Construction Technology laboratory
  - Transport and Geospatial laboratory

  The School is staffed by an international faculty of academics who are strong in teaching as well as research and professional experiences. Besides teaching the undergraduate and graduate courses, they are active in research collaboration with industrial organisations, offering engineering consultancy, conferences, seminars and short courses for the benefit of the industry. To facilitate the coordination of various academic and research activities and also to better reflect their focus areas, the School is organised into three Divisions:
  - Environmental and Water Resources Engineering (EWRE)
  - Infrastructure Systems and Maritime Studies (ISMS)
  - Structures and Mechanics (SM)

  The School provides a number of practice-oriented courses to prepare the students for their challenging careers. The courses are designed to provide the requisite breadth and depth so that the students are able to pursue a career in planning, design and construction of civil, environmental, maritime projects and systems, as well as in research and development. Lectures and tutorials complemented by laboratory sessions, design
projects, practical training, industrial visits and seminars will equip the students with the principles and practical aspects of their areas of studies. Upon graduation, they are able to be involved in various engineering and maritime activities.

- **School of Computer Engineering**
  
  **Mission**
  The School of Computer Engineering (SCE) has successfully produced exceptional engineers in the last 2 decades. In the last 2 years, SCE has produced the top earning graduates in NTU.

  SCE provides quality undergraduate programmes which combine a distinctive blend of theory and practice with critical hands-on-experience, and project-based learning. Communication and professional skills are enhanced through carefully selected industrial internships which complement the programme, ensuring our students are ready to meet goals and rise to challenges as part of a global workforce.

  Career prospects for our graduates received a boost with the government’s Intelligent Nation Masterplan (iN2015). This initiative aims to harness the Infocomm industry in ways that will enhance and grow Singapore’s economy in new areas. With the government investing over a few hundred million dollars in the local Infocomm industry, students can look forward to the surge in demand for quality graduates.

- **Vision**
  - To foster an innovative and entrepreneurial community
  - To prepare graduates for lifelong learning and leadership
  - To conduct cutting-edge research in collaboration with industry and eminent international institutions

- **Goals**
  - Develop human resources to their fullest potential
  - Raise the School profile locally and internationally
  - Cater to diverse backgrounds and learning abilities of students
  - Promote self-learning through structured programmes
  - Increase the sense of belonging of students and alumni

- **Core values**
  - Innovation
  - Integrity
  - Teamwork
  - Lifelong Learning
  - Professionalism
  - Passion
  - Proactiveness

- **School of Electrical and Electronic Engineering**

  The School of Electrical and Electronic Engineering is one of the three founding Schools with which Nanyang Technological Institute (now Nanyang Technological University) commenced its undergraduate programmes in engineering, soon after it was set up in August 1981. The first batch of students to obtain the B.Eng. (Electrical) degree graduated in 1985.

  The School has a faculty of close to 160 full-time professors with higher degrees from world-renowned universities. They have wide and varied backgrounds and strong research and professional expertise. Apart from teaching undergraduate and postgraduate programmes, faculty members are active in research and development with a broad range of collaborations with renowned overseas universities, research institutes and multinational companies. The School also offers advanced short courses for working engineers to keep them updated on the latest developments in the rapidly evolving areas of electrical and electronic engineering.

  Adopting the motto E3: Excellence in Engineering Education, the School strives to excel in teaching, research and professional services in Electrical and Electronic Engineering and contribute to technological innovation and economic advancement of the nation.

  **Bachelor of Engineering Programmes Offered by the School:**
  - Bachelor of Engineering (Electrical and Electronic Engineering)
  - Bachelor of Engineering (Electrical and Electronic Engineering) with Minor in Business
  - Bachelor of Engineering (Information Engineering and Media)
  - Bachelor of Engineering (Information Engineering and Media) with Minor in Business
  - Bachelor of Engineering (Electrical and Electronic Engineering) and Bachelor of Arts (Honours) in Economics; Bachelor of Engineering (Information Engineering and Media) and Bachelor of Arts (Honours) in Economics
  - NTU-Georgia Tech Integrated Bachelor Of Engineering (Electrical and Electronic Engineering) and Master of Science (Electrical and Computer Engineering) Programme

- **School of Materials Science and Engineering**

  **Mission**
  The mission of the School of Materials Science and Engineering (MSE) is to provide university teaching and research in Materials Science and Engineering, and to make professional contributions to industry and the community in Singapore.

  **Vision**
  Our vision is to become an institution of global excellence in an environment and culture of ideas, creativity, research and entrepreneurship.

  **Core Values**
  The core values help the School achieve excellence in teaching, research and contribution to industry and the community. These values include:
  - Quality and innovative teaching
  - People-centred service
  - Academic excellence
  - Strategic and impactful research
  - Industrial relevance
  - Community development

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The student-oriented focus of the School offers students more flexibility and choices in their course of study. Some students may choose to further their interests and aptitudes in design or mechatronics by opting for an in-depth specialisation in either of these streams from the start of their second year. Within each of these streams, students study the core mechanical engineering courses, together with courses in their specific area of specialisation.

The School keeps abreast of advanced technological developments in industry and in research. For this purpose, the School is divided administratively into six divisions:

1) Aerospace Engineering
2) Engineering Mechanics
3) Manufacturing Engineering
4) Mechatronics & Design
5) Systems & Engineering Management
6) Thermal & Fluids Engineering

College of Humanities, Arts, & Social Sciences

The College offers a wide selection of major disciplines across three distinct schools: the School of Art, Design and Media (ADM), Singapore’s premier professional art school that offers degree programmes in Art, Design and Interactive Digital Media; the Wee Kim Wee School of Communication and Information (WKWSCI), Asia’s top school in Mass Communications; and the School of Humanities and Social Sciences (HSS), an energetic school dedicated to the study of human progress, the human condition, its social aspects, and in all, an enlightened understanding of the individual and society.

The College seeks to offer well-balanced programmes that foster a culture of excellence and creativity through the breadth and depth of syllabus. Rooted in the belief of cross-discipline mastery, students can take minors or second majors beyond their primary disciplines, across the three schools, from ADM – a Minor in Art History; from WKWSCI – a Minor in Information and New Media or Minor in Communication Studies; from HSS – a whole host of minors in the humanities and social sciences.

Higher education should not only equip students with a valuable skill set necessary for their prospective career, it should also extend their understanding of ways in which societies function and path them on a journey of self-discovery. Along the way, students will gain new perspectives and develop interests and meet friends they will cherish for life. To these ends, the College aims to foster in students a spirited intellectual curiosity, openness, independence and integrity. The College provides challenging curricular and co-curricular options, and an environment that is conducive for learning, reflection, interaction and community involvement.

Whether students are majoring in Economics, Digital Filmmaking or Journalism, pursuing an education in the College of Humanities, Arts, and Social Sciences will enable them to question assumptions, articulate informed judgment and make innovative contributions to diverse professions and industries.

The College achieves excellence in education through:

- cultivating the highest standards of education;
- promoting interdisciplinary learning; and
- producing graduates with creative and innovative talent to meet the challenges of the 21st century.
• School of Art, Design and Media
The BFA in Art, Design and Media is a four-year degree programme for undergraduates interested in a major in Art, Design and Media within specialisation in six disciplines at NTU.
  – Digital Animation
  – Digital Filmmaking
  – Photography and Digital Imaging
  – Interactive Media
  – Product Design
  – Visual Communication

This degree combines a rigorous foundation in traditional art and design studio disciplines and innovative developments in new media. Delivery is through a balanced combination of studio practice and scholarship in cultural and historical studies. While the degree retains the canonical core elements of an art and design programme, it also reflects a breadth of interests that is relevant both regionally and globally and embraces many of the key areas that comprise contemporary art, design and media studies.

The first two semesters constitute the foundation year, where students learn the fundamentals of visual creation including; drawing, design in two and three dimensions, time based design, visual storytelling and a survey of art history. Specialisation begins in the second year, and continues throughout the programme. In addition to the studio-based courses, students are required to complete critical theory, history and philosophy modules.

Honours are awarded on completion of the fourth year to those students who have performed at a high level of excellence.

• School of Humanities and Social Sciences
Established in 2004, the School of Humanities and Social Sciences (HSS) is a dynamic and fast-growing school with distinctive interdisciplinary research strengths in Literary and Cultural Studies; Environment & Sustainability; Global Asia; Humanities, Science, & Society; and New Frontiers in Neuroscience. Home to more than 220 faculty and staff members, and over 2700 undergraduates and 300 graduate students, HSS prepares its students for opportunities and challenges in a globalised world through a curriculum that foster curiosity and resourcefulness.

Taking its place beside the established technological disciplines in NTU, the School offers a firm promise of intellectual fusion and collaboration, vibrancy, cultural enrichment and freshness. Complementing the existing scientific-based disciplines, HSS contributes added creative dimensions, innovative thinking strategies and a key focus on the capacity of each individual to make a difference through intellectual self-responsibility and resourcefulness.

• Wee Kim Wee School of Communication and Information
Vision
To be the premier school of communication and information in Asia with international eminence.

Mission
To educate and nurture communication and information professionals and academics, to advance knowledge, and to serve society.

Background
The Wee Kim Wee School of Communication and Information (WKWSCI) was founded in 1992 and has already acquired the status as one of Asia’s premier communication schools. It is well-recognized for its strengths in teaching and research, its close ties with the media and information industries, and for its success rate in placing students in communication professions upon graduation.

WKWSCI has five divisions offering a wide range of communication courses both at the undergraduate and graduate levels. The divisions are: Journalism and Publishing, Broadcast and Cinema Studies, Public and Promotional Communication, Information Studies, and Communication Research.

Students in WKWSCI receive a balance of theoretical knowledge and practical training in their broad-based curriculum. The School has invested in comparable industry equipment and technology for all its courses, especially in information technology, such as web-design, multimedia, desktop publishing, audio and video production. The School also has state-of-the-art equipment for training in journalism.

Objectives
The School’s four graduate degree programmes by coursework are collectively multi-disciplinary in nature and aimed to provide graduates with relevant work experience with advanced professional education in the areas of information studies, knowledge management, information systems and mass communication. In addition, the School offers research degrees such as Doctor of Philosophy, Master of Communication Studies and Master of Applied Science.
Unique Features of the School

1. Multidisciplinary undergrad curriculum featuring five academic concentrations - Journalism; Broadcast and Cinema Studies; Communication Policy and Research; Advertising; and Public Relations. There is also an interdisciplinary concentration that allows students to tailor the curriculum of their choice to meet their own specific needs. At the same time, the curriculum encourages students to take general education modules, work on real-life and lab-based practicum, portfolio seminars, workshops, and many more.

2. Students can take up academic minors in all schools. Some popular options are Arts, Design & Media, Drama & Performance, Economics, English Literature, History, Chinese Language & Culture, Business, Education Studies, Music, Environmental Management, Sociology, and Psychology among others.

3. Students are encouraged to apply for the Overseas Exchange Programme. Successful students can spend up to six months at top communication schools in leading universities in America, Australia, China and India.

4. The School offers a required professional internship of 24 weeks where students gain first-hand industry training and experience under the supervision of professors and industry practitioners.

5. WKWSCI prepares students for comprehensive hands-on learning through campus media and various special projects, including Nanyang Spectrum - a 30 minute weekly TV news magazine; Radio Fusion – simulated radio broadcast weekly on Internet; Nanyang Chronicle – student-produced campus newspaper; Going Overseas for Advanced Reporting (GO-FAR); Film Festivals, and ConnexSCIons – student-produced alumni newsletter.

College of Science

The NTU Science education arouses the student’s spirit of inquiry, instils respect for evidence, objectivity and reasoning, cultivates critical analytical thinking, and develops problem solving ability. These are skills highly valued by employers. At the College of Science, such skills are imparted through a combination of theory, experiments and practical applications - features characteristic of all our innovative direct Bachelor of Science (Honours) programmes. Opportunities abound for our students in industrial internship, attachments to research labs, and study aboard. Our graduates have been sought after by employers from sectors as diverse as banking and finance, scientific R&D, IT, biomedical, chemical, educational, government.

Our flexible curricula in Biology, Chemistry, Physics and Mathematics prepare students to tackle multidisciplinary problems in sustainability, energy, environment, economics and health that constitute major challenges for the future of mankind. Students have the choice of programmes in these disciplines, with optional concentrations in current topics such as Green Chemistry and Nanotechnology, as well as several multidisciplinary programmes such as the double degree programme in Biomedical Sciences and Chinese Medicine, B.Sc.(Hons) in Physics with 2nd major in Mathematical Sciences, and the combined major in Mathematics & Economics.

• School of Biological Sciences

Mission
To achieve excellence in teaching, research, development and service to the community in the field of Life Sciences so as to attain improvement in human health.

Overview
The School of Biological Sciences was established in July 2001 to produce graduates in biological and biomedical sciences to meet the demand for a skilled workforce relevant for the biomedical manufacturing and research industries, and health care services. The School is housed in a 30,000 m² building containing 60 research laboratories, core instrumentation rooms and an adjoining two-storey animal holding facility. The building also contains state-of-the-art classrooms, computer suites and teaching laboratories equipped with high-speed wireless internet access providing world-class educational support for undergraduate and graduate students alike. The School offers rigorous undergraduate programmes that are taught by an international team of experienced academics and eminent researchers. Undergraduates will experience a challenging and engaging learning environment that promotes innovation, critical and creative thinking. The B.Sc. (Honours) programme incorporates elective courses that allow specialization in areas of biological sciences that match students’ interests. The School also offers the only double degree programme in Singapore that integrates biomedical sciences and Chinese medicine. Graduates from this programme will have attained in-depth knowledge and skill-sets necessary for practising Chinese medicine and related biomedical research.

• School of Physical and Mathematical Sciences

Mission
Our mission is twofold: in teaching, to impart the habit and mode of thinking in science and mathematics using the most effective pedagogical methods; in research, to contribute to the scholarship of discovery, integration, application and teaching.

Vision
Our vision is to build a renowned school with strong faculty, innovative curricula, promising students, strong links with industry and supportive alumni.

Overview
The new building of NTU’s School of Physical & Mathematical Sciences (SPMS) was opened officially by Dr Ng Eng Hen, Minister for Education and Second Minister for Defence, Singapore, on 21 July 2009.

The new SPMS complex is an indication of the University’s commitment to excellence in education and research. The SPMS complex provides an environment conducive for intellectual pursuits which help to attract and retain the very best global talent: faculty, researchers and students. The cluster of three interconnected buildings, totalling 38,000 square meters, house the Divisions of Chemistry & Biological Chemistry, Mathematical Sciences, and Physics & Applied Physics. The design of the buildings is in line with our philosophy of advancing multidisciplinary collaborations while promoting excellence in our core areas.
The Chemistry & Biological Chemistry building is modelled after the new Oxford Chemistry building, reputed to have the best safety features by industry standards in the western world. The building is well-equipped for interdisciplinary research with emphasis on synthesis, molecular design, catalysis, biological chemistry, interfacial science and new materials. The building houses cutting edge equipment including state-of-the-art nuclear magnetic resonance instruments and mass spectrometers.

A special feature of the Mathematical Sciences building is the well-placed interactive meeting spaces that are known to provide the best environment for learning and research by facilitating faculty-faculty, faculty-student, and student-student discussion on mathematics and statistics problems. Unlike traditional mathematics departments, we have incorporated modern laboratories and computing facilities to do cutting-edge teaching and research on modern multidisciplinary application areas in bioinformatics, biocomputing, finance, digital media, etc.

The Physics and Applied Physics building has many laboratories for the training of a new breed of graduates with strong fundamental understanding of science and the ability of putting together the technology built up on scientific principles. The building and faculty members provide an environment for learning the core principles of physics, as well as for students to acquire mechanical, electronic, software, engineering and design skills, laboratory teamwork, and resource management for success in large-scale projects.

As of 2011, the SPMS building is revamped with interactive tutorial rooms, better known as smart classrooms, which accommodate information technology and allow students to better partake in group discussions. They are built under the recommendation of NTU’s Blue Ribbon Commission (BRC), to promote better and more effective learning.

Established in 2005, SPMS provides students with excellent preparation for further studies and fulfilling careers, through its innovative and relevant B.Sc.(Hons) programmes in Chemistry & Biological Chemistry, Mathematical Sciences, Mathematics & Economics, Physics & Applied Physics. It also offers M.Sc. and Ph.D. programmes in chemistry, mathematical sciences, physics and earth sciences.

Up till July 2011, SPMS has proudly seen three batches of graduates who have completed their degrees in 4 years, and some in 3.5 or even 3 years. A number of graduates from our undergraduate programmes have gone to graduate studies and research at top institutions around the world including Berkeley, Harvard, Stanford, Technical University of Munich, and London School of Economics. Their achievements bear testimony to the high quality of education that NTU and SPMS have given them.

In August 2010, the SPMS welcomes the addition of the Division of Earth Sciences into this family. This new division also admits its pioneer batch of PhD students in the same month and will offer a new undergraduate programme in the near future.

• **Lee Kong Chian School of Medicine (LKCMedicine) (1st Intake in 2013)**

The Lee Kong Chian School of Medicine is a joint school between two of the world’s premier institutions of higher education, Imperial College London and Nanyang Technological University. The new medical school established at NTU in Singapore offers a 5-year MBBS degree jointly awarded by both institutions. The first cohort of 50 medical students will be accepted for admission in 2013, with a gradual increase to 150 students or more annually.

The Lee Kong Chian School of Medicine is named after the renowned business leader, pioneer and philanthropist Tan Sri Dato’ Lee Chong Chien in recognition of the gift of $150 million made by the Lee Foundation towards the establishment of the School.

The partnership agreement for the School of Medicine between Imperial College London and NTU was agreed and announced in 2010. The MBBS programme at the Lee Kong Chian School of Medicine will be the first time that Imperial has chosen to develop and deliver a course overseas. With the establishment of the School, NTU is expanding its array of programmes to include medical education to complement its existing technology based subjects.

**Interdisciplinary Graduate School**

New knowledge is always found at the crossroads between disciplines. And embarking on a PhD at the Interdisciplinary Graduate School (IGS) within NTU in interdisciplinary research could put you en route to a breakthrough discovery. IGS which was newly launched on June 25, 2012 by NTU President, Professor Bertil Andersson, offers prestigious scholarships for outstanding graduate students.

IGS has thematic graduate programmes involving interdisciplinary research to support NTU’s Five Peaks of Excellence. For a start, IGS will focus on the first two peaks: Sustainable Earth and New Media. Student enrolment has already commenced in January 2012 which saw IGS’s first intake of 25 PhD students. Subsequently, Future Healthcare will also be rolled out soon in 2013.

Research projects are offered and are carried out by any of the following centres:

- Earth Observatory of Singapore (EOS)
- Energy Research Institute @ NTU (ERI@N)
- Institute for New Media (IMI)
- Nanyang Environment and Water Research Institute (NEWRI)
- Singapore Centre On Environmental Life Sciences Engineering (SCELSE)

Another innovative initiative is the Industrial Postgraduate Programme (IPP) which allows students to work and study at the same time while drawing a salary. This new programme is Singapore’s latest postgraduate programme which is set to foster closer ties between the academia and industries. The IPP aims to bolster Singapore’s industrial R&D sector. This collaboration with IGS is jointly developed by The Economic Development Board and The Ministry of Education.

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The unique features of an IGS PhD student comprise crossdisciplinary learning and research approaches in a research-intensive university. Moreover, students get the first hand accessible opportunity to work with top researchers from every school who are at the core of NTU. The graduate students will work with engineering and business professors, physicists, biologists, chemists, economists, doctors, psychologists, and experts in arts design and media.

This research approach resonates well with the school’s mission. Solutions to global challenges, particularly in environmental sustainability, new media and future healthcare, will be sought. IGS will work closely with leading players in government, business and the industry.

Two of NTU’s joint PhD programmes will come under the purview of IGS. These partnerships are with Austria’s University of Natural Resources and Life Sciences (BOKU) and Germany’s Technical University of Munich (TUM) in the areas of future healthcare and energy research respectively. Successful candidates will be conferred degrees jointly awarded by NTU and the partner university, and spend half of their candidature in each institution.

This research methodology incorporates well with the school’s mission. In addition, it aims to facilitate the application of its research to critical challenges, particularly in environmental sustainability, new media and future healthcare. Gradually, IGS will progress towards working with leading players in government, business and the industry.

Autonomous Institutes
- Earth Observatory of Singapore
- National Institute of Education
- S. Rajaratnam School of International Studies
- Singapore Centre on Environmental Life Sciences Engineering

Other Institutes and Centres
- Cornell-Nanyang Institute of Hospitality Management
- Energy Research Institute @ NTU
- Institute for Media Innovation
- Nanyang Environment and Water Research Institute

Administrative Departments
The colleges are supported by administrative departments which provide quality service to the university’s stakeholders and to the wider community.

The following is a list of all our administrative and support offices:
- President’s Office
- Alumni Affairs Office
- Career & Attachment Office
- Centre for Continuing Education
- Centre for Excellence in Learning and Teaching
- Centre for IT Services
- China Affairs Office
- CN Yang Scholars Programme Office
- Corporate Communications Office
- Development Office
- Office of Global Education & Mobility
- Graduate Studies Office
- Housing Services Office – Nanyang Executive Centre
- Legal and Secretariat Office
- Library
- Nanyang Innovation and Enterprise Office
- Office of Academic Services
- Office of Admissions and Financial Aid
- Office of Development & Facilities Management
- Office of Finance
- Office of Health and Safety
- Office of Human Resources
- Office of International Affairs
- Student Affairs Office – International Student Centre – Sports and Recreation Centre – Student Counselling Centre
- Research Support Office
- Undergraduate Research Experience on Campus (URECA) Programme Office
The undergraduate programmes offered in AY 2012-13 are as follows:

<table>
<thead>
<tr>
<th>Programme</th>
<th>Degree Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accountancy</td>
<td>Bachelor of Accountancy</td>
</tr>
<tr>
<td>Aerospace Engineering</td>
<td>Bachelor of Engineering (Aerospace Engineering)</td>
</tr>
<tr>
<td>Art, Design and Media</td>
<td>Bachelor of Fine Arts in Digital Animation</td>
</tr>
<tr>
<td></td>
<td>Bachelor of Fine Arts in Digital Filmmaking</td>
</tr>
<tr>
<td></td>
<td>Bachelor of Fine Arts in Photography and Digital Imaging</td>
</tr>
<tr>
<td></td>
<td>Bachelor of Fine Arts in Interactive Media</td>
</tr>
<tr>
<td></td>
<td>Bachelor of Fine Arts in Product Design</td>
</tr>
<tr>
<td></td>
<td>Bachelor of Fine Arts in Visual Communication</td>
</tr>
<tr>
<td>Arts (Education)</td>
<td>Bachelor of Arts (Education)</td>
</tr>
<tr>
<td>Bioengineering</td>
<td>Bachelor of Engineering (Bioengineering)</td>
</tr>
<tr>
<td>Biological Sciences</td>
<td>Bachelor of Science in Biological Sciences</td>
</tr>
<tr>
<td>Business</td>
<td>Bachelor of Business</td>
</tr>
<tr>
<td>Chemical and Biomolecular Engineering</td>
<td>Bachelor of Engineering (Chemical and Biomolecular Engineering)</td>
</tr>
<tr>
<td>Chemistry and Biological Chemistry</td>
<td>Bachelor of Science in Chemistry and Biological Chemistry</td>
</tr>
<tr>
<td>Chinese</td>
<td>Bachelor of Arts in Chinese</td>
</tr>
<tr>
<td>Civil Engineering</td>
<td>Bachelor of Engineering (Civil)</td>
</tr>
<tr>
<td>Communication Studies</td>
<td>Bachelor of Communication Studies</td>
</tr>
<tr>
<td>Computer Engineering</td>
<td>Bachelor of Engineering (Computer Engineering)</td>
</tr>
<tr>
<td>Computer Science</td>
<td>Bachelor of Engineering (Computer Science)</td>
</tr>
<tr>
<td>Economics</td>
<td>Bachelor of Arts in Economics</td>
</tr>
<tr>
<td>Electrical and Electronic Engineering</td>
<td>Bachelor of Engineering (Electrical and Electronic Engineering)</td>
</tr>
<tr>
<td>English</td>
<td>Bachelor of Arts in English</td>
</tr>
<tr>
<td>Environmental Engineering</td>
<td>Bachelor of Engineering (Environmental Engineering)</td>
</tr>
<tr>
<td>History</td>
<td>Bachelor of Arts in History</td>
</tr>
<tr>
<td>Information Engineering and Media</td>
<td>Bachelor of Engineering (Information Engineering and Media)</td>
</tr>
<tr>
<td>Linguistics and Multilingual Studies</td>
<td>Bachelor of Arts in Linguistics and Multilingual Studies</td>
</tr>
<tr>
<td>Maritime Studies</td>
<td>Bachelor of Science (Maritime Studies)</td>
</tr>
<tr>
<td>Materials Engineering</td>
<td>Bachelor of Engineering (Materials Engineering)</td>
</tr>
<tr>
<td>Mathematical Sciences</td>
<td>Bachelor of Science in Mathematical Sciences</td>
</tr>
<tr>
<td>Mathematics and Economics</td>
<td>Bachelor of Science in Mathematics and Economics</td>
</tr>
<tr>
<td>Mechanical Engineering</td>
<td>Bachelor of Engineering (Mechanical Engineering)</td>
</tr>
<tr>
<td>Physics and Applied Physics</td>
<td>Bachelor of Science in Applied Physics</td>
</tr>
<tr>
<td></td>
<td>Bachelor of Science in Physics</td>
</tr>
<tr>
<td>Psychology</td>
<td>Bachelor of Arts in Psychology</td>
</tr>
<tr>
<td>Science (Education)</td>
<td>Bachelor of Science (Education)</td>
</tr>
<tr>
<td>Sociology</td>
<td>Bachelor of Arts in Sociology</td>
</tr>
<tr>
<td>Sport Science and Management</td>
<td>Bachelor of Science (Sport Science and Management)</td>
</tr>
</tbody>
</table>
Single Degree Programmes (Part-Time)

<table>
<thead>
<tr>
<th>Programme</th>
<th>Degree Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td>Bachelor of Education</td>
</tr>
<tr>
<td>Electrical and Electronic Engineering</td>
<td>Bachelor of Engineering (Electrical and Electronic Engineering)</td>
</tr>
<tr>
<td>Mechanical Engineering</td>
<td>Bachelor of Engineering (Mechanical Engineering)</td>
</tr>
</tbody>
</table>

Double Degree Programmes (Full-Time)

Students in the double degree programmes (DDP) are awarded with a degree certificate for each of the two programmes. Under the DDP, some courses may be counted towards the requirements of both degrees, thus allowing a student to complete two degrees in a shorter period than it would take to complete them separately.

<table>
<thead>
<tr>
<th>Programme</th>
<th>Degree Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accountancy and Business</td>
<td>Bachelor of Accountancy</td>
</tr>
<tr>
<td>Biomedical Sciences and Chinese Medicine</td>
<td>Bachelor of Science in Biomedical Sciences Bachelor of Medicine (Chinese Medicine)</td>
</tr>
<tr>
<td>Business and Computing</td>
<td>Bachelor of Business</td>
</tr>
<tr>
<td>Business and Computer Engineering</td>
<td>Bachelor of Engineering (Computer Science)</td>
</tr>
<tr>
<td>Engineering* and Economics</td>
<td>Bachelor of Engineering*</td>
</tr>
</tbody>
</table>

Integrated Programmes (Full-Time)

Students in the integrated programmes are awarded with two degrees - a Bachelor's degree and a Master's degree.

<table>
<thead>
<tr>
<th>Programme</th>
<th>Degree Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer Engineering</td>
<td>Bachelor of Engineering (Computer Engineering)</td>
</tr>
<tr>
<td></td>
<td>Master of Science (Computer Science)*</td>
</tr>
<tr>
<td>Computer Science</td>
<td>Bachelor of Engineering (Computer Science)</td>
</tr>
<tr>
<td></td>
<td>Master of Science (Computer Science)*</td>
</tr>
<tr>
<td>Electrical and Electronic Engineering</td>
<td>Bachelor of Engineering (Electrical and Electronic Engineering)</td>
</tr>
<tr>
<td></td>
<td>Master of Science (Electrical and Computer Engineering)*</td>
</tr>
<tr>
<td>Renaissance Engineering Programme</td>
<td>Bachelor of Engineering Science*</td>
</tr>
<tr>
<td></td>
<td>Master of Science in Technology Management</td>
</tr>
</tbody>
</table>

* The Bachelor of Engineering Science degree awarded will be in the specific Engineering discipline
* The Master of Science degrees are awarded by the Georgia Institute of Technology
Degree Programmes and Requirements

Nanyang Business School
(College of Business)

(A) Bachelor of Accountancy programme
The Bachelor of Accountancy programme offered by the Nanyang Business School (NBS) is the most established and well-regarded Accountancy programme in Singapore and the region. We have a long tradition of training professional accountants for leadership roles as partners in accounting firms, chief financial officers of major corporations and managing directors of public and private companies. The majority of the top accountants in Singapore have been trained by us in the last 50 years.

The three-year direct honours Bachelor of Accountancy (B.Acc.) programme is recognised as a professional accounting qualification in Singapore by the Institute of Certified Public Accountants of Singapore and the Accounting and Corporate Regulatory Authority. It is accredited by CPA Australia and recognised by the Institute of Chartered Accountants in Australia and Institute of Chartered Accountants in England and Wales for entry into their respective programmes. Our degree is also accredited by the Association to Advance Collegiate Schools of Business (AACSB). We are among only nine schools in the world, outside of the US, to have the AACSB accreditation in Accounting.

Partnering with the top US accounting programme at the University of Illinois at Urbana-Champaign, we embarked on Project Discovery more than ten years ago, to radically transform the way that Accounting is taught. There is a greater focus on risk assessment, corporate governance and ethics, and integration of disciplines such as economics, finance, strategy, psychology and systems thinking into the understanding of Accounting. Active learning methods based on real-world cases and projects are emphasised to develop students’ critical thinking and communication skills.

With top Accounting professors teaching in the programme, up-to-date curriculum and pedagogical changes, coupled with the renowned rigour and high standards of our programme, we ensure that our students have the best Accountancy education available in this part of the world, and that our graduates are well prepared to meet the challenges of the new and global economy.

Curriculum structure
The curriculum for the B.Acc. programme comprises Business and core Accounting courses, a professional attachment and breadth courses which include General Education Requirements and unrestricted electives.

Business Courses
B.Acc. students are required to complete nine Business courses within the three-year direct honours programme.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB1101</td>
<td>Accounting I</td>
</tr>
<tr>
<td>AB1102</td>
<td>Accounting II</td>
</tr>
<tr>
<td>AB1201</td>
<td>Financial Management</td>
</tr>
<tr>
<td>AB1202</td>
<td>Statistical and Quantitative Methods</td>
</tr>
<tr>
<td>AB1301</td>
<td>Business Law</td>
</tr>
<tr>
<td>AB1501</td>
<td>Marketing</td>
</tr>
<tr>
<td>AB1401</td>
<td>Information Technology</td>
</tr>
<tr>
<td>AB1601</td>
<td>Organisational Behavior and Design</td>
</tr>
<tr>
<td>AB3601</td>
<td>Strategic Management</td>
</tr>
</tbody>
</table>

In addition to these nine business courses, students who have not passed or are not exempted from the Qualifying English Test for admission to the programme are required to read HW0001 English Proficiency.

Core Accounting Courses
Students are required to read nine core Accounting courses across their second and third years of study.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC2101</td>
<td>Accounting Measurement and Disclosure</td>
</tr>
<tr>
<td>AC2102</td>
<td>Accounting for Decision-Making and Control</td>
</tr>
<tr>
<td>AC2103</td>
<td>Risk Management, Control and Ethics</td>
</tr>
<tr>
<td>AC2301</td>
<td>Principles of Taxation</td>
</tr>
<tr>
<td>AC2302</td>
<td>Company Law</td>
</tr>
<tr>
<td>AC2401</td>
<td>Accounting Information Systems</td>
</tr>
<tr>
<td>AC3101</td>
<td>Assurance and Auditing</td>
</tr>
<tr>
<td>AC3102</td>
<td>Risk Reporting and Analysis</td>
</tr>
<tr>
<td>AC3103</td>
<td>Business Valuation and Analysis</td>
</tr>
</tbody>
</table>

Professional Attachment
NBS students pursue a professional attachment lasting eight or ten weeks at the end of their second year of study. This attachment is carefully crafted to be relevant and enriching, allowing our students to acquire first-hand practical experience and sharpen their skills in the industry. In addition to providing practical real-life work experience for our students to balance their academic training, NBS students also get to interact and network with professionals in the working environment, setting up valuable contacts necessary to give them the edge in the working world. The attachment often serves as an excellent opportunity for employers to assess our students and their quality, prior to making a permanent job offer to them, even before graduation.

General Education Requirements
Apart from the Business and Core courses and the professional attachment mentioned above, NBS students need to fulfill the following General Education Requirements (GER) to complete their programme:

(I) GER – Core

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB0901</td>
<td>Principles of Economics: A Singapore Perspective</td>
</tr>
<tr>
<td>AB0601</td>
<td>Communication Management Fundamentals</td>
</tr>
<tr>
<td>AB0602</td>
<td>Communication Management Strategies</td>
</tr>
</tbody>
</table>

In addition to the above three courses, students will also take a course in Environmental Sustainability in Year Two. The course will be chosen from a menu of Environmental Sustainability courses offered by the School.

(II) GER - Prescribed Electives (PE)
Students are required to take a prescribed elective course from each of the following areas:
- Liberal Studies (LS)
- Arts, Humanities and Social Sciences (AHSS)
- Science, Technology and Society (STS)

These courses offer breadth of study, enabling NBS students to understand and appreciate the broader issues and trends in areas of study relating to Liberal Studies, Arts, Humanities and Social Sciences and Science, Technology and Society, areas of which represent key fields broadly relevant to all professions.
Unrestricted Electives (UE)
The programme’s flexibility also allows students to pursue a variety of options for an enriching learning experience, thus ensuring that they are endowed with a wide set of skills and knowledge to meet the demands of the new economy.

Unrestricted electives available to NBS students under the broadening component include:

(I) Broad-based education options
Being a large comprehensive University, students enjoy many options for interdisciplinary learning and exposure. The flexibility of a well-designed curriculum which balances the in-depth disciplinary training in the respective fields of profession with broadening study enables students to pursue a variety of options outside their area of specialisation.

Under the broad-based and flexible framework of the Accountancy undergraduate programme, students can also obtain a minor under the University Minor Programme offered by other schools in areas such as Communications, Psychology, Entrepreneurship, Sports Management, etc. In addition, students may also choose to read electives offered by other schools from foreign languages, sciences, technology, communications, and humanities to arts, design, media and sports.

(II) Overseas exchange experience
Recognising the increasing importance of international exposure and the value of cross-cultural links and exchanges in today’s global economy, NBS students are encouraged to pursue a semester of study or work at one of NTU’s overseas partner universities under the GEM – Explorer. Short term study abroad opportunities GEM – Discoverer programme are also available.

(III) Second specialisation programme
The Second Specialisation programme offers students who are academically able the choice of obtaining a second specialisation in an area outside of their first specialisation to broaden their skill sets and knowledge, making them more attractive to employers.

Students in the Second Specialisation Programme (SSP) read the SSP courses in place of Unrestricted Electives (UEs) in the degree programme requirements.

Second specialisations may be pursued in these areas:
- Banking and Finance
- Business Law
- Economics
- Human Resource Consulting
- Information Technology
- Marketing

Curriculum Structure

Banking and Finance
(To complete four from a menu of courses)
Four courses to be chosen from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BF2201</td>
<td>Investments</td>
</tr>
<tr>
<td>BF2202</td>
<td>Mathematical Methods for Finance</td>
</tr>
<tr>
<td>BF2203</td>
<td>Management of Financial Institutions</td>
</tr>
<tr>
<td>BF2204</td>
<td>International Financial Management</td>
</tr>
<tr>
<td>BF2205</td>
<td>Equity Securities</td>
</tr>
<tr>
<td>BF2206</td>
<td>Wealth Planning</td>
</tr>
<tr>
<td>BF3201</td>
<td>Derivative Securities</td>
</tr>
<tr>
<td>BF3202</td>
<td>Fixed Income Securities</td>
</tr>
<tr>
<td>BF3203</td>
<td>Advanced Corporate Securities</td>
</tr>
<tr>
<td>BF3204</td>
<td>Financial Modeling</td>
</tr>
<tr>
<td>BF3205</td>
<td>Portfolio Management</td>
</tr>
<tr>
<td>BF3206</td>
<td>Financial Risk Management</td>
</tr>
<tr>
<td>BF3207</td>
<td>Alternative Investments</td>
</tr>
<tr>
<td>BF3208</td>
<td>Bank Financing &amp; Credit Risk Management</td>
</tr>
</tbody>
</table>

Business Law
(To take four courses comprising one compulsory core course and three prescribed electives)
One compulsory core course

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BL9301</td>
<td>Law of Commercial Transactions</td>
</tr>
</tbody>
</table>

Three prescribed electives to be chosen from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BL9302</td>
<td>Management of Intellectual Property and New Media</td>
</tr>
<tr>
<td>BL9303</td>
<td>Advanced Company Law</td>
</tr>
<tr>
<td>BL9304</td>
<td>Negotiation and Dispute Resolution</td>
</tr>
<tr>
<td>BL9305</td>
<td>Advanced Taxation</td>
</tr>
<tr>
<td>BH3301</td>
<td>Employment Law</td>
</tr>
</tbody>
</table>

Economics
Course requirements for a second major in Economics:
(To complete 11 courses comprising five compulsory core courses and six prescribed electives)
Five compulsory core courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB1202</td>
<td>Statistical Quantitative Methods</td>
</tr>
<tr>
<td>AB0901</td>
<td>Principles of Economics</td>
</tr>
<tr>
<td>HE2001</td>
<td>Intermediate Microeconomics</td>
</tr>
<tr>
<td>HE2002</td>
<td>Intermediate Macroeconomics</td>
</tr>
<tr>
<td>HE4010</td>
<td>Singapore Economy in a Globalized World</td>
</tr>
</tbody>
</table>

Prescribed electives - Choose four from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>HE1003</td>
<td>Basic Mathematics for Economists</td>
</tr>
<tr>
<td>HE2004</td>
<td>Introductory Econometrics</td>
</tr>
<tr>
<td>HE2005</td>
<td>International Trade</td>
</tr>
<tr>
<td>HE2006</td>
<td>International Monetary Economics</td>
</tr>
<tr>
<td>HE2007</td>
<td>Money and Banking</td>
</tr>
<tr>
<td>HE2008</td>
<td>Public Finance</td>
</tr>
<tr>
<td>HE2009</td>
<td>Industrial Organisation</td>
</tr>
<tr>
<td>HE2010</td>
<td>Development Economics</td>
</tr>
<tr>
<td>HE2011</td>
<td>Labour Economics and Labour Relations</td>
</tr>
<tr>
<td>HE2012</td>
<td>Economic Thought</td>
</tr>
<tr>
<td>HE2020</td>
<td>Survey Methods &amp; Sampling Techniques</td>
</tr>
<tr>
<td>HE3001</td>
<td>Mathematical Economics</td>
</tr>
<tr>
<td>HE3002</td>
<td>Game Theory &amp; Applications to Social Sciences</td>
</tr>
</tbody>
</table>
HE3003  The Chinese Economy
HE3004  Health Economics
HE3005  Environmental Economics
HE3006  Urban & Transport Economics
HE3007  Financial Economics
HE3010  Energy Economics
HE3011  Cost-Benefit Analysis
HE3020  Applied Econometrics
HE3022  Econometric Modelling & Forecasting

Prescribed electives - Choose two from the following:
HE4001  Advanced Microeconomics
HE4002  Advanced Macroeconomics
HE4003  Advanced International Finance
HE4004  Behavioural Economics
HE4005  Growth Theory and Empirics
HE4011  Current Topics in Economics
HE4020  Econometric Time Series Analysis

NBS students enjoy exemptions from HE1004A and HE9091 in lieu of their completion of AB1202 and AB0901 in the first year of study.

Human Resource Consulting
(To complete four courses comprising one compulsory core and three electives)
One compulsory core course
BH2601  Strategic Human Resource and Consulting

Three prescribed electives to be chosen from the following:
BH2602  Total Rewards Management
BH2603  Talent Sourcing & Acquisition
BH2604  Managing & Consulting through Research
BH3601  Talent Development & Management
BH3602  Performance Management & HR Merits
BH3603  Cultural Intelligence at Work
BH3301  Employment Law

Information Technology
(To complete four courses comprising one compulsory core course and three electives)
One compulsory core course
BC2402  Data Management and Business Intelligence

Three prescribed electives to be chosen from the following:
BC2403  Project and Vendor Management
BC2404  Financial Analytic and Reporting
BC2405  Decision Tools for Managers
BC3401  Enterprise Computing
BC3402  Information Systems in Financial Services
BC3403  Designing Strategic Networked Enterprises

Marketing
(To complete four compulsory courses as follows)
BM2501  Market Behaviour
BM2502  Market intelligence
BM2503  Market Relationships
BM3501  Marketing Strategy

(B) Bachelor of Business programme
The rigorous three-year Bachelor of Business (B.Bus.) honours programme is among the top undergraduate business programmes in Asia. The broad-based programme is innovatively designed to deliver both academic knowledge and the key competencies needed for peak performances in a dynamic and competitive business environment. The programme attracts the very best students in Singapore and the region and its graduates are sought after by major employers for their specialised knowledge and strong competencies in creative and critical thinking.

The programme is noted for these distinctive features:
- Relevance: Industry-relevant majors and professional attachments that prepare our students to contribute effectively to their future employers.
- Flexibility and choice: Students may take up options such as minors offered by other schools in NTU, overseas exchange programmes, or second specialisation.

A wide range of specialisations are available to best match students’ diverse aptitudes and interests:

Actuarial Science – The first of its kind in Asia since 1991, this specialisation is globally recognised with full accreditation from the Institute & Faculty of Actuaries, UK.

Banking and Finance – We are a Chartered Financial Analyst (CFA) Programme Partner and we offer the largest range of cutting-edge courses. Our students achieve a high degree of success in the Chartered Financial Analyst certification.

Human Resource Consulting – The only Human Resource Consulting specialisation in the Asia-Pacific region that prepares graduates to focus strategically on building and sustaining people as a critical source of competitive advantage.

Information Technology – With a state-of-the-art curriculum that combines rigorous IT competency with business domain knowledge, this unique programme produces IT-savvy professionals who are much sought after by businesses in Singapore and abroad.

Marketing – This highly interactive programme offers a curriculum with a strong global and Asian perspective, a practical orientation and an emphasis on thinking skills, imagination and creativity. Our highly-rated students go on to find jobs in virtually every industry.

Tourism and Hospitality Management – Designed in collaboration with the Singapore Tourism Board and major industry players in response to strong industry demand, this specialisation focuses on the high growth areas of business travel and events, attractions and integrated resorts management.
Curriculum Structure

The curriculum for the B.Bus. programme comprises foundational and advanced Business courses, a professional attachment and breadth courses which include General Education Requirements and unrestricted electives.

Business Courses
B.Bus. students are required to complete nine Business courses within the three-year direct honours programme.

- AB1101 Accounting I
- AB1102 Accounting II
- AB1201 Financial Management
- AB1202 Statistical and Quantitative Methods
- AB1301 Business Law
- AB1401 Information Technology
- AB1501 Marketing
- AB1601 Organisational Behavior and Design
- AB1601 Strategic Management

In addition to these nine business courses, students who have not passed or are not exempted from the Qualifying English Test for admission to the programme are required to read HW0001 English Proficiency.

Business Enhancement Courses
In addition, all Business students are to take three business enhancement courses as follows:

Two compulsory courses:
- BE1401 Business Operations and Processes
- BE2601 Principles of Management

The balance one core course can be chosen from the following menu:
- BE2501 International Business Environment
- BE3201 Entrepreneurial Finance
- BE3301 Commercial & Company Law

Specialisation Courses

Actuarial Science
Seven courses compulsory core courses

- BA2201 Actuarial Economics
- BA2202 Mathematics of Finance
- BA2203 Statistical Modelling
- BA2204 Models
- BA3201 Life Contingencies and Demography
- BA3202 Actuarial Statistics
- BA3203 Actuarial Aspects of Asset Valuation

The following courses are available as Unrestricted Electives for Actuarial Science students:
- BA2205 Actuarial Computing
- BA2206 Principles of Risk & Insurance
- BA3204 Actuarial Management
- BA3205 Property & Casualty Insurance
- BA3206 Insurer Operations & Financial Analysis

Actuarial Science majors who would like to obtain full professional exemptions from the Institute & Faculty of Actuaries (UK) will have to take the unrestricted electives BA2201 and BA3203.

Banking and Finance
To take six courses comprising two compulsory core courses and four specialisation prescribed electives.

Two compulsory core courses
- BF2201 Investments
- BF3201 Derivative Securities

Four specialisation prescribed electives to be chosen from the following:
- BF2202 Mathematical Methods of Finance
- BF2203 Management of Financial Institutions
- BF2204 International Financial Management
- BF2205 Equity Securities
- BF2206 Wealth Planning
- BF3202 Fixed Income Securities
- BF3203 Advanced Corporate Finance
- BF3204 Financial Modeling
- BF3205 Portfolio Management
- BF3206 Banking Financing and Credit Management
- BF3207 Alternative Investments
- BU8226 Financial Risk Management

Human Resource Consulting
To take six courses comprising one compulsory core course and five specialisation prescribed electives.

One compulsory core course
- BH2601 Strategic Human Resource and Consulting

Five specialisation prescribed electives to be chosen from the following:
- BH2602 Total Rewards Management
- BH2603 Talent Sourcing & Acquisition
- BH2604 Management & Consulting through Research
- BH3301 Talent Development & Management
- BH3601 Performance Management & HR Metrics
- BH3602 Cultural Intelligence at Work
- BH3603 Employment Law

Note: In view of the pre-requisites for the various HRC courses, HRC majors are strongly encouraged to read BH2601 Strategic Human Resource and Consulting in Year 2, Semester 1.

Information Technology
To take six courses comprising two compulsory core courses and four specialisation prescribed electives

Two compulsory core courses
- BC2401 Systems Analysis and Design
- BC2402 Data Management and Business Intelligence
Four specialisation prescribed electives to be chosen from the following:

- BC2403 Project and Vendor Management
- BC2404 Financial Analytics and Reporting
- BC2405 Decision Tools for Managers
- BC3401 Enterprise Computing
- BC3402 Information Systems in Financial Services
- BC3403 Designing Strategic Networked Enterprises

**Marketing**

To take six courses comprising four compulsory core courses and two specialisation prescribed electives.

Four compulsory core courses

- BM2501 Market Behavior
- BM2502 Market Intelligence
- BM2503 Market Relationships
- BM3501 Marketing Strategy

Two specialisation prescribed electives to be chosen from the following:

- BE2501 International Business Environment
- BM2504 Integrated Marketing Communications
- BM2505 Marketing Channels
- BM3502 Global Market Strategy
- BM3503 Retail Management
- BM3504 Sales Management
- BM3505 Services Marketing
- BM3506 Strategic Brand Management
- BT2501 Tourism & Hospitality Management
- BT3502 Tourism & Technology

**Tourism and Hospitality Management**

Six compulsory core courses

- BT2401 Revenue Management for Tourism & Hospitality
- BT2402 Service Operations Management for Tourism & Hospitality
- BT2504 Corporate Social Responsibility in Tourism & Hospitality
- BT2501 Tourism and Hospitality Management
- BT2502 Tourism & Hospitality Facility Management & Design
- BM3505 Services Marketing

**Professional Attachment**

NBS students pursue a professional attachment lasting eight or ten weeks at the end of their second year of study. This attachment is carefully crafted to be relevant and enriching, allowing our students to acquire first-hand practical experience and sharpen their skills in the industry. In addition to providing practical real-life work experience for our students to balance their academic training, NBS students also get to interact and network with professionals in the working environment, setting up valuable contacts necessary to give them the edge in the working world. The attachment often serves as an excellent opportunity for employers to assess our students and their quality, prior to making a permanent job offer to them, even before graduation.

**General Education Requirements**

Apart from the Business and Core courses and the professional attachment mentioned above, NBS students need to fulfill General Education Requirements (GER) to complete their programme:

**(I) GER - Core**

- AB0601 Communication Management Fundamentals
- AB0602 Communication Management Strategies
- AB0901 Principles of Economics: A Singapore Perspective

In addition to the above three courses, students will also take a course in Environmental Sustainability in Year Two. The course will be chosen from a menu of Environmental Sustainability courses offered by the School.

**(II) GER - Prescribed Electives (PE)**

Students are required to take a prescribed elective course from each of the following areas:

- Liberal Studies (LS)
- Arts, Humanities and Social Sciences (AHSS)
- Science, Technology and Society (STS)

These courses offer breadth of study, enabling NBS students to understand and appreciate the broader issues and trends in areas of study relating to Liberal Studies, Arts, Humanities and Social Sciences and Science, Technology and Society, areas of which represent key fields broadly relevant to all professions.

**Unrestricted Electives (UE)**

The programme’s flexibility also allows students to pursue a variety of options for an enriching learning experience, thus ensuring that they are endowed with a wide set of skills and knowledge to meet the demands of the new economy.

Unrestricted electives available to NBS students under the broadening component include:

**(I) Broad-based education options**

Being a large comprehensive University, students enjoy many options for interdisciplinary learning and exposure. The flexibility of a well-designed curriculum which balances the in-depth disciplinary training in the respective fields of profession with broadening study enables students to pursue a variety of options outside their area of specialisation.

Under the broad-based and flexible framework of the Business undergraduate programme, students can also obtain a minor under the University Minor Programme offered by other schools in areas such as Communications, Psychology, Entrepreneurship, Sports Management, etc.

In addition, students may also choose to read electives offered by other schools from foreign languages, sciences, technology, communications, and humanities to arts, design, media and sports.

**(II) Overseas exchange experience**

Recognising the increasing importance of international exposure and the value of cross-cultural links and exchanges in today’s global economy, NBS students are encouraged to pursue a semester of study or work at one of NTU’s overseas partner universities under the GEM – Explorer. Short term study abroad opportunities, GEM – Discoverer programme, are also available.
(III) Second specialisation programme
The Second Specialisation programme offers students who are academically able the choice of obtaining a second specialisation in an area outside of their first specialisation to broaden their skill sets and knowledge, making them more attractive to employers.

Students in the Second Specialisation Programme (SSP) read the SSP courses in place of Unrestricted Electives (UEs) in the degree programme requirements.

Second specialisations may be pursued in these areas:
- Banking and Finance
- Business Law
- Economics
- Human Resource Consulting
- Information Technology
- Marketing

Curriculum structure

Banking and Finance
(To complete four from a menu of courses)
Four courses to be chosen from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BF2201</td>
<td>Investments</td>
</tr>
<tr>
<td>BF2202</td>
<td>Mathematical Methods for Finance</td>
</tr>
<tr>
<td>BF2203</td>
<td>Management of Financial Institutions</td>
</tr>
<tr>
<td>BF2204</td>
<td>International Financial Management</td>
</tr>
<tr>
<td>BF2205</td>
<td>Equity Securities</td>
</tr>
<tr>
<td>BF2206</td>
<td>Wealth Planning</td>
</tr>
<tr>
<td>BF3201</td>
<td>Derivative Securities</td>
</tr>
<tr>
<td>BF3202</td>
<td>Fixed Income Securities</td>
</tr>
<tr>
<td>BF3203</td>
<td>Advanced Corporate Finance</td>
</tr>
<tr>
<td>BF3204</td>
<td>Financial Modeling</td>
</tr>
<tr>
<td>BF3205</td>
<td>Portfolio Management</td>
</tr>
<tr>
<td>BF3206</td>
<td>Bank Financing &amp; Credit Risk Management</td>
</tr>
<tr>
<td>BF3207</td>
<td>Alternative Investments</td>
</tr>
<tr>
<td>BF3208</td>
<td>Financial Risk Management</td>
</tr>
</tbody>
</table>

Business Law
(To complete four courses comprising two compulsory core courses and two prescribed electives)
Two compulsory core courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC2302</td>
<td>Company Law</td>
</tr>
<tr>
<td>BL9301</td>
<td>Law of Commercial Transactions</td>
</tr>
</tbody>
</table>

Two prescribed electives to be chosen from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BL9302</td>
<td>Management of Intellectual Property and New Media</td>
</tr>
<tr>
<td>BL9303</td>
<td>Advanced Company Law</td>
</tr>
<tr>
<td>BL9304</td>
<td>Negotiation and Dispute Resolution</td>
</tr>
<tr>
<td>BL9305</td>
<td>Advanced Taxation</td>
</tr>
<tr>
<td>BH3301</td>
<td>Employment Law</td>
</tr>
</tbody>
</table>

Economics
Course requirements for a second major in Economics:
(To complete 11 courses comprising five compulsory core courses and six prescribed electives)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB1202</td>
<td>Statistical Quantitative Methods</td>
</tr>
<tr>
<td>AB0901</td>
<td>Principles of Economics</td>
</tr>
<tr>
<td>HE2001</td>
<td>Intermediate Microeconomics</td>
</tr>
<tr>
<td>HE2002</td>
<td>Intermediate Macroeconomics</td>
</tr>
<tr>
<td>HE4010</td>
<td>Singapore Economy in a Globalized World</td>
</tr>
</tbody>
</table>

Prescribed electives - Choose four from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>HE1003</td>
<td>Basic Mathematics for Economists</td>
</tr>
<tr>
<td>HE2004</td>
<td>Introductory Econometrics</td>
</tr>
<tr>
<td>HE2005</td>
<td>International Trade</td>
</tr>
<tr>
<td>HE2006</td>
<td>International Monetary Economics</td>
</tr>
<tr>
<td>HE2007</td>
<td>Money and Banking</td>
</tr>
<tr>
<td>HE2008</td>
<td>Public Finance</td>
</tr>
<tr>
<td>HE2009</td>
<td>Industrial Organisation</td>
</tr>
<tr>
<td>HE2010</td>
<td>Development Economics</td>
</tr>
<tr>
<td>HE2011</td>
<td>Labour Economics and Labour Relations</td>
</tr>
<tr>
<td>HE2012</td>
<td>Economic Thought</td>
</tr>
<tr>
<td>HE2020</td>
<td>Survey Methods &amp; Sampling Techniques</td>
</tr>
<tr>
<td>HE3001</td>
<td>Mathematical Economics</td>
</tr>
<tr>
<td>HE3002</td>
<td>Game Theory &amp; Applications to Social Sciences</td>
</tr>
<tr>
<td>HE3003</td>
<td>The Chinese Economy</td>
</tr>
<tr>
<td>HE3004</td>
<td>Health Economics</td>
</tr>
<tr>
<td>HE3005</td>
<td>Environmental Economics</td>
</tr>
<tr>
<td>HE3006</td>
<td>Urban &amp; Transport Economics</td>
</tr>
<tr>
<td>HE3007</td>
<td>Financial Economics</td>
</tr>
<tr>
<td>HE3010</td>
<td>Energy Economics</td>
</tr>
<tr>
<td>HE3011</td>
<td>Cost-Benefit Analysis</td>
</tr>
<tr>
<td>HE3020</td>
<td>Applied Econometrics</td>
</tr>
<tr>
<td>HE3022</td>
<td>Econometric Modeling &amp; Forecasting</td>
</tr>
</tbody>
</table>

Prescribed electives - Choose two from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>HE4001</td>
<td>Advanced Microeconomics</td>
</tr>
<tr>
<td>HE4002</td>
<td>Advanced Macroeconomics</td>
</tr>
<tr>
<td>HE4003</td>
<td>Advanced International Finance</td>
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<td>HE4004</td>
<td>Behavioural Economics</td>
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<td>HE4005</td>
<td>Growth Theory and Empirics</td>
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<td>HE4011</td>
<td>Current Topics in Economics</td>
</tr>
<tr>
<td>HE4020</td>
<td>Econometric Time Series Analysis</td>
</tr>
</tbody>
</table>

NBS students enjoy exemptions from HE1004A and HE9091 in lieu of their completion of AB1202 and AB0901 in the first year of study.
Human Resource Consulting
(To complete four courses comprising one compulsory core &
three electives)

One compulsory core course

BH2601 Strategic Human Resource and Consulting

Three prescribed electives to be chosen from the following:

BH2602 Total Rewards Management
BH2603 Talent Sourcing & Acquisition
BH2604 Managing & Consulting through Research
BH3301 Employment Law
BH3601 Talent Development & Management
BH3602 Performance Management & HR Metrics
BH3603 Cultural Intelligence at Work

Information Technology
(To complete four courses comprising two compulsory core
courses and two prescribed electives)

Two compulsory core courses

BC2401 Systems Analysis & Design
BC2402 Data Management and Business Intelligence

Two prescribed electives to be chosen from the following:

BC2403 Project and Vendor Management
BC2404 Financial Analytics and Reporting
BC2405 Decision Tools for Managers
BC3401 Enterprise Computing
BC3402 Information Systems in Financial Services
BC3403 Designing Strategic Networked Enterprises

Marketing
(To complete four compulsory courses)

BM2501 Market Behaviour
BM2502 Market Intelligence
BM2503 Market Relationships
BM3501 Marketing Strategy

(C) Double Degree in Accountancy
and Business programme

The synergy between Accountancy and Business is widely appreciated in an increasingly complex business environment. The Double Degree in Accountancy and Business leverages this synergy to equip graduates with multiple sets of skills and knowledge to meet the challenges of the new economy.

Graduates who are well-versed in both Accountancy and Business are set to thrive in today’s vibrant and global business environment. Also, armed with a dual set of skills, graduates will command higher marketability and enjoy wider career options upon graduation.

Curriculum structure

The curriculum for the Double Degree Programme comprises Business and Accounting courses, a professional attachment, and breadth courses which include General Education Requirements and unrestricted electives.

Nine Business courses

Students are required to complete nine business courses in the course of the programme.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB1101</td>
<td>Accounting I</td>
</tr>
<tr>
<td>AB1102</td>
<td>Accounting II</td>
</tr>
<tr>
<td>AB1201</td>
<td>Financial Management</td>
</tr>
<tr>
<td>AB1202</td>
<td>Statistical and Quantitative Methods</td>
</tr>
<tr>
<td>AB1301</td>
<td>Business Law</td>
</tr>
<tr>
<td>AB1401</td>
<td>Information Technology</td>
</tr>
<tr>
<td>AB1501</td>
<td>Marketing</td>
</tr>
<tr>
<td>AB1601</td>
<td>Organisational Behavior and Design</td>
</tr>
<tr>
<td>AB3601</td>
<td>Strategic Management</td>
</tr>
</tbody>
</table>

In addition to these nine business courses, students who have not passed or are not exempted from the Qualifying English Test for admission to the programme are required to read HW0001 English Proficiency.

Accounting Core Courses

Nine Accounting core courses are read by students across the second, third and fourth year of study.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC2101</td>
<td>Accounting Measurement and Disclosure</td>
</tr>
<tr>
<td>AC2102</td>
<td>Accounting for Decision-Making and Control</td>
</tr>
<tr>
<td>AC2103</td>
<td>Risk Management, Control and Ethics</td>
</tr>
<tr>
<td>AC2301</td>
<td>Principles of Taxation</td>
</tr>
<tr>
<td>AC2302</td>
<td>Company Law</td>
</tr>
<tr>
<td>AC2401</td>
<td>Accounting Information Systems</td>
</tr>
<tr>
<td>AC3101</td>
<td>Assurance and Auditing</td>
</tr>
<tr>
<td>AC3102</td>
<td>Risk Reporting and Analysis</td>
</tr>
<tr>
<td>AC3103</td>
<td>Business Valuation and Analysis</td>
</tr>
</tbody>
</table>

Business Enhancement Courses

Students are to take three business enhancement courses, as follows:

Two compulsory courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BE1401</td>
<td>Business Operations and Processes</td>
</tr>
<tr>
<td>BE2601</td>
<td>Principles of Management</td>
</tr>
</tbody>
</table>

The balance one core course can be chosen from the following menu:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BE2501</td>
<td>International Business Environment</td>
</tr>
<tr>
<td>BE3201</td>
<td>Entrepreneurial Finance</td>
</tr>
<tr>
<td>BE3301</td>
<td>Commercial &amp; Company Law</td>
</tr>
</tbody>
</table>

Business Specialisation Courses

A wide range of specialisations are available to best match students’ diverse aptitudes and interests. Double Degree students will have the opportunity to specialise in one of the following six business specialisations at the end of their first year of study by choice and academic merit:

Actuarial Science – The first of its kind in Asia since 1991, this specialisation is globally recognised with accreditation from the Institute of Actuaries, UK.
Banking and Finance – Offers the largest range of cutting-edge courses. Our students achieve a high degree of success in the Chartered Financial Analyst certification.

Human Resource Consulting – The only Human Resource Consulting specialisation in the Asia-Pacific region that prepares graduates to focus strategically on building and sustaining people as a critical source of competitive advantage.

Information Technology – With a state-of-the-art curriculum that combines rigorous IT competency with business domain knowledge, this unique programme produces IT-savvy professionals who are much sought after by businesses in Singapore and abroad.

Marketing – This highly interactive programme offers a curriculum with a strong global and Asian perspective, a practical orientation and an emphasis on thinking skills, imagination and creativity. Our highly-rated students go on to find jobs in virtually every industry.

Tourism and Hospitality Management – Designed in collaboration with the Singapore Tourism Board and major industry players in response to strong industry demand, this major focuses on the high growth areas of business travel and events, attractions and integrated resorts management.

Details of the specialisation courses are as follows:

**Actuarial Science**
To take seven courses comprising five compulsory core courses and two specialisation prescribed electives.

Seven courses compulsory core courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BA2201</td>
<td>Actuarial Economics</td>
</tr>
<tr>
<td>BA2202</td>
<td>Mathematics of Finance</td>
</tr>
<tr>
<td>BA2203</td>
<td>Statistical Modelling</td>
</tr>
<tr>
<td>BA2204</td>
<td>Models</td>
</tr>
<tr>
<td>BA3201</td>
<td>Life Contingencies and Demography</td>
</tr>
<tr>
<td>BA3202</td>
<td>Actuarial Statistics</td>
</tr>
<tr>
<td>BA3203</td>
<td>Actuarial Aspects of Asset Valuation</td>
</tr>
</tbody>
</table>

The following courses are available as Unrestricted Electives for Actuarial Science students:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BA2205</td>
<td>Actuarial Computing</td>
</tr>
<tr>
<td>BA2206</td>
<td>Principles of Risk &amp; Insurance</td>
</tr>
<tr>
<td>BA3204</td>
<td>Actuarial Management</td>
</tr>
<tr>
<td>BA3205</td>
<td>Property &amp; Casualty Insurance</td>
</tr>
<tr>
<td>BA3206</td>
<td>Insurer Operations &amp; Financial Analysis</td>
</tr>
</tbody>
</table>

Actuarial Science majors who would like to obtain full professional exemptions from the Institute & Faculty of Actuaries (UK) will have to take the unrestricted electives BA2201 and BA3203.

Banking and Finance
To take six courses comprising two compulsory core courses and four specialisation prescribed electives.

Two compulsory core courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BF2201</td>
<td>Investments</td>
</tr>
<tr>
<td>BF3201</td>
<td>Derivative Securities</td>
</tr>
</tbody>
</table>

Four specialisation prescribed electives to be chosen from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BF2202</td>
<td>Mathematical Methods of Finance</td>
</tr>
<tr>
<td>BF2203</td>
<td>Management of Financial Institutions</td>
</tr>
<tr>
<td>BF2204</td>
<td>International Financial Management</td>
</tr>
<tr>
<td>BF2205</td>
<td>Equity Securities</td>
</tr>
<tr>
<td>BF2206</td>
<td>Wealth Planning</td>
</tr>
<tr>
<td>BF3202</td>
<td>Fixed Income Securities</td>
</tr>
<tr>
<td>BF3203</td>
<td>Advanced Corporate Finance</td>
</tr>
<tr>
<td>BU8226</td>
<td>Financial Risk Management</td>
</tr>
<tr>
<td>BF3205</td>
<td>Portfolio Management</td>
</tr>
<tr>
<td>BF3204</td>
<td>Banking Financing and Credit Management</td>
</tr>
<tr>
<td>BF3207</td>
<td>Alternative Investments</td>
</tr>
</tbody>
</table>

Human Resource Consulting
To take six courses comprising one compulsory core course and five specialisation prescribed electives.

One compulsory core course

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BH2601</td>
<td>Strategic Human Resource and Consulting</td>
</tr>
</tbody>
</table>

Five specialisation prescribed electives to be chosen from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BH2602</td>
<td>Total Rewards Management</td>
</tr>
<tr>
<td>BH2603</td>
<td>Talent Sourcing &amp; Acquisition</td>
</tr>
<tr>
<td>BH2604</td>
<td>Management &amp; Consulting through Research</td>
</tr>
<tr>
<td>BH3301</td>
<td>Employment Law</td>
</tr>
<tr>
<td>BH3601</td>
<td>Talent Development &amp; Management</td>
</tr>
<tr>
<td>BH3602</td>
<td>Performance Management &amp; HR Metrics</td>
</tr>
<tr>
<td>BH3603</td>
<td>Cultural Intelligence at Work</td>
</tr>
</tbody>
</table>

Note: In view of the pre-requisites for the various HRC courses, HRC majors are strongly encouraged to read BH2601 Strategic Human Resource and Consulting in Year 2, Semester 1.

Information Technology
To take six courses comprising two compulsory core courses and four specialisation prescribed electives.

Two compulsory core courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC2401</td>
<td>Systems Analysis and Design</td>
</tr>
<tr>
<td>BC2402</td>
<td>Data Management and Business Intelligence</td>
</tr>
</tbody>
</table>

Four specialisation prescribed electives to be chosen from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC2403</td>
<td>Project and Vendor Management</td>
</tr>
<tr>
<td>BC2404</td>
<td>Financial Analytics and Reporting</td>
</tr>
<tr>
<td>BC2405</td>
<td>Decision Tools for Managers</td>
</tr>
<tr>
<td>BC3401</td>
<td>Enterprise Computing</td>
</tr>
<tr>
<td>BC3402</td>
<td>Information Systems in Financial Services</td>
</tr>
<tr>
<td>BC3403</td>
<td>Designing Strategic Networked Enterprises</td>
</tr>
</tbody>
</table>
Marketing
To take six courses comprising four compulsory core courses and two specialisation prescribed electives.

BM2501 Market Behavior
BM2502 Market Intelligence
BM2503 Market Relationships
BM3501 Marketing Strategy

Two specialisation prescribed electives to be chosen from the following:

BE2501 International Business Environment
BM2504 Integrated Marketing Communications
BM2505 Marketing Channels
BM3502 Global Market Strategy
BM3503 Retail Management
BM3504 Sales Management
BM3505 Services Marketing
BM3506 Strategic Brand Management
BT2501 Tourism & Hospitality Management
BT3502 Tourism & Technology

Tourism and Hospitality Management
To take six compulsory core courses

BM3505 Services Marketing
BT2401 Revenue Management for Tourism & Hospitality
BT2402 Service Operations Management for Tourism & Hospitality
BT2501 Tourism and Hospitality Management
BT2502 Tourism & Hospitality Facility Management & Design
BT2504 Corporate Social Responsibility in Tourism & Hospitality

Professional Attachment
NBS students pursue a professional attachment lasting eight or ten weeks at the end of their second year of study. This attachment is carefully crafted to be relevant and enriching, allowing our students to acquire first-hand practical experience and sharpen their skills in the industry. In addition to providing practical real-life work experience for our students to balance their academic training, NBS students also get to interact and network with professionals in the working environment, setting up valuable contacts necessary to give them the edge in the working world. The attachment often serves as an excellent opportunity for employers to assess our students and their quality, prior to making a permanent job offer to them, even before graduation.

General Education Requirements
Apart from the Business and Core courses and the professional attachment mentioned above, NBS students need to fulfill General Education Requirements (GER) to complete their programme:

(I) GER - Core
AB0601 Communication Management Fundamentals
AB0602 Communication Management Strategies
AB0901 Principles of Economics: A Singapore Perspective*

* This course will also cover topics on Singapore Studies.

In addition to the above three courses, students will also take a course in Environmental Sustainability in Year Two. The course will be chosen from a menu of Environmental Sustainability courses offered by the School.

GER – Prescribed Electives (PE)
Students are required to take one prescribed elective course from each of the following areas:

• Liberal Studies (LS)
• Arts, Humanities and Social Sciences (AHSS)
• Science, Technology and Society (STS)

These courses offer breadth of study, enabling NBS students to understand and appreciate the broader issues and trends in areas of study relating to Liberal Studies, Arts, Humanities and Social Sciences and Science, Technology and Society, areas of which represent key fields broadly relevant to all professions.

Unrestricted Electives (UE)
The programme’s flexibility also allows students to pursue a variety of options for an enriching learning experience, thus ensuring that they are endowed with a wide set of skills and knowledge to meet the demands of the new economy.

Unrestricted electives available under the broadening component include:

(I) Broad-based education options
Being a large comprehensive University, students enjoy many options for interdisciplinary learning and exposure. The flexibility of a well-designed curriculum which balances the in-depth disciplinary training in the respective fields of profession with broadening study enables students to pursue a variety of options outside their area of specialisation.

Under the broad-based and flexible framework of the double degree undergraduate programme, students can also obtain a minor under the University Minor Programme offered by other schools in areas such as Communications, Psychology, Entrepreneurship, Sports Management, etc.

In addition, students may also choose to read electives offered by other schools from foreign languages, sciences, technology, communications, and humanities to arts, design, media and sports.

(II) Overseas exchange experience
Recognising the increasing importance of international exposure and the value of cross-cultural links and exchanges in today’s global economy, NBS students are encouraged to pursue a semester of study or work at one of NTU’s overseas partner universities under the GEM – Explorer. Short term study abroad opportunities, GEM – Discoverer programm, are also available.

Description of Courses
For visitors and prospective students: Please visit our website at http://www.nbs.ntu.edu.sg/PROSPECTIVESTUDENTS/UNDERGRAD/Pages/Home.aspx for more information.
College of Engineering
Undergraduate Study
The College of Engineering offers the following undergraduate programmes:

• Bachelor of Engineering programmes

In one of the following majors:
Δ Aerospace Engineering
Δ BioEngineering
Δ Chemical and Biomolecular Engineering
Δ Civil Engineering ^
Δ Computer Engineering
Δ Computer Science
Δ Electrical and Electronic Engineering ^
Δ Environmental Engineering ^
Δ Information Engineering and Media
Δ Materials Engineering
Δ Mechanical Engineering ^
Δ Engineering with Business Minor
  (Applicable to all single Engineering degree programmes listed above)

^ Students may select this major at the point of admission or after one semester of studies. In all cases, admission and streaming into an engineering major will be merit-based.

• Bachelor of Science programme
Δ Maritime Studies

• Double Major programme
Δ Maritime Studies and Business

• Double Degree programmes
Δ Computer Science and Business
Δ Computer Engineering and Business
Δ Engineering (in a specific engineering major) and Economics

• NTU-Georgia Tech Integrated programmes
Δ B.Eng and MS (Computer Engineering)
Δ B.Eng and MS (Computer Science)
Δ B.Eng and MS (Electrical and Computer Engineering)

• Double Degree programmes
  (Applicable to all single Engineering degree programmes listed above)
Δ Engineering (in a specific engineering major) and Economics

Description of Courses
Please visit our website at http://coe.ntu.edu.sg/CurrentStudents/UndergraduateProgrammes/Pages/default.aspx for more information on our courses.

School of Chemical and Biomedical Engineering

Bachelor of Engineering
(Chemical and Biomolecular Engineering)
The programme amalgamates principles of chemical engineering and life sciences (biology, biochemistry and genetics) to facilitate the development of safe, profitable and environmental-friendly processes for the synthesis and manufacture of products from chemical / biological raw materials.

Curriculum structure of B.Eng. (CBE)
The total number of AUs required in the B.Eng. (CBE) programme to qualify for graduation is 138 AUs. Students are to fulfill the specified AUs requirement in the B.Eng. (CBE) programme, according to the broad groups of courses in the curriculum structure indicated below:

(a) General Education Requirement (GER)
The first group of courses is collectively called the “GER” and consists of 42 AUs for adequate grounding in broad cross-disciplinary areas the Engineering Majors. Students are to fulfill the GER in the following manner:

(i) Core Courses (12 AUs)
Effective Communication (2 AUs)
Technical Communication (2 AUs)
Professional Communication (2 AUs)
Environmental Sustainability (3 AUs)
Engineers and Society (3 AUs)

(ii) Prescribed Electives (15 AUs)
GER Prescribed Electives are classified under four areas of interests. Students are to satisfy their choices of courses according to specified AUs per area as follow:

a) Arts, Humanities and Social Sciences (3 AUs)
b) Management and Business (3 AUs)
c) Science, Technology and Society (3 AUs)
d) Liberal Studies (3 AUs)
e) Any areas of the above (3 AUs)

(iii) Unrestricted Electives (15 AUs)
Students are to elect 15 AUs of Unrestricted Electives from the wide selection of courses available in the University. This includes courses in Minor programmes, technical electives related to Engineering Majors (including CBE prescribed electives), and any other courses offered by other Majors.

(b) Engineering Major’s Requirement
Students are required to take 87 AUs of CBE core courses and 9 AUs of CBE Prescribed Electives from the current three specialisation areas (namely Pharmaceutical Engineering, Biotechnology and Therapeutic Engineering, and Nanotechnology and Green Processing). A student can elect to be classified under a specialisation area if he/she takes three CBE Prescribed Electives (9 AUs) under a particular specialisation area. It is not necessary to have a specialisation area to meet graduation requirements.

Bachelor of Engineering (Bioengineering)
The programme trains students in the blended field of modern biology with engineering advances information technology, electronics, communications and materials to develop new engineering approaches and tools for biomedical applications.
Curriculum structure of B.Eng. (BIE)
The total number of AUs required in the B.Eng. (BIE) programme to qualify for graduation is 138 AUs. Students are to fulfill the specified AUs requirement in the B.Eng. (BIE) programme, according to the broad groups of courses in the curriculum structure indicated below:

(a) General Education Requirement (GER)
The first group of courses is collectively called the “GER” and consists of 42 AUs for adequate grounding in broad cross-disciplinary areas beyond the Engineering Majors. Students are to fulfill the GER in the following manner:

(i) Core Courses (12 AUs)
- Effective Communication (2 AUs)
- Technical Communication (2 AUs)
- Professional Communication (2 AUs)
- Environmental Sustainability (3 AUs)
- Engineers and Society (3 AUs)

(ii) Prescribed Electives (15 AUs)
GER Prescribed Electives are classified under four areas of interests. Students are to satisfy their choices of courses according to specified AUs per area as follow:

a) Arts, Humanities and Social Sciences (3 AUs)
b) Management and Business (3 AUs)
c) Science, Technology and Society (3 AUs)
d) Liberal Studies (3 AUs)
e) Any areas of the above (3 AUs)

(iii) Unrestricted Electives (15 AUs)
Students are to elect 15 AUs of Unrestricted Electives from the wide selection of courses available in the University. This includes courses in Minor programmes, technical electives related to Engineering Majors (including BIE prescribed electives), and any other courses offered by other Majors.

(b) Engineering Major’s Requirement
Students are required to take 87 AUs of BIE core courses and 9 AUs of BIE Prescribed Electives from the current two specialisation areas (namely Bioinstrumental and Bioelectronics, and Biomaterials and Tissue Engineering).

Description of Courses
Please visit our website at http://www.scbe.ntu.edu.sg/Current Students/Pages/default.aspx for the information on Description of Courses.

School of Civil and Environmental Engineering

(1) Division of Environmental and Water Resources Engineering
The Division of Environmental and Water Resources Engineering engages in cutting edge research in a broad spectrum of environment and water related areas. The main focus is on upstream R&D and development of novel technologies for both national and regional needs. Areas of research include water reclamation, water resources management, waste recovery and reuse, environmental biotechnology, environmental remediation, coastal management, environmental hydraulics and sediment transport.

(2) Division of Infrastructure Systems and Maritime Studies
The Division of Infrastructure Systems and Maritime Studies was formed on 1 November 2005 in line with the integrated system approach to civil engineering. The Division consists of faculty members specialising in Project Finance and Management, Geotechnical Engineering, Transportation Engineering, Spatial Information and Maritime. These areas encompass the development of key infrastructure systems in a global city: land development and improvement, transport system, logistics system, port and airport.

(3) Division of Structures and Mechanics
In the Division of Structures and Mechanics, the research focuses are on Structural Dynamics and Seismic Engineering, Structural Connections, Protective Technology, Computational Mechanics, Concrete and Building Technology and Fire Engineering. Our faculty also actively support in the research programmes of the Protective Technology Research Centre, Institute of Catastrophe Risk Management and Earth Observatory of Singapore.

Degree Programmes and Requirements
Bachelor of Engineering in Civil Engineering

<table>
<thead>
<tr>
<th>Course code and title</th>
<th>AUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>MH1810 Mathematics I</td>
<td>3</td>
</tr>
<tr>
<td>FE1008 Computing</td>
<td>3</td>
</tr>
<tr>
<td>PH1011 Physics</td>
<td>3</td>
</tr>
<tr>
<td>HW0110 Effective Communication</td>
<td>2</td>
</tr>
<tr>
<td>GER Elective - AHSS</td>
<td>3</td>
</tr>
<tr>
<td>FE1073 Introduction to Engineering &amp; Practices</td>
<td>1</td>
</tr>
<tr>
<td>MH1811 Mathematics II</td>
<td>3</td>
</tr>
<tr>
<td>CV0001 Civil Engineering and Subsustainable Built Environment</td>
<td>3</td>
</tr>
<tr>
<td>CV1011 Mechanics of Materials</td>
<td>4</td>
</tr>
<tr>
<td>CV1012 Fluid Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>CV1013 Civil Engineering Materials</td>
<td>3</td>
</tr>
<tr>
<td>CV1711 Civil Engineering Drawing</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total AUs</strong></td>
<td><strong>32</strong></td>
</tr>
</tbody>
</table>

GER: General Education Requirement
GER Elective – AHSS (Arts, Humanities & Social Sciences)

Students with only GCE ‘O’ level Physics qualification are required to take FE1012 Physics A (4AUs)

Students who have not passed or are not exempted from the Qualifying English Test are required to take HW0001 English Proficiency (6AUs)
Year 2 Semester 1

<table>
<thead>
<tr>
<th>Course code and title</th>
<th>AUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>CV2011 Structural Analysis I</td>
<td>3</td>
</tr>
<tr>
<td>CV2013 Engineering Geology &amp; Soil Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>CV2015 Hydraulics</td>
<td>3</td>
</tr>
<tr>
<td>CV2018 Probability &amp; Statistics</td>
<td>3</td>
</tr>
<tr>
<td>CV2711 Civil Engineering Laboratory A</td>
<td>1</td>
</tr>
<tr>
<td>HW0210 Technical Communication</td>
<td>2</td>
</tr>
<tr>
<td>Free Elective</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total AUs</strong></td>
<td><strong>18</strong></td>
</tr>
</tbody>
</table>

GER: General Education Requirement
Free Elective

Year 2 Semester 2

<table>
<thead>
<tr>
<th>Course code and title</th>
<th>AUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>CV2012 Structural Analysis II</td>
<td>3</td>
</tr>
<tr>
<td>CV2014 Geotechnical Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CV2016 Hydrology</td>
<td>3</td>
</tr>
<tr>
<td>CV2019 Matrix Algebra &amp; Computational Methods</td>
<td>3</td>
</tr>
<tr>
<td>CV2712 Civil Engineering Laboratory B</td>
<td>1</td>
</tr>
<tr>
<td>Free Elective</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total AUs</strong></td>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

GER: General Education Requirement
Free Elective

Year 3 Semester 1

<table>
<thead>
<tr>
<th>Course code and title</th>
<th>AUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>CV3011 Reinforced Concrete Design</td>
<td>3</td>
</tr>
<tr>
<td>CV3013 Foundation Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CV3014 Transportation Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CV3015 Environmental Engineering</td>
<td>3</td>
</tr>
<tr>
<td>HW0310 Professional Communication</td>
<td>2</td>
</tr>
<tr>
<td>GER Elective - LS</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total AUs</strong></td>
<td><strong>17</strong></td>
</tr>
</tbody>
</table>

GER: General Education Requirement
GER Elective – LS (Liberal Studies)

Year 3 Semester 2

<table>
<thead>
<tr>
<th>Course code and title</th>
<th>AUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>CV3012 Steel Design</td>
<td>3</td>
</tr>
<tr>
<td>CV3016 Construction Technology &amp; Processes</td>
<td>3</td>
</tr>
<tr>
<td>Free Elective</td>
<td>3</td>
</tr>
<tr>
<td>GER Elective - STS</td>
<td>3</td>
</tr>
<tr>
<td>GER Elective</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total AUs</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

GER: General Education Requirement
GER Elective – STS (Science, Technology & Society)
GER Elective – can be taken from any category of AHSS, BM, LS or STS
Free Elective

Year 3 Special Semester

<table>
<thead>
<tr>
<th>Course code and title</th>
<th>AUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>CV3912 Industrial Orientation</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total AUs</strong></td>
<td><strong>4</strong></td>
</tr>
</tbody>
</table>

Year 4 Semester 1

<table>
<thead>
<tr>
<th>Course code and title</th>
<th>AUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>CV0002 Engineers &amp; Society</td>
<td>3</td>
</tr>
<tr>
<td>CV4011 Project Planning &amp; Management</td>
<td>3</td>
</tr>
<tr>
<td>CV4711 Seminars &amp; Site Visits</td>
<td>1</td>
</tr>
<tr>
<td>CV4911 Final Year Project</td>
<td>4</td>
</tr>
<tr>
<td>GER Elective - BM</td>
<td>3</td>
</tr>
<tr>
<td>CV4XXX Specialisation Course / Core Elective</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total AUs</strong></td>
<td><strong>17</strong></td>
</tr>
</tbody>
</table>

GER: General Education Requirement
GER Elective – BM (Business & Management)

Year 4 Semester 2

<table>
<thead>
<tr>
<th>Course code and title</th>
<th>AUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>CV4911 Final Year Project</td>
<td>4</td>
</tr>
<tr>
<td>CV4912 Integrated Design Project</td>
<td>3</td>
</tr>
<tr>
<td>CV4XXX Specialisation Course / Core Elective</td>
<td>3</td>
</tr>
<tr>
<td>CV4XXX Specialisation Course / Core Elective</td>
<td>3</td>
</tr>
<tr>
<td>Free Elective</td>
<td>3</td>
</tr>
<tr>
<td>Free Elective</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total AUs</strong></td>
<td><strong>19</strong></td>
</tr>
<tr>
<td><strong>Grand Total (Year 1 to 4)</strong></td>
<td><strong>138</strong></td>
</tr>
</tbody>
</table>

GER: General Education Requirement
Free Elective

List of Core Electives (Specialisation Course) of Degree of Bachelor in Civil Engineering (B.Eng.)

Year 4: Core Electives

<table>
<thead>
<tr>
<th>Course code and title</th>
<th>AUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>CV4101 Structural Analysis III</td>
<td>3</td>
</tr>
<tr>
<td>CV4102 Advanced Steel Design</td>
<td>3</td>
</tr>
<tr>
<td>CV4103 Offshore Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CV4104 Bridge Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CV4105 Prestressed Concrete</td>
<td>3</td>
</tr>
<tr>
<td>CV4106 Construction Law &amp; Dispute Resolution</td>
<td>3</td>
</tr>
<tr>
<td>CV4107 Engineering Economics and Finance</td>
<td>3</td>
</tr>
<tr>
<td>CV4108 IT in Engineering Construction</td>
<td>3</td>
</tr>
<tr>
<td>CV4109 Advanced Foundation Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CV4110 Excavation &amp; Retaining Wall</td>
<td>3</td>
</tr>
<tr>
<td>CV4111 Ground Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CV4112 Traffic Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CV4113 Highway Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CV4114 Airport Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CV4115 Applied Hydrology</td>
<td>3</td>
</tr>
<tr>
<td>CV4116 Coastal Engineering</td>
<td>3</td>
</tr>
<tr>
<td>EN2003 Water Supply Engineering</td>
<td>3</td>
</tr>
<tr>
<td>EN3001 Solid &amp; Hazardous Waste Management</td>
<td>3</td>
</tr>
<tr>
<td>EN3002 Wastewater Engineering</td>
<td>3</td>
</tr>
<tr>
<td>EN3004 Air Pollution Control Engineering</td>
<td>3</td>
</tr>
<tr>
<td>EN4101 Surface Water Quality</td>
<td>3</td>
</tr>
<tr>
<td>EN4104 Environmental Hydraulics</td>
<td>3</td>
</tr>
</tbody>
</table>

GER: General Education Requirement
GER Elective – BM (Business & Management)
**Bachelor of Engineering in Environmental Engineering**

### Year 1 Semesters 1 & 2

<table>
<thead>
<tr>
<th>Course code and title</th>
<th>AUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>MH1810 Mathematics I</td>
<td>3</td>
</tr>
<tr>
<td>FE1008 Computing</td>
<td>3</td>
</tr>
<tr>
<td>PH1011 Physics</td>
<td>3</td>
</tr>
<tr>
<td>HW0110 Effective Communication</td>
<td>2</td>
</tr>
<tr>
<td>GER Elective - AHSS</td>
<td>3</td>
</tr>
<tr>
<td>FE1073 Introduction to Engineering &amp; Practices</td>
<td>1</td>
</tr>
<tr>
<td>MH1811 Mathematics II</td>
<td>3</td>
</tr>
<tr>
<td>EN0001 Sustainability Practices for Urban and Marine Environment</td>
<td>3</td>
</tr>
<tr>
<td>EN1001 Environmental Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>CV1012 Fluid Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>HW0210 Technical Communication</td>
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<tr>
<td><strong>Total AUs</strong></td>
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</table>

GER: General Education Requirement  
Free Elective

Students with only GCE ‘O’ Level Physics qualification are required to take FE1012 Physics A (4AUs)

Students who have not passed or are not exempted from the Qualifying English Test are required to take HW0001 English Proficiency (0AUs)

### Year 2 Semester 1

<table>
<thead>
<tr>
<th>Course code and title</th>
<th>AUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>CV1011 Mechanics of Materials</td>
<td>4</td>
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<tr>
<td>CV1711 Civil Engineering Drawing</td>
<td>1</td>
</tr>
<tr>
<td>CV2015 Hydraulics</td>
<td>3</td>
</tr>
<tr>
<td>CV2018 Probability &amp; Statistics</td>
<td>3</td>
</tr>
<tr>
<td>EN2001 Environmental Issues in a Changing World</td>
<td>3</td>
</tr>
<tr>
<td>EN2002 Environmental Biology and Microbiology</td>
<td>3</td>
</tr>
<tr>
<td>EN2711 Environmental Engineering Laboratory A</td>
<td>1</td>
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<tr>
<td><strong>Total AUs</strong></td>
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### Year 2 Semester 2

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>CV2011 Structural Analysis I</td>
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<td>CV2016 Hydrology</td>
<td>3</td>
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<tr>
<td>CV2019 Matrix Algebra &amp; Computational Methods</td>
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<tr>
<td>EN2003 Water Supply Engineering</td>
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<tr>
<td>EN2712 Environmental Engineering Laboratory B</td>
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GER: General Education Requirement  
Free Elective

### Year 3 Semester 1

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<tbody>
<tr>
<td>CV2013 Engineering Geology &amp; Soil Mechanics</td>
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<td>EN3001 Solid &amp; Hazardous Waste Management</td>
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<td>EN3002 Wastewater Engineering</td>
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</tr>
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<td>EN3003 Environmental Transport Processes</td>
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<tr>
<td>HW0310 Professional Communication</td>
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GER: General Education Requirement  
GER Elective – LS (Liberal Studies)

### Year 3 Semester 2

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<tbody>
<tr>
<td>EN3004 Air Pollution Control Engineering</td>
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<td>EN3005 Structural Design</td>
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<td>Free Elective</td>
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<td>GER Elective - STS</td>
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<td>GER Elective</td>
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GER: General Education Requirement  
Free Elective  
GER Elective – STS (Science, Technology & Society)  
GER Elective – can be taken from any category of AHSS, BM, LS or STS

### Year 3 Special Semester

<table>
<thead>
<tr>
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<th>AUs</th>
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<tr>
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### Year 4 Semester 1

<table>
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<tbody>
<tr>
<td>CV0002 Engineers and Society</td>
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<tr>
<td>CV4011 Project Planning &amp; Management</td>
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<tr>
<td>EN4711 Seminars &amp; Site Visits</td>
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<tr>
<td>EN4911 Final Year Project</td>
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<tr>
<td>GER Elective - BM</td>
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<td>EN4XX Specialisation Course / Core Elective</td>
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GER: General Education Requirement  
GER Elective – BM (Business & Management)

### Year 4 Semester 2

<table>
<thead>
<tr>
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<th>AUs</th>
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<tbody>
<tr>
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<tr>
<td>EN4912 Integrated Design Project</td>
<td>3</td>
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<tr>
<td>EN4XX Specialisation Course / Core Elective</td>
<td>3</td>
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<tr>
<td>EN4XX Specialisation Course / Core Elective</td>
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<tr>
<td>Free Elective</td>
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<td><strong>Total AUs</strong></td>
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**Grand Total (Year 1 to 4)**  
**138**

GER: General Education Requirement  
Free Elective
List of Core Electives (Specialisation Course) of Degree of Bachelor in Environmental Engineering (B.Eng.)

**Year 4: Core Electives**
(not every course will be offered at any one time)

<table>
<thead>
<tr>
<th>Course code and title</th>
<th>AUs</th>
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</thead>
<tbody>
<tr>
<td>CV3016 Construction Technology &amp; Processes</td>
<td>3</td>
</tr>
<tr>
<td>CV4107 Engineering Economics and Finance</td>
<td>3</td>
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<tr>
<td>CV4115 Applied Hydrology</td>
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<td>CV4116 Coastal Engineering</td>
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<td>EN4101 Surface Water Quality</td>
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<tr>
<td>EN4102 Membrane Water Reclamation Technology</td>
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<tr>
<td>EN4103 Biotechnology in Environmental Engineering</td>
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<tr>
<td>EN4104 Environmental Hydraulics</td>
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<tr>
<td>EN4105 Integrated Environmental Management</td>
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<tr>
<td>EN4106 Geo-Environmental Engineering</td>
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Bachelor of Science in Maritime Studies

**Year 1 Semester 1**

<table>
<thead>
<tr>
<th>Course code and title</th>
<th>AUs</th>
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<tbody>
<tr>
<td>BU8101 Accounting</td>
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<tr>
<td>BU8601 Fundamentals of Management</td>
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<tr>
<td>MT1001 Mathematics I for Maritime Studies</td>
<td>3</td>
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<tr>
<td>MT1002 Introduction to Maritime Industry</td>
<td>2</td>
</tr>
<tr>
<td>MT1003 Trade Practice and Incoterms</td>
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</tr>
<tr>
<td>HW0110 Effective Communication</td>
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</table>

Total AUs 16

Students who have not passed or are not exempted from the Qualifying English Test are required to take HW0001 English Proficiency (0AUs)

**Year 1 Semester 2**

<table>
<thead>
<tr>
<th>Course code and title</th>
<th>AUs</th>
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<tbody>
<tr>
<td>BU8301 Fundamentals of Business Law</td>
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<tr>
<td>HE1091 Principles of Economics</td>
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<tr>
<td>MT0001 Shipping and Environment (EN0001)</td>
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<tr>
<td>MT1004 Introduction to Meteorology and Oceanography</td>
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Free Elective

Total AUs 15

GER: General Education Requirement
Free Elective

**Year 2 Semester 1**

<table>
<thead>
<tr>
<th>Course code and title</th>
<th>AUs</th>
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<tbody>
<tr>
<td>MT2001 Probability &amp; Statistics (CV2018)</td>
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<td>MT2002 Shipping Economics</td>
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<td>MT2003 Maritime Technology</td>
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<tr>
<td>GER Elective - STS</td>
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</table>

Free Elective

Total AUs 15

GER: General Education Requirement
Free Elective
GER Elective – STS (Science, Technology & Society)

**Year 2 Semester 2**

<table>
<thead>
<tr>
<th>Course code and title</th>
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<tr>
<td>MT2004 Mathematics II for Maritime Studies</td>
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<td>MT2005 Port Economics</td>
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<td>MT2006 Regulatory Framework of Shipping</td>
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<td>HW0210 Technical Communication</td>
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<tr>
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</table>

Total AUs 16

GER: General Education Requirement
GER Elective – LS (Liberal Studies)
Free Elective

**Year 3 Semester 1**

<table>
<thead>
<tr>
<th>Course code and title</th>
<th>AUs</th>
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<tbody>
<tr>
<td>MT3001 Maritime Law</td>
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<tr>
<td>MT3002 Introduction to Marine Insurance</td>
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<tr>
<td>MT3003 Organisation of a Ship Owning Entity</td>
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<tr>
<td>MT3004 Shipping Management</td>
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Total AUs 15

GER: General Education Requirement
GER Elective – AHSS (Arts, Humanities & Social Sciences)

**Year 3 Semester 2**

<table>
<thead>
<tr>
<th>Course code and title</th>
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<tbody>
<tr>
<td>MT3005 Quality Management in Shipping</td>
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<tr>
<td>MT3006 Ship Chartering</td>
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<tr>
<td>MT0002 Professionals in Society</td>
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</tr>
<tr>
<td>HW0310 Professional Communication</td>
<td>2</td>
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<tr>
<td>GER Elective</td>
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</tr>
<tr>
<td>FREE Elective</td>
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Total AUs 17

GER: General Education Requirement
GER Elective – can be taken from any category of AHSS, BM, LS or STS
Free Elective

**Year 3 Special Semester**

<table>
<thead>
<tr>
<th>Course code and title</th>
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Total AUs 4

**Year 4 Semester 1**

<table>
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<tbody>
<tr>
<td>MT4001 Shipping Logistics</td>
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</tr>
<tr>
<td>MT4002 Essentials of Project Management</td>
<td>3</td>
</tr>
<tr>
<td>MT4003 Maritime Strategy</td>
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<tr>
<td>MT4004 Research Project (Semester 1)</td>
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<td>MT4XXX Specialisation Course / Core Elective</td>
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Total AUs 16
<table>
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<tr>
<th>Year 4 Semester 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course code and title</td>
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<tr>
<td>MT4401 Research Project (Semester 2)</td>
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<td>MT4XXX Specialisation Course / Core Elective</td>
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<tr>
<td>GER Elective - BM</td>
</tr>
<tr>
<td>Free Elective</td>
</tr>
<tr>
<td>Total AUs</td>
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<tr>
<td>Grand Total (Year 1 to 4)</td>
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</table>

GER: General Education Requirement
GER Elective – BM (Business & Management)
Free Elective

### Double Degree in Civil Engineering and Economics

<table>
<thead>
<tr>
<th>Year 1 Semester 1 &amp; 2</th>
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</thead>
<tbody>
<tr>
<td>Course code and title</td>
</tr>
<tr>
<td>MH1810 Mathematics I</td>
</tr>
<tr>
<td>FE1008 Computing</td>
</tr>
<tr>
<td>PH1011 Physics</td>
</tr>
<tr>
<td>HW0110 Effective Communication</td>
</tr>
<tr>
<td>FE1073 Introduction to Engineering &amp; Practices</td>
</tr>
<tr>
<td>HE1001 Microeconomic Principles</td>
</tr>
<tr>
<td>HE1002 Macroeconomic Principles</td>
</tr>
<tr>
<td>MH1811 Mathematics II</td>
</tr>
<tr>
<td>CV0001 Civil Engineering and Sustainable Built Environment</td>
</tr>
<tr>
<td>CV1011 Mechanics of Materials</td>
</tr>
<tr>
<td>CV1012 Fluid Mechanics</td>
</tr>
<tr>
<td>CV1013 Civil Engineering Materials</td>
</tr>
<tr>
<td>CV1711 Civil Engineering Drawing</td>
</tr>
<tr>
<td>HE1005 Introduction to Probability and Statistical Inference</td>
</tr>
<tr>
<td>Total AUs</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Year 2 Semester 1</th>
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</thead>
<tbody>
<tr>
<td>Course code and title</td>
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<tr>
<td>CV2011 Structural Analysis I</td>
</tr>
<tr>
<td>CV2013 Engineering Geology &amp; Soil Mechanics</td>
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<td>CV2015 Hydraulics</td>
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<td>CV2018 Probability &amp; Statistics</td>
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<tr>
<td>CV2711 Civil Engineering Laboratory A</td>
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<td>HE2002 Intermediate Macroeconomics</td>
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<td>HE2005 Principles of Econometrics</td>
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<tbody>
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<td>CV2014 Geotechnical Engineering</td>
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<td>CV2016 Hydrology</td>
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<td>CV2019 Matrix Algebra &amp; Computational Methods</td>
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<td>CV2712 Civil Engineering Laboratory B</td>
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<td>HW0210 Technical Communication</td>
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</thead>
<tbody>
<tr>
<td>Course code and title</td>
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<tr>
<td>CV3011 Reinforced Concrete Design</td>
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<tr>
<td>CV3013 Foundation Engineering</td>
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<tr>
<td>CV3014 Transportation Engineering</td>
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<tr>
<td>CV3015 Environmental Engineering</td>
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<td>HW0310 Professional Communication</td>
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<td>HE3021 Intermediate Econometrics</td>
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<tbody>
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<tr>
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<td>Econ - Core Elective 3</td>
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<th>Year 4 Semester 1</th>
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<tbody>
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<td>Course code and title</td>
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<tr>
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<td>CV4XXX Specialisation Course / Core Elective</td>
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<tr>
<td>Course code and title</td>
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<td>CV4911 Final Year Project</td>
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<td>Econ - Core Elective 6</td>
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<td>Econ - Core Elective 7</td>
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### Year 5 Semester 2

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<td>CV4911 Final Year Project</td>
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<td>Econs - Core Elective 10</td>
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<td><strong>Grand Total (Year 1 to 5)</strong></td>
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#### Double Degree in Environmental Engineering and Economics

### Year 1 Semesters 1 & 2

<table>
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<tbody>
<tr>
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<td>FE1008 Computing</td>
<td>3</td>
</tr>
<tr>
<td>PH1011 Physics</td>
<td>3</td>
</tr>
<tr>
<td>HW0110 Effective Communication</td>
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</tr>
<tr>
<td>FE1073 Introduction to Engineering &amp; Practices</td>
<td>1</td>
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<tr>
<td>HE1001 Microeconomic Principles</td>
<td>3</td>
</tr>
<tr>
<td>HE1002 Macroeconomic Principles</td>
<td>3</td>
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<td>MH1811 Mathematics II</td>
<td>3</td>
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<tr>
<td>CV1012 Fluid Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>EN0001 Sustainability Practices for Urban and Marine Environment</td>
<td>3</td>
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<tr>
<td>EN1001 Environmental Chemistry</td>
<td>3</td>
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<td>HW0210 Technical Communication</td>
<td>2</td>
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<tr>
<td>HE1005 Introduction to Probability and Statistical Inference</td>
<td>3</td>
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<td><strong>Total AUs</strong></td>
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Students who have not passed or are not exempted from the Qualifying English Test are required to take HW0001 English Proficiency (0AUs)

### Year 2 Semester 1

<table>
<thead>
<tr>
<th>Course code and title</th>
<th>AUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>CV1011 Mechanics of Materials</td>
<td>4</td>
</tr>
<tr>
<td>CV1711 Civil Engineering Drawing</td>
<td>1</td>
</tr>
<tr>
<td>CV2015 Hydraulics</td>
<td>3</td>
</tr>
<tr>
<td>CV2018 Probability &amp; Statistics</td>
<td>3</td>
</tr>
<tr>
<td>EN2001 Environmental Issues in a Changing World</td>
<td>3</td>
</tr>
<tr>
<td>EN2002 Environmental Biology and Microbiology</td>
<td>3</td>
</tr>
<tr>
<td>EN2711 Environmental Engineering Laboratory A</td>
<td>1</td>
</tr>
<tr>
<td>HE2005 Principles of Econometrics</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total AUs</strong></td>
<td><strong>21</strong></td>
</tr>
</tbody>
</table>

### Year 2 Semester 2

<table>
<thead>
<tr>
<th>Course code and title</th>
<th>AUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>CV2011 Structural Analysis I</td>
<td>3</td>
</tr>
<tr>
<td>CV2016 Hydrology</td>
<td>3</td>
</tr>
<tr>
<td>CV2019 Matrix Algebra &amp; Computational Methods</td>
<td>3</td>
</tr>
<tr>
<td>EN2003 Water Supply Engineering</td>
<td>3</td>
</tr>
<tr>
<td>EN2712 Environmental Engineering Laboratory B</td>
<td>1</td>
</tr>
<tr>
<td>HE2002 Intermediate Macroeconomics</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total AUs</strong></td>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

### Year 3 Semester 1

<table>
<thead>
<tr>
<th>Course code and title</th>
<th>AUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>CV2013 Engineering Geology &amp; Soil Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>EN3001 Solid &amp; Hazardous Waste Management</td>
<td>3</td>
</tr>
<tr>
<td>EN3002 Wastewater Engineering</td>
<td>3</td>
</tr>
<tr>
<td>EN3003 Environmental Transport Processes</td>
<td>3</td>
</tr>
<tr>
<td>HW0310 Professional Communication</td>
<td>2</td>
</tr>
<tr>
<td>HE3021 Intermediate Econometrics</td>
<td>3</td>
</tr>
<tr>
<td>HE4010 Singapore Economy in a Globalised World</td>
<td>4</td>
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<tr>
<td><strong>Total AUs</strong></td>
<td><strong>21</strong></td>
</tr>
</tbody>
</table>

### Year 3 Semester 2

<table>
<thead>
<tr>
<th>Course code and title</th>
<th>AUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN3004 Air Pollution Control Engineering</td>
<td>3</td>
</tr>
<tr>
<td>EN3005 Structural Design</td>
<td>3</td>
</tr>
<tr>
<td>Econs - Core Elective 1</td>
<td>3</td>
</tr>
<tr>
<td>Econs - Core Elective 2</td>
<td>3</td>
</tr>
<tr>
<td>Econs - Core Elective 3</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total AUs</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

### Year 3 Special Semester

<table>
<thead>
<tr>
<th>Course code and title</th>
<th>AUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN3912 Integrated Design Project</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total AUs</strong></td>
<td><strong>4</strong></td>
</tr>
</tbody>
</table>

### Year 4 Semester 1

<table>
<thead>
<tr>
<th>Course code and title</th>
<th>AUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>CV0002 Engineers &amp; Society</td>
<td>3</td>
</tr>
<tr>
<td>CV4011 Project Planning &amp; Management</td>
<td>3</td>
</tr>
<tr>
<td>EN4711 Seminars &amp; Site Visits</td>
<td>1</td>
</tr>
<tr>
<td>GER Elective</td>
<td>3</td>
</tr>
<tr>
<td>EN4XXX Specialisation Course / Core Elective</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total AUs</strong></td>
<td><strong>13</strong></td>
</tr>
</tbody>
</table>

### Year 4 Semester 2

<table>
<thead>
<tr>
<th>Course code and title</th>
<th>AUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN4912 Integrated Design Project</td>
<td>3</td>
</tr>
<tr>
<td>EN4XXX Specialisation Course / Core Elective</td>
<td>3</td>
</tr>
<tr>
<td>EN4XXX Specialisation Course / Core Elective</td>
<td>3</td>
</tr>
<tr>
<td>Econs - Core Elective 4</td>
<td>3</td>
</tr>
<tr>
<td>Econs - Core Elective 5</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total AUs</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

### Year 5 Semester 1

<table>
<thead>
<tr>
<th>Course code and title</th>
<th>AUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN4911 Final Year Project</td>
<td>4</td>
</tr>
<tr>
<td>Econs - Core Elective 6</td>
<td>3</td>
</tr>
<tr>
<td>Econs - Core Elective 7</td>
<td>3</td>
</tr>
<tr>
<td>Econs - Core Elective 8</td>
<td>3</td>
</tr>
<tr>
<td>Econs - Core Elective 9</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total AUs</strong></td>
<td><strong>16</strong></td>
</tr>
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</table>

### Year 5 Semester 2

<table>
<thead>
<tr>
<th>Course code and title</th>
<th>AUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN4911 Final Year Project</td>
<td>4</td>
</tr>
<tr>
<td>Econs - Core Elective 10</td>
<td>4</td>
</tr>
<tr>
<td>Econs - Core Elective 11</td>
<td>4</td>
</tr>
<tr>
<td>Econs - Core Elective 12</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total AUs</strong></td>
<td><strong>16</strong></td>
</tr>
<tr>
<td><strong>Grand Total (Year 1 to 5)</strong></td>
<td><strong>175</strong></td>
</tr>
</tbody>
</table>
## Bachelor of Science in Maritime Studies with Business Major

### Year 1 Semester 1
<table>
<thead>
<tr>
<th>Course code and title</th>
<th>AUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB1101 Accounting I</td>
<td>4</td>
</tr>
<tr>
<td>AB1201 Financial Management</td>
<td>3</td>
</tr>
<tr>
<td>MT1001 Mathematics I for Maritime Studies</td>
<td>3</td>
</tr>
<tr>
<td>MT1002 Introduction to Maritime Industry</td>
<td>2</td>
</tr>
<tr>
<td>MT1003 Trade Practice and Incoterms</td>
<td>3</td>
</tr>
<tr>
<td>HW0110 Effective Communication</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total AUs</strong></td>
<td><strong>17</strong></td>
</tr>
</tbody>
</table>

Students who have not passed or are not exempted from the Qualifying English Test are required to take HW0001 English Proficiency (0AUs).

### Year 1 Semester 2
<table>
<thead>
<tr>
<th>Course code and title</th>
<th>AUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB0901 Principles of Economics</td>
<td>3</td>
</tr>
<tr>
<td>AB1501 Marketing</td>
<td>3</td>
</tr>
<tr>
<td>AB1601 Organisation Behaviour and Design</td>
<td>3</td>
</tr>
<tr>
<td>MT0001 Shipping and Environment (EN0001)</td>
<td>3</td>
</tr>
<tr>
<td>MT1004 Introduction to Meteorology and Oceanography</td>
<td>3</td>
</tr>
<tr>
<td>GER Elective - LS</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total AUs</strong></td>
<td><strong>18</strong></td>
</tr>
</tbody>
</table>

GER: General Education Requirement
GER Elective – LS (Liberal Studies)

### Year 2 Semester 1
<table>
<thead>
<tr>
<th>Course code and title</th>
<th>AUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB1102 Accounting II</td>
<td>4</td>
</tr>
<tr>
<td>AB1301 Business Law</td>
<td>3</td>
</tr>
<tr>
<td>AB1401 Information Technology</td>
<td>3</td>
</tr>
<tr>
<td>MT2001 Probability &amp; Statistics (CV2018)</td>
<td>3</td>
</tr>
<tr>
<td>MT2002 Shipping Economics</td>
<td>3</td>
</tr>
<tr>
<td>MT2003 Maritime Technology</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total AUs</strong></td>
<td><strong>19</strong></td>
</tr>
</tbody>
</table>

GER: General Education Requirement
Free Elective

### Year 2 Semester 2
<table>
<thead>
<tr>
<th>Course code and title</th>
<th>AUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>MT2004 Mathematics II for Maritime Studies</td>
<td>3</td>
</tr>
<tr>
<td>MT2005 Port Economics</td>
<td>3</td>
</tr>
<tr>
<td>MT2006 Regulatory Framework of Shipping</td>
<td>2</td>
</tr>
<tr>
<td>HW0210 Technical Communication</td>
<td>2</td>
</tr>
<tr>
<td>AC2302 Company Law</td>
<td>4</td>
</tr>
<tr>
<td>Free Elective</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total AUs</strong></td>
<td><strong>17</strong></td>
</tr>
</tbody>
</table>

### Year 3 Semester 1
<table>
<thead>
<tr>
<th>Course code and title</th>
<th>AUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>MT3001 Maritime Law</td>
<td>3</td>
</tr>
<tr>
<td>MT3002 Introduction to Marine Insurance</td>
<td>3</td>
</tr>
<tr>
<td>MT3003 Organisation of a Ship Owning Entity</td>
<td>3</td>
</tr>
<tr>
<td>MT3004 Shipping Management</td>
<td>3</td>
</tr>
<tr>
<td>GER Elective - AHSS</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total AUs</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

GER: General Education Requirement
GER Elective – AHSS (Arts, Humanities & Social Sciences)

### Year 3 Semester 2
<table>
<thead>
<tr>
<th>Course code and title</th>
<th>AUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>MT0002 Professionals in Society</td>
<td>3</td>
</tr>
<tr>
<td>MT3005 Quality Management in Shipping</td>
<td>3</td>
</tr>
<tr>
<td>MT3006 Ship Chartering</td>
<td>3</td>
</tr>
<tr>
<td>HW0310 Professional Communication</td>
<td>2</td>
</tr>
<tr>
<td>GER Elective - STS</td>
<td>3</td>
</tr>
<tr>
<td>BC2404 Financial Analytics and Reporting</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total AUs</strong></td>
<td><strong>18</strong></td>
</tr>
</tbody>
</table>

GER: General Education Requirement
GER Elective – STS (Science, Technology & Society)

### Year 3 Special Semester
<table>
<thead>
<tr>
<th>Course code and title</th>
<th>AUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>MT3007 Industrial Immersion</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total AUs</strong></td>
<td><strong>4</strong></td>
</tr>
</tbody>
</table>

### Year 4 Semester 1
<table>
<thead>
<tr>
<th>Course code and title</th>
<th>AUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>MT4001 Shipping Logistics</td>
<td>3</td>
</tr>
<tr>
<td>MT4002 Essentials of Project Management</td>
<td>3</td>
</tr>
<tr>
<td>MT4003 Maritime Strategy</td>
<td>3</td>
</tr>
<tr>
<td>MT4004 Research Project (Semester 1)</td>
<td>4</td>
</tr>
<tr>
<td>MT4XXX Specialisation Course / Core Elective</td>
<td>3</td>
</tr>
<tr>
<td>BE2501 International Business Environment</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total AUs</strong></td>
<td><strong>20</strong></td>
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</table>

### Year 4 Semester 2
<table>
<thead>
<tr>
<th>Course code and title</th>
<th>AUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>MT4XXX Specialisation Course / Core Elective</td>
<td>3</td>
</tr>
<tr>
<td>Free Elective</td>
<td>3</td>
</tr>
<tr>
<td>GER Elective</td>
<td>3</td>
</tr>
<tr>
<td>BH3603 Cultural Intelligent at Work</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total AUs</strong></td>
<td><strong>20</strong></td>
</tr>
</tbody>
</table>

### Grand Total (Year 1 to 5)
**20148**

GER: General Education Requirement
GER Elective – can be taken from any category of AHSS, BM, LS or STS
Free Elective

### Description of Courses

Please visit our website at [http://www.cee.ntu.edu.sg/CurrentStudents/undergraduatestudents/Pages/Home.aspx](http://www.cee.ntu.edu.sg/CurrentStudents/undergraduatestudents/Pages/Home.aspx) for the information on Description of Courses.
School of Computer Engineering

Undergraduate study
1. Bachelor of Engineering (Computer Engineering)
2. Bachelor of Engineering (Computer Science)
3. Bachelor of Engineering (Computer Engineering/Computer Science) and Bachelor of Business (Information Technology) [Double degree programme with NBS]
4. Bachelor of Engineering (Computer Engineering/Computer Science) and Bachelor of Arts (Economics) [Double degree programme with HSS]
5. Integrated Bachelor of Engineering (Computer Engineering/Computer Science) awarded by NTU and Master of Science (Computer Science) awarded by Georgia Institute of Technology [NTU-Georgia Tech Integrated Programme]

Curriculum structure of the B.Eng. (Computer Engineering) and B.Eng. (Computer Science) (applicable to students matriculating in 2011 and after)
- Four years full-time for the B.Eng. degree.

Curriculum structure of the double degree programme in B.Eng. (Computer Engineering/Computer Science) and B.Bus. (Information Technology) Business
- The double degree may be completed in four years and consists of a hybrid curriculum merging Business and Computer Engineering or Computer Science courses.
- A holistic approach is presented with specialised electives, and a Final Year Project in Year 4.

Bachelor of Engineering Degree
- First Class Honours
- Second Upper Honours
- Second Lower Honours
- Third Class Honours
- Pass

By choosing a combination of prescribed elective courses in the fourth year, students may achieve specialisation in areas such as:

Computer Engineering
- Digital Media
- Embedded Systems
- High Performance Computing
- Networking and Mobility

Computer Science
- Digital Media
- High Performance Computing
- Information Systems
- Intelligent Systems

Bachelor of Engineering (Computer Engineering/Computer Science) & Bachelor of Business (Information Technology) Degrees
- First Class Honours
- Second Upper Honours
- Second Lower Honours
- Third Class Honours
- Pass
Curriculum structure of the double degree honours programme in:

B.Eng (Computer Engineering/Computer Science) and B.A (Economics)

The double degree honours programme can be completed in five years.

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Semester 1</th>
<th>Coursework</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semester 2</td>
<td>Coursework</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 2</th>
<th>Semester 1</th>
<th>Coursework</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semester 2</td>
<td>Coursework</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Industrial Orientation</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 3</th>
<th>Semester 1</th>
<th>Coursework</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semester 2</td>
<td>Coursework</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 4</th>
<th>Semester 1</th>
<th>Coursework</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semester 2</td>
<td>Coursework</td>
<td>Final Year Project</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 5</th>
<th>Semester 1</th>
<th>Coursework</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semester 2</td>
<td>Coursework</td>
<td></td>
</tr>
</tbody>
</table>

**Bachelor of Engineering (Computer Engineering/Computer Science) & Bachelor of Arts (Economic) Degrees**

- First Class Honours
- Second Upper Honours
- Second Lower Honours
- Third Class Honours
- Pass

Curriculum structure of the Integrated B.Eng (Computer Engineering/Computer Science) and M.S. (Computer Science)

- The integrated programme can be completed in four years.
- Students will spend the first three years at SCE. There will be opportunities to select from a myriad of undergraduate-level courses including computer game programming, intelligent systems, and network security. The subsequent year or year and a half at Georgia Institute of Technology, will be spent reading graduate-level courses, and going into an in-depth study of their chosen specialisations.

**Integrated programme curriculum structure**

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Semester 1</th>
<th>Coursework</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semester 2</td>
<td>Coursework</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 2</th>
<th>Semester 1</th>
<th>Coursework</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semester 2</td>
<td>Coursework</td>
<td></td>
</tr>
<tr>
<td>Multidisciplinary Design Project</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial Orientation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 3</th>
<th>Semester 1</th>
<th>Coursework</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semester 2</td>
<td>Coursework</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 4</th>
<th>Semester 1</th>
<th>Coursework</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semester 2</td>
<td>Coursework</td>
<td></td>
</tr>
</tbody>
</table>

| Bachelor or Engineering (Computer Engineering/Computer Science) & Master of Science (Computer Science) Degrees |

At Georgia Institute of Technology, USA

- The diversity and flexibility of the curriculum allows students to have a comprehensive all-rounded education with a global perspective.

**Description of Courses**

Please visit our website at http://sce.ntu.edu.sg/CurrentStudents/Undergraduate/Pages/GeneralInformation.aspx for the information on Description of Courses.
School of Electrical and Electronic Engineering

1. Bachelor of Engineering
   (Electrical and Electronic Engineering)

To achieve our vision of becoming a great global university founded on science and technology and in light of the global conditions faced by Singapore in the twenty-first century, the new curriculum for ‘A’ Level intake will obtain the desired attributes of NTU graduates in the areas that include but not limited to global exposure, broad literacy in the sciences and the arts, intellectual curiosity, research, creativity and innovation, entrepreneurship, and awareness of socio-economic and environmental issues.

The core courses consist of Mathematics, Sciences, Computing, Fundamental and Specialised Engineering courses, Industrial Orientation and Final Year Project. The Core Electives include all engineering design and technical electives in the third and final year. The GER Core courses include Communication Skills courses, Environmental Sustainability and Singapore Studies, whilst GER Electives include courses in the area of Liberal Studies, Science, Technology and Society, Business and Management, and Arts, Humanities and Social Sciences.

The new curriculum structure with the distributions of AUs for different categories of courses is outlined below:

<table>
<thead>
<tr>
<th></th>
<th>Number of AUs</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core</td>
<td>77</td>
<td>96</td>
</tr>
<tr>
<td>Core Elective</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>GER Core</td>
<td>12</td>
<td>27</td>
</tr>
<tr>
<td>GER Elective</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Unrestricted Elective</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>138</strong></td>
<td></td>
</tr>
</tbody>
</table>

The reduced number of AUs would mean a slightly lower workload per semester for students who will have more time to spend on elective courses such as URECA, UROP, language electives, etc., or be involved in cultural activities to broaden and deepen their university experiences.

To give a clearer picture of the significant features introduced to the curriculum structure, major changes were made to each year of study:

First year
The first year curriculum covers fundamentals in the physical sciences, such as Mathematics, Physics, and Computing to provide a strong foundation for specialisation in the years to follow. A new course called “An Introduction to Engineering and Practices” has been introduced to provide an opportunity for all engineering students in the first semester to have a better understanding of the different engineering disciplines so that they can make an informed choice before they are streamed to their respective groups.

Second year
In the second year, further courses on Engineering Mathematics are included to strengthen the foundation for more advanced study in electrical and electronic engineering. Other core fundamental electrical and electronic engineering courses such as Circuit Analysis, Semiconductor Fundamentals, Electronics, Data Structures and Algorithms, and Signals and Systems are introduced to provide a broad background for all areas of electrical and electronic engineering. In addition, students undertake two courses of laboratory experiments and a new structured course named Introduction to EEE Design and Project to provide the necessary grounding in the practical skills required of engineers.

Third year
In the third year, basic principles which underpin a broad spectrum of technologies encompassed by the area of electrical and electronic engineering are taught. These include core courses on Engineering Electromagnetics, and Microprocessors. In addition, students will select two electives from a list of more specialised courses in preparation for more in-depth specialisation in their final year.

Final year
In the final year, students are given the flexibility to select their prescribed elective courses under three broad groups, namely Electrical and System Engineering, Electronic Engineering and Infocommunication Engineering. They may select any two design elective courses and three technical elective courses from their respective groups.

However, students who prefer a more in-depth study can select the courses from one of 9 areas of specialisation, namely, Biomedical Electronics, Communication Engineering, Computer Engineering, Intelligent Systems and Control Engineering, Digital Media Processing, Integrated Circuits Design, Microelectronics, Photonics, and Power and Clean Energy.

In addition to the elective technical courses, all students are required to take compulsory courses such as Professional Communication, and Engineers and Society.

EEE Curriculum (A-Level)

First Year Courses
EE1002 Physics Foundation for Electrical and Electronic Engineering
EE1003 Introduction to Materials for Electronics
MH1810 Mathematics 1
MH1811 Mathematics 2
FE1008 Computing
PH1011 Physics *
FE1073 An Introduction to Engineering and Practices
HW0110 Effective Communication

* Students without GCE ‘A’ level Physics are required to read FE1012 Physics A, instead of PH1011 Physics.

Second Year Courses
EE2001 Circuit Analysis
EE2002 Analog Electronics
EE2003 Semiconductor Fundamentals
EE2004 Digital Electronics
EE2006 Engineering Mathematics I
EE2007 Engineering Mathematics II
EE2008 Data Structures and Algorithms
EE2010 Signal and Systems
EE2071 Laboratory 2A
EE2072 Laboratory 2B
Third Year Courses
EE3001 Engineering Electromagnetics
EE3002 Microprocessors
EE3076 Industrial Orientation *
EE3080 Design and Innovation Project
EE0001 Environmental Sustainability

* Besides the 10-week Industrial Orientation (IO), engineering students may opt for the 20-week Industrial Attachment.

Final Year Courses
EE0040 Engineers and Society
EE4079 Final Year Project
HW0310 Professional Communication

In addition, students will be required to read two (2) design elective and three (3) technical elective courses within one of the three option groups.

Electrical and Systems Engineering Option Group
Design Elective Courses
EE4207 Control Engineering Design
EE4208 Intelligent System Design
EE4503 Power Engineering Design
EE4504 Design of Clean Energy Systems
EE4901 Biomedical Control System Design
EE4902 Design of Medical Information Processing Systems

Technical Elective Courses
EE4001 Software Engineering
EE4265 Process Control Systems
EE4266 Computer Vision
EE4268 Robotics and Automation
EE4273 Digital Control Systems
EE4285 Computational Intelligence
EE4530 Power System Analysis and Control
EE4532 Power Electronics and Drives
EE4533 Power Apparatus and System Protection
EE4534 Modern Distribution Systems with Renewable Resources
EE4840 Biophotonics
EE4903 Physiological Systems Analysis
EE4904 Biomedical Instrumentation
EE4905 Biomedical Signal Processing
EE4906 Medical Imaging Systems

Electronic Engineering Option Group
Design Elective Courses
EE4303 Mixed-Signal IC Design
EE4304 Radio Frequency Integrated System Design
EE4305 Digital Design with HDL
EE4613 CMOS Process and Device Simulation by Technology CAD
EE4614 Device Parameter Extraction and Layout Implementation
EE4815 Optical Design
EE4816 Photonic Devices: Design and Characterization

Technical Elective Courses
EE4001 Software Engineering
EE4340 VLSI Systems
EE4341 Advanced Analog Circuits
EE4343 Radio Frequency Circuits
EE4344 Analysis & Design of Integrated Circuits
EE4645 Microfabrication Engineering
EE4646 VLSI Technology
EE4647 Microelectronic Devices
EE4648 Flat Panel Display Technologies
EE4694 IC Reliability and Failure Analysis
EE4695 Semiconductor Physics
EE4836 Semiconductor Optoelectronics
EE4838 Laser Engineering and Applications
EE4839 Fibre Optic Communications
EE4840 Biophotonics

Infocommunication Engineering Option Group
Design Elective Courses
EE4105 Cellular Communication System Design
EE4109 Microwave Circuit and System Design
EE4110 Optical Communication System Design
EE4413 DSP System Design
EE4717 Web Application Design
EE4718 Enterprise Network Design

Technical Elective Courses
EE4001 Software Engineering
EE4151 RF and Microwave Engineering
EE4152 Digital Communications
EE4153 Telecommunication Systems
EE4188 Wireless Communications
EE4189 Spread Spectrum Communications
EE4190 Introduction to Modern Radar
EE4455 Embedded Systems
EE4475 Audio Signal Processing
EE4476 Image Processing
EE4478 Digital Video Processing
EE4483 Artificial Intelligence and Data Mining
EE4490 Multimedia Systems
EE4756 Computer Architecture
EE4758 Computer Security
EE4761 Computer Networking
EE4791 Database Systems

Final Year Specialisation Courses
Students who wish to pursue a more in-depth specialization within the 3 broad option groups may select the relevant design and technical electives courses from 9 areas of specialization under the respective option group.
Electrical and Systems Engineering

<table>
<thead>
<tr>
<th>Option Group</th>
<th>Specialisation</th>
<th>Recommended Elective Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intelligent Systems &amp; Control Engineering</td>
<td>EE4207, EE4208, EE4265, EE4266, EE4268, EE4273, EE4285, EE4906</td>
</tr>
<tr>
<td></td>
<td>Power &amp; Clean Energy</td>
<td>EE4503, EE4504, EE4530, EE4532, EE4533, EE4534</td>
</tr>
<tr>
<td></td>
<td>Biomedical Electronics</td>
<td>EE4901, EE4902, EE4903, EE4904, EE4905, EE4906, EE4265, EE4266, EE4840</td>
</tr>
</tbody>
</table>

Electronic Engineering

<table>
<thead>
<tr>
<th>Option Group</th>
<th>Specialisation</th>
<th>Recommended Elective Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Integrated Circuit Design</td>
<td>EE4303, EE4304, EE4305, EE4340, EE4341, EE4343, EE4344, EE4694</td>
</tr>
<tr>
<td></td>
<td>Microelectronics</td>
<td>EE4613, EE4614, EE4645, EE4646, EE4647, EE4648, EE4694, EE4695</td>
</tr>
<tr>
<td></td>
<td>Photonics</td>
<td>EE4815, EE4816, EE4648, EE4695, EE4836, EE4838, EE4839, EE4840</td>
</tr>
</tbody>
</table>

Infocommunications Engineering

<table>
<thead>
<tr>
<th>Option Group</th>
<th>Specialisation</th>
<th>Recommended Elective Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Communication Engineering</td>
<td>EE4105, EE4109, EE4110, EE4151, EE4152, EE4153, EE4188, EE4189, EE4190</td>
</tr>
<tr>
<td></td>
<td>Computer Engineering</td>
<td>EE4001, EE4717, EE4718, EE4756, EE4758, EE4761, EE4455, EE4483, EE4490, EE4791</td>
</tr>
<tr>
<td></td>
<td>Digital Media Processing</td>
<td>EE4001, EE4413, EE4415, EE4455, EE4475, EE4476, EE4478, EE4483, EE4490</td>
</tr>
</tbody>
</table>

EEE Curriculum (Poly Direct-Entry)

**Second Year Courses**
EE1002 Physics Foundation for Electrical and Electronic Engineering
EE2001 Circuit Analysis
EE2002 Analog Electronics
EE2003 Semiconductor Fundamentals
EE2004 Digital Electronics
EE2005 AC Circuits and Machines
EE2006 Engineering Mathematics I
EE2007 Engineering Mathematics II
EE2008 Data Structures and Algorithms
EE2010 Signal and Systems
EE2071 Laboratory 2A
EE2072 Laboratory 2B
EE2073 Introduction to EEE Design & Project
EE2092 Mathematics A
FE1012 Physics A
HW0210 Technical Communication

**Third Year Courses**
EE3001 Engineering Electromagnetics
EE3002 Microprocessors
EE3076 Industrial Orientation *
EE3080 Design and Innovation Project
EE0001 Environmental Sustainability

*Besides the 10-week Industrial Orientation (IO), engineering students may opt for the 20-week Industrial Attachment.

Students will be required to read 2 pre-specialised Major Prescribed Elective Courses from the following list.
EE3010 Electrical Devices and Machines
EE3011 Modelling and Control
EE3012 Communication Principles
EE3013 Semiconductor Devices and Processing
EE3014 Digital Signal Processing
EE3015 Power Systems and Conversion
EE3017 Computer Communications

EE3018 Introduction to Photonics
EE3019 Integrated Electronics

**Final Year Courses**
EE0040 Engineers and Society
EE4079 Final Year Project
HW0310 Professional Communication
In addition, students will be required to read two (2) design elective courses and at least three (3) / four (4) technical elective courses within one of the three option groups.

**Electrical and Systems Engineering Option Group**

**Design Elective Courses**
EE4207 Control Engineering Design
EE4208 Intelligent System Design
EE4503 Power Engineering Design
EE4504 Design of Clean Energy Systems
EE4901 Biomedical Control System Design
EE4902 Design of Medical Information Processing Systems

**Technical Elective Courses (Select at least 4)**
EE4001 Software Engineering
EE4265 Process Control Systems
EE4266 Computer Vision
EE4268 Robotics and Automation
EE4273 Digital Control Systems
EE4285 Computational Intelligence
EE4530 Power System Analysis and Control
EE4532 Power Electronics and Drives
EE4533 Power Apparatus and System Protection
EE4534 Modern Distribution Systems with Renewable Resources
EE4840 Biophotonics
EE4903 Physiological Systems Analysis
EE4904 Biomedical Instrumentation
EE4905 Biomedical Signal Processing
EE4906 Medical Imaging Systems
Electronic Engineering Option Group

Design Elective Courses
EE4303 Mixed-Signal IC Design
EE4304 Radio Frequency Integrated System Design
EE4305 Digital Design with HDL
EE4613 CMOS Process and Device Simulation by Technology CAD
EE4614 Device Parameter Extraction and Layout Implementation
EE4815 Optical Design
EE4816 Photonic Devices: Design and Characterization

Technical Elective Courses (Select at least 4)
EE4001 Software Engineering
EE4340 VLSI Systems
EE4341 Advanced Analog Circuits
EE4343 Radio Frequency Circuits
EE4344 Analysis & Design of Integrated Circuits
EE4645 Microfabrication Engineering
EE4646 VLSI Technology
EE4647 Microelectronic Devices
EE4648 Flat Panel Display Technologies
EE4694 IC Reliability and Failure Analysis
EE4695 Semiconductor Physics
EE4836 Semiconductor Optoelectronics
EE4838 Laser Engineering and Applications
EE4839 Fibre Optic Communications
EE4840 Biophotonics

Infocommunication Engineering Option Group

EE4001 Software Engineering **
** Core course for Infocommunication Engineering students.

Design Elective Courses
EE4105 Cellular Communication System Design
EE4109 Microwave Circuit and System Design
EE4110 Optical Communication System Design
EE4413 DSP System Design
EE4717 Web Application Design
EE4718 Enterprise Network Design

Technical Elective Courses (Select at least 3)
EE4151 RF and Microwave Engineering
EE4152 Digital Communications
EE4153 Telecommunication Systems
EE4188 Wireless Communications
EE4189 Spread Spectrum Communications
EE4190 Introduction to Modern Radar
EE4455 Embedded Systems
EE4475 Audio Signal Processing
EE4476 Image Processing
EE4478 Digital Video Processing
EE4483 Artificial Intelligence and Data Mining
EE4490 Multimedia Systems
EE4756 Computer Architecture
EE4758 Computer Security
EE4761 Computer Networking
EE4791 Database Systems

Final Year Specialisation Courses
Students who wish to pursue a more in-depth specialization within the 3 broad option groups may select the relevant design and technical electives courses from 9 areas of specialization under the respective option group.

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<tr>
<th>Option group</th>
<th>Specialisation</th>
<th>Recommended elective courses</th>
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<td>Electrical and Systems</td>
<td>Intelligent Systems &amp; Control Engineering</td>
<td>EE4207, EE4208, EE4265, EE4266, EE4268, EE4273, EE4285, EE4906</td>
</tr>
<tr>
<td>Engineering</td>
<td>Power &amp; Clean Energy</td>
<td>EE4503, EE4504, EE4530, EE4532, EE4533, EE4534</td>
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<td>Infocommunications Engineering</td>
<td>Communication Engineering</td>
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<td></td>
<td>Digital Media Processing</td>
<td>EE4001, EE4413, EE4105, EE4455, EE4475, EE4476, EE4478, EE4483, EE4490</td>
</tr>
</tbody>
</table>
1. Bachelor of Engineering (Electrical and Electronic Engineering) - Part-Time

The part-time B.Eng. Programme in Electrical and Electronic Engineering (EEE) was launched in 1996 on a self-financed basis to provide a platform for polytechnic graduates to further their studies and obtain degrees on a part-time basis while remaining in their respective jobs. The programme is offered only to applicants who have already obtained a Diploma in Electrical/Electronics Engineering or an equivalent qualification from one of the polytechnics in Singapore, and are in full-time employment in a technical job.

Intake has been kept at around 150 every year. An invitation for applications is advertised in several newspapers in December each year, with a briefing for prospective students 3 weeks before the closing date at the end of January. Detailed information on the programme is available at http://www.eee.ntu.edu.sg/ProspectiveStudents/BEngPartTime/. All part-time students undergo an orientation programme similar to that conducted for full-time students before they begin their first semester of study.

The curriculum of the part-time B.Eng. Programme has been revised from time to time in line with the curriculum of the full-time B.Eng. programme. Part-time students follow the curriculum prepared for full-time direct-entry students (Diploma holders) closely, except that part-time students gain the exemption for the inter-semester project module and industrial attachment in Years 2 and 3, respectively, as well as an exemption for 2AUs of Unrestricted Electives in Years 4 or 5. Part-time students also enjoy the benefit of a broad-based education. Two courses in mathematics and science are included in the first year to better prepare students for subsequent years of study. To balance their workload, they are exempted for the same number of AUs of Unrestricted Electives. Today, part-time students in Years 4 and 5 enjoy as many options as full-time students, as long as the number of students for each course is about 10.

Part-time students sit for the same examination as their full-time counterparts and after successful completion of the programme requirements, receive the same B.Eng. degree in Electrical Engineering, which is wholly recognized by reputable professional institutions such as The Institution of Engineering and Technology of the United Kingdom (IET), Engineering Accreditation Board, Singapore (EAB), Professional Engineers Board, Singapore (PEB) and The Institution of Engineers, Singapore (IES). The year 2001 saw the graduation of the first batch of part-time B.Eng. students -- 73 students graduated, with many receiving good honours. This pattern has varied slightly from year to year. Since its inception, the part-time B.Eng. programme has been a testimony to NTU's success in maximizing its output using existing facilities.

Singapore citizens (SC) and Singapore Permanent Residents (SPR) enjoy MOE Tuition Fee Subsidy, with the Government meeting 55% of the cost for SCs and 20% for SPRs.

2. Bachelor of Engineering (Electrical and Electronic Engineering) with Minor in Business

Students enrolled in this programme follow the Electrical and Electronic Engineering curriculum, with the additional 5 business courses (totaling 15 AUs), in fulfillment of requirements for the Minor in Business.

The Business Minor programme prepares students for life-long learning in various financial, management and business skills and tools in their professional careers. This is especially important in a rapidly changing knowledge-based economy. In addition, it prepares students who may enrol in postgraduate business programmes in the future.

3. Bachelor of Engineering (Information Engineering and Media)

The Bachelor of Engineering in Information Engineering and Media (B.Eng. (IEM)) is a new multi-disciplinary and inter-disciplinary degree programme designed for those who aspire to a career in the fields of Infocommunications (Infocomm) and Digital Media. The programme is hosted by the School of Electrical and Electronic Engineering, and jointly offered with the School of Art, Design and Media, the School of Computer Engineering, and the Wee Kim Wee School of Communication and Information.

The programme aims:

- To train professional Infocomm engineers with strong technical skills to meet the demand for Infocomm manpower.
- To train engineers with an exposure to the artistic and creative processes and equip them with an understanding of the needs of the growing media industry.
- To provide graduates with a solid foundation in mathematics, information sciences and soft-skills for diverse careers and life-long learning.
- To develop graduates with a good understanding of their roles in society and a strong sense of ethical and professional responsibilities.

This programme is mainly technical and is rigorously grounded in core information and communication engineering principles, with 60% of curriculum covering courses programming, computer hardware/software, communications and networking, and digital audio/image/video processing. This part of the programme prepares graduates for jobs in the IT, computer and communications industries.

In addition, the programme provides a good exposure to the artistic and creative aspects of the media industry with about 20% of the curriculum devoted to courses such as digital art and design, animation and game design, and radio/TV/movie production. This part of the programme equips graduates with basic knowledge and understanding of media design and production in line with industrial needs.

The graduates will be able to work with media designers in content creation, production and delivery. They will be in a unique position to better understand the needs of the content creators and to develop new technologies and tools which will help the media industry achieve higher productivity and elevate it to the next level of excellence.

Besides specialized training, the programme will provide a holistic undergraduate education with 20% of the curriculum being devoted to broadening courses in arts, humanities and social sciences, science and technology, business and communication skills. This is to enrich the learning experience of students and to equip them with comprehensive and broad-based knowledge that would be needed upon their graduation in today's fast changing world.
For more information, please visit http://www.ntu.edu.sg/eee/iem or email to iemonline@ntu.edu.sg.

IEM Curriculum

Year 1
Mathematics 1
Mathematics 2
Physics
Computing
Digital Electronics
Analog Electronics
Data Structures and Algorithms
Object-Oriented Programming
Basic Media Writing
Thinking and Communicating Visually I
General Education Requirement (Art, Humanities and Social Sciences)

Year 2
Engineering Mathematics I
Engineering Mathematics II
Software Engineering
Computer Communications
Microprocessors
Signals and Systems
Introduction to Design and Project
Visual Literacy and Communication
Thinking and Communicating Visually II
General Education Requirement (Liberal Studies)
General Education Requirement (Science, Technology and Society)

Year 3
Digital Signal Processing
Communication Principles
Information Security
Design and Innovation Project
Industrial Orientation
Thinking and Communicating Visually III
Environment Sustainability
General Education Requirement (Elective)
Free Elective 1
Free Elective 2
Free Elective 3
Free Elective 4

Year 4
Final Year Project
Design Elective 1
Technical Elective 1
Technical Elective 2
Technical Elective 3
Design Elective 2 / Technical Elective 4
Engineers and Society
Professional Communication
General Education Requirement (Business and Management)
Free Elective 5

Design Electives
Object-Oriented Software Engineering Design
Web Application Design
Enterprise Network Design
Cellular Communication System Design
DSP System Design

Technical Electives
Computer Architecture
Database Systems
Computer Networking
Multimedia Systems
Digital Communications
Telecommunication Systems
Wireless Communications
Embedded Systems
Audio Signal Processing
Image Processing
Digital Video Processing
Artificial Intelligence & Data Mining
Audio Radio Production
Single-Camera Production
Web Design & Technology
Interface Design
Interactive I
Augmented and Virtual Reality
Media Management & Processing
Computer Vision
Computer Graphics and Animation
Simulation and Modeling

4. Bachelor of Engineering (Information Engineering and Media) with Minor in Business

Students enrolled in this programme follow the Information Engineering and Media curriculum, with the additional 5 business courses (totaling 15 AUs), in fulfillment of requirements for the Minor in Business.

The Business Minor Programme prepares students for life-long learning in various financial, management and business skills and tools in their professional careers. This is especially important in a rapidly changing knowledge-based economy. In addition, it prepares students who may enrol in postgraduate business programmes in the future.

5. Bachelor of Engineering (Electrical and Electronic Engineering) and Bachelor of Arts (Honours) in Economics

Bachelor of Engineering (Information Engineering and Media) and Bachelor of Arts (Honours) in Economics

The double-degree programme in Engineering and Economics aims to produce engineers who are knowledgeable and competent in both engineering and economics. The multi-disciplinary approach will inject relevant soft skills, which are essential to the professional development of an engineer for the 21st Century. Jointly offered by the School of Electrical and Electronic Engineering and the School of Humanities and Social Sciences, this double-degree programme provides students with strong foundation in the fundamentals of Engineering principles and knowledge of Economics, wide choice of Engineering and Economics electives, and vigorous training in problem solving, verbal and written communication skills. Students enrolled in this programme can earn two degrees in 5 to 5½ years.
5. NTU-Georgia Tech Integrated Bachelor of Engineering (EEE) and Master of Science (ECE) Programme

The NTU-Georgia Tech Integrated Bachelor’s and Master’s programme is tailor-made for aspiring students who wish to pursue a career in the infocommunications industry. Students enrolled in this programme can earn two degrees in four years instead of the usual five to five-and-a-half years. Students will spend three to four years in NTU’s School of Electrical and Electronic Engineering, majoring in Information and Communications, and the next one to one-and-a-half years in Georgia Tech’s School of Electrical and Computer Engineering, specializing in Computer Engineering and Telecommunications.

Students admitted into the integrated programmes are eligible to apply for the prestigious Infocomm Development Authority (IDA)’s National Infocomm Scholarship. The National Infocomm Scholarship is sponsored by Infocomm and end-user companies such as IBM, Microsoft, Oracle, DBS, SingTel and StarHub. The scholars can look forward to internships with their sponsoring company, and will have the opportunity to work in the company when they graduate.

For more information, please refer to www.eee.ntu.edu.sg/ProspectiveStudents/NTU-GT/Pages/Home.aspx or send an email to ipeeehelp@ntu.edu.sg.

Divisions

Division of Power Engineering

This Division specializes in electrical power and energy technologies. It is one of the entities of Nanyang Technological University which has been playing a significant role in the Peak of Excellence in ‘Sustainable Earth’. Its academic and research activities are targeted at energy sustainability for mankind.

The core educational thrust of the Division is its Power and Clean Energy Specialization program, a package of senior-year courses to allow B.Eng (Electrical and Electronic Engineering) candidates to graduate with specialized knowledge in the electrical power and clean energy area. The Division also offers power and energy related undergraduate courses for Energy Minor, Environmental Sustainability, and B.Eng (Aerospace) programs. At postgraduate level, the Division offers a course-work program in Master of Science in Power Engineering, which has been well received by the regional power industries. Its postgraduate M.Eng and PhD research program has been instrumental in producing high-quality research and academic manpower for Asia in power and energy system areas.

In research, the Division has been at the forefront of emerging sustainable energy system technologies by leveraging on its inherent core strengths in power systems and power electronics. Its faculty has secured in recent years more than $515 million of external research grants for various projects in efficient solar energy based systems for water production, in intelligent energy distribution and storage systems, and in wind and marine renewables. These funded projects have also been valuable in providing research staff training at postgraduate and postdoctoral levels.

Division of Circuits and Systems

As a student-centric, design and research-intensive division, we are creating tomorrow’s leaders and developing new knowledge in electronics and integrated circuit design. The Division supports teaching and research activities in the areas of circuits and systems for both undergraduate and postgraduate levels. At the graduate level, it conducts one Master of Science programme in Electronics together with the Division of Microelectronics at NTU and one full-time Joint Master of Science programme in Integrated Circuit Design with the Technical University of Munich, Germany.

Its research activities are focused mainly on RF/mm-wave integrated circuits and systems, mixed-signal IC and applications, and VLSI design with a strong emphasis on low-voltage low-power IC design. The division currently has 25 faculty members, one visiting professor, two visiting assistant professors, one senior lecturer, 58 research staff, 17 technical staff, 4 administrative staff and more than 150 Ph.D. and Master’s students.

Its research activities are focused mainly on RF/mm-wave integrated circuits and systems, mixed-signal IC and applications, and VLSI design with a strong emphasis on low-voltage low-power IC design. The division currently has 25 faculty members, one visiting professor, two visiting assistant professors, one senior, 58 research staff, 17 technical staff, 4 administrative staff and more than 150 Ph.D. and Master’s students.

The Division works closely with EDB on various IC design specialist manpower training schemes to support our teaching and research programmes. It has also been active in providing professional services to industry by offering continuing education courses and technical consultation to the electronics, semiconductor and IC design industry. The Division has fostered a strong link with several renowned universities such as the University of Michigan, MIT, Yale University, University of California, Los Angeles , California Institute of Technology, Purdue University, Technical University of Munich, University of Electronic, Science and Technology of China, Fudan University, Zhejiang University, Linkoping University, University of Toronto, University of Waterloo, and McMaster University . All the activities in the division are supported by 17 technicians in two research centres - the new IC Design Centre of Excellence, VIRTUS (“Excellence” in Latin) and the Electromagnetic Effects Research Lab (EMERL), one joint lab with Advanced RFIC, and five laboratories which are grouped into one Integrated Electronics Research cluster.

Division of Information Engineering

The Division of Information Engineering supports teaching and research activities in the areas of Computer Engineering and Media Signal Processing. In the undergraduate curriculum, the Division offers two final-year specialisations in Computer Engineering and Digital Media Processing. Both specialisations are designed to train students for the rapidly changing areas in Information Technology and Info-Communications. The Division also offers Master of Science programmes in Signal Processing (M.Sc.(SP)).

The Division is active in research work, consultancy services, and professional society activities in the areas of Signal Processing for Communications, Multimedia Signal Processing, Signal Classification and Pattern Recognition, Statistical and Adaptive Signal Processing, Watermarking and Authentication, Biometrics and Information Security, and Pervasive Technologies. Staff members are closely affiliated and actively involved in research and development projects with the Centre for Information Security, Centre for Signal Processing, and several other centres in the University. R&D projects are typically funded by local companies,
A*STAR, DSO, MINDEF, MOE, NRF and research institutes or by the university’s research funds.

The Division operates four research/teaching laboratories to provide various state-of-the-art computing, teaching, and R&D facilities and equipment to students and staff members.

**Division of Control and Instrumentation**

The teaching and research activities of the Division of Control and Instrumentation cover the broad areas of control, automation, robotics, computer vision, biomedical engineering. The Division actively promotes the development and integration of these areas so as to bring about innovations and new applications. It has 24 academic staff members and 9 laboratories to support its teaching and research activities. The Division offers two final-year options: Intelligent Systems and Control Engineering, and Biomedical Electronics. It also offers a very successful M.Sc. programme in Computer Control and Automation, and supports three courses for the School of Mechanical and Aerospace Engineering’s M.Sc. programme in Biomedical Engineering.

The Division is active in broad research areas of control systems technology, robotics, computational intelligence, computer vision and biomedical engineering. In particular, the Division is strong in control theory, energy efficiency, mobile robotics and computational intelligence. Staff members of the Division actively participate in the R&D activities of the research centres: EXQUISITUS, Centre for E-City (http://www.exquisitus.eee.ntu.edu.sg) and VALENS, Centre of Excellence for Bio-Instrumentation, Devices, and Signal Processing (http://www.valens.eee.ntu.edu.sg/). Our research activities are driven by Singapore’s needs to develop more efficient and competitive expertise and technologies relevant to the automation and control industries, and are funded by National Research Foundation, A*STAR, MOE, DSO, MINDEF, and industries. The Division organises a biennial International Conference on Control, Automation, Robotics and Vision that provides a forum for sharing the latest knowledge and development in these areas.

**Division of Communication Engineering**

The Division of Communication Engineering supports teaching and research activities in the areas of telecommunications and networking. Besides teaching communication engineering and networking courses at the undergraduate level, the Division offers an M.Sc. programme in Communications Engineering to cater for the needs of practicing engineers in industry and the postgraduate students. In addition, the Division also provides a graduate diploma programme in Information Communication Technology (G Dip ICT) for those who are interested in making a career switch to the Infocomm Industry.

Staff members lead research activities at three research centres: Network Technology Research Centre (NTRC), Satellite Research Centre (SaRC), and Positioning and Wireless Technology Centre (PWTC). In addition, the Division hosts four research groups: Microwave Circuits, Antennas and Propagation (MCAP), Modulation, Coding and Signal Processing (MCSP), Media & Networking, and Optical Communication. Some staff members also participate in the research projects of the Centre for Signal Processing (CSP), Centre for Modelling and Control of Complex Systems (CMCCS), and Centre for Information Security (CIS).

The Division, together with the Division of Information Engineering, has been organising a biennial International Conference on Information, Communications and Signal Processing since 1997. Similarly, together with the Division of Microelectronics, the Division organizes a biennial International Conference named Photonics Global Conference since 2008.

The Division is active in various communication areas, including communication theory, wireless communications, RF & microwave engineering, antenna design, optical communications, photonics, networking and algorithms. It has more than 100 PhD students working in a wide range of research topics. Yearly publications comprise about 150 journal papers and near 100 conference papers. Research grants for on-going projects exceed $15 million.

**Division of Microelectronics**

The Division is responsible for teaching and research in the fields of Microelectronics and Photonics. Besides supporting the teaching of two final-year specialisations in Microelectronics and Photonics at the undergraduate level, the Division also runs two M.Sc. programmes, namely, the M.Sc. in Electronics and the NTU-TUM Joint M.Sc. in Microelectronics. As for the Ph.D. degree programme, other than the NTU Ph.D. degree, the division also offers joint Ph.D. degrees with TUM, Paris-Tech and UTT Paris.

Staff of the Division are also actively involved in research work at the following centres.

1. (1) NOVITAS, Centre of Excellence for Nanoelectronics. The following are the key research focuses of this research centre:
   - Advanced Silicon Device and Integration Technologies
   - Compound Semiconductor Devices and ICs
   - Nanotechnologies
   For more information, please visit http://www.novitas.eee.ntu.edu.sg/

2. (2) OPTIMUS, Centre of Excellence for advanced photonic research with impacts on fundamental science as well as novel technology and applications. The following are the key research focuses of this research centre:
   - Novel Photonic Materials and Devices
   - Photonic Nano-Structures and Applications
   - Optical Fibre Technology
   - Advanced Optical Communications
   For more information, please visit http://www.optimus.eee.ntu.edu.sg/

As of April 2012, the number of postgraduate research students registered for M.Eng. and Ph.D. degrees stands at 173 (MEng:2, PhD:171).
## Curriculum Structure - Bachelor of Engineering (EEE) (GCE ‘A’ Level Intake)

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* Students without ‘A’ level Physics are required to read FE1012 Physics A (4 AU), instead of FE1011.

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Total Academic Units for Graduation **138**
#### Curriculum Structure - Bachelor of Engineering (EEE)

(Polytechnic Diploma Intake)

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**Curriculum Structure - NTU-Georgia Integrated Bachelor of Engineering (EEE) & MS (ECE) Programme**

*(GCE ‘A’ Level Intake)*

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#### Graduation Requirements For NTU B.Eng. (EEE) 138 AU

### Year 4 at Georgia Tech

Fulfill the Georgia Tech’s M.S.(ECE) requirements:
- Three ECE 6000 level (or above) courses from a combination of two technical areas: Computer Engineering and Telecommunications.
- Three ECE 6000 level (or above) courses, two of which must be outside the above two technical areas.
- Two minor subjects in an area outside ECE, such as Mathematics, Computer Science, etc.
- Two electives, which may be met by credit transfer, subject to Georgia Tech’s approval, from two NTU’s senior-level or graduate-level courses in relevant areas.
The Technical Electives for B.Eng.(EEE) in the Infocomm group are:

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**Total Academic Units for Graduation** 138
Curriculum Structure - Bachelor of Engineering (IEM)
(Polytechnic Diploma Intake)

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<td>(A) IM1001 Data Structures &amp; Algorithms ; (B) IM1002 Analog Electronics ; (C) IM1003 Object-Oriented Programming ; (D) IM1004 Digital Electronics.</td>
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**Special Programme**

**Design and Innovation Project**
The Design and Innovation Project (DIP) is a practical training course for all full-time second-year EEE/IEM students. The course is designed to exercise creativity, stimulate innovation and cultivate technopreneur capabilities. It focuses on an in-depth project covering the design, prototyping, testing and documentation of innovative electrical, electronic or IT products. The course, supported by lectures in project management, requires each student to undertake a project and work in groups under the supervision of academic staff. It culminates in a project competition. Through proposing team-based projects, students are actively involved in this course.

**UROP**
UROP has been offered in EEE since 1997 to encourage more undergraduates to consider R&D as a career choice.

In EEE, UROP is administered as an unrestricted elective course, carrying 3AUs. Students are expected to conduct an independent in-depth study of a particular topic under the supervision of an academic staff.

**Undergraduate Research Experience on Campus**
The Undergraduate Research Experience on Campus (URECA) aims to cultivate a research culture amongst the most able undergraduates at NTU.

URECA is available to undergraduates (second and third years in four-year Bachelor's degree programmes and second years in three-year Bachelor's degree programmes) who have excelled in their academic examinations.

This ‘select’ group of undergraduates are eligible for either stipend, without academic units or with academic units and if they choose to undertake URECA, they will be known as NTU President Research Scholars (NTU PRSs). NTU PRSs are required to undertake a research project for a minimum of 160 hours over a 10-month in an academic year. Invitations are sent to eligible students in August.

For details, please visit the website http://www.ntu.edu.sg/ureca/Pages/default.aspx.

**Description of Courses**
Please visit our website at http://www.eee.ntu.edu.sg/CurrentStudents/Undergraduate/Pages/Undergraduate.aspx for the information on Description of Courses.
School of Materials Science Engineering

Undergraduate study

Bachelor of Engineering in Materials Engineering

Programme features:
- Four-year full-time for the B.Eng degree (Direct Honours)
- Accelerated Honours stream for better students to obtain Honours degree in three and a half years
- Excellent training in individual and team project work
- Comprehensive hands-on training through formal laboratory work
- Industrial Attachment
- Superbly equipped laboratories
- Specializations in selected areas in the final year

Bachelor of Engineering in Materials Engineering

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<tr>
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Bachelor of Engineering in Materials Engineering with Minor in Business

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<td><strong>Total AUs</strong></td>
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Curriculum structure

Bachelor of Engineering in Materials Engineering (Hons)

Accelerated Stream

Year 1
- Semester 1
- Semester 2
Year 2
- Semester 1
- Semester 2
Year 3
- Semester 1
- Semester 2
Industrial Attachment
- Semester 2
Final Year Project
- Semester 1

Bachelor of Engineering (B.Eng.) Degree

- First Class Honours
- Second Upper Honours
- Second Lower Honours
- Third Class Honours
- Pass

Bachelor of Engineering in Materials Engineering (Hons) and minor in Business

Year 1
- Semester 1
- Semester 2
Year 2
- Semester 1
- Semester 2
Year 3
- Semester 1
- Semester 2
Industrial Attachment
- Semester 2
Final Year Project
- Semester 1

Bachelor of Engineering (B.Eng.) Degree

- First Class Honours
- Second Upper Honours
- Second Lower Honours
- Third Class Honours
- Pass
Bachelor of Engineering in Materials Engineering and Bachelor of Arts (Hons) in Economics (New curriculum)

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Curriculum structure for Double Degree

- First Class Honours
- Second Upper Honours
- Second Lower Honours
- Third Class Honours
- Pass

Description of Courses

Please visit our website at http://www.mse.ntu.edu.sg/CURRENTSTUDENTS/UNDERGRADUATE/Pages/CourseSummary.aspx for the information on Description of Courses.

School of Mechanical and Aerospace Engineering

Undergraduate study

Aerospace Engineering

Aerospace Engineering is the application of advanced science and engineering principles to the design, assembly, manufacturing and optimisation of flight vehicles and their propulsion systems. These vehicles include a variety of aircraft and spacecraft. It is often called aeronautical engineering when referring solely to aircraft and astronautical engineering when referring to spacecraft. Aerospace engineering encompasses both.

The division has its vision set on placing MAE’s Aerospace Engineering at the forefront of aerospace engineering education, research and outreach programmes in Asia and the Asia-Pacific region. The BEng (Aerospace Engineering) degree programme has successfully obtained full accreditation from the Engineering Accreditation Board (EAB) in 2011. The Aerospace Engineering degree programme has also received regional recognition at the Frost & Sullivan Asia Pacific Aerospace & Defense Awards where NTU was singled out as the “2009 Aerospace Academic Institution of the year” in recognition for its outstanding role in nurturing the best Aerospace engineers for the future and providing them with skills to meet the industry’s high standards.

Students undergo rigorous training that includes courses that address the appropriate core competencies in flight sciences and integrated system view of aircraft design, manufacturing, assembly, maintenance, and safety. Our staff also adopt a holistic approach when it comes to teaching through the introduction of problem-based learning, as well as the provision of industrial mentors to give our students the vital practical link to the growing aviation industry. The programme has strong backing from the aviation industry and defense organisations as evident by their provision of scholarships and contribution to collaborative research funds.

In research, the division has identified four Knowledge Domains (KDs) in Aerodynamics, Flight Mechanics and Control, Aerospace Structures and Propulsion. Our academic staff’s expertise cover these domains and more. The Main Aircraft Laboratory houses facilities to support teaching and research; these include the four KD based laboratories, a fighter jet, helicopters, a flight simulator, water and wind tunnels.

Engineering Mechanics

The Engineering Mechanics division is dedicated to excellence in teaching and research. It ensures that its work strategically supports the mission of the School and University. The Division comprises faculty members whose expertise lie broadly in the four domains, namely solid mechanics; dynamics, vibration and acoustics; numerical methods; and micro mechanics and systems.

The division provides fundamental and specialised courses essential for the analysis and design of mechanical systems and components. The courses include mechanics of materials; mechanics of structures; kinematics and dynamics of machinery; design of machine components; engineering design; finite element methods for engineering applications; noise and vibration; mechanics of aerospace materials; aerospace structures; marine and offshore structural integrity, etc. The division also offers postgraduate courses in the areas of advanced mechanics of materials; failure analysis; experimental mechanics; micromechanics; biomaterials and biomechanics; electronic packaging; mechanics of micro-systems and MEMS.

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Faculty members in the division are highly active in research through both fundamental and strategic research programmes. Current research interests are broadly scoped and grouped into four knowledge domains, namely: solid mechanics, dynamics, vibration and acoustics, numerical methods and micro mechanics and systems. The research activities are funded by various government agencies and industry partners. Modern laboratories are in place to support research as well as teaching. The division attracts high calibre research students both locally and internationally, and has strategic collaborations with renowned universities and institutions.

**Manufacturing Engineering**
Manufacturing translates ideas, concepts and design into tangible products and services that meet the needs of society. Manufacturing engineering is multi-disciplinary in nature involving the science and engineering of materials, processes, inspection and measurement, process design and computational modeling, to name a few. Besides technology, modern manufacturing deals with the economic and organisational impact of product and process design, as well as marketing, production, distribution, product service support and sustainable manufacturing.

The teaching and research in the division covers the processing and applications of metals, polymers, ceramics, composites and semiconductor and bio-materials, ultra-precision engineering and micro/nano fabrication, surface engineering, advanced measurement and inspection, joining and assembly and tribology.

Contrary to popular belief, manufacturing in Singapore has not waned but rather morphed into high end manufacturing. For example, April 2011 figures from EDB shows that the precision engineering industry alone employs 22 percent of the total manufacturing workforce in Singapore. The division continues to help local industries maintain a competitive edge and leadership position by researching Next Generation Manufacturing technologies such as advanced materials and materials processing, multi-scale modelling, advanced 3D additive manufacturing, concurrent engineering, green design and manufacturing, precision engineering, and advanced manufacturing and re-manufacturing processes.

**Mechatronics and Design**
The core competencies of the Division are in mechatronics, sensing & system Identification, actuation & control, and computer visualisation. The focus is on the synergistic integration of mechanical engineering with electronics, intelligent computer control and design which is vital in the realisation of innovative products and systems. The division aims to train and nurture engineers and researchers who can conceptualise and design innovative products and systems in support of Singapore’s new economy.

In teaching, the division is responsible for the core curricula of the undergraduate Mechatronics Specialisation stream, and hosts the undergraduate Mechatronics Specialisation stream, and hosts the undergraduate Mechatronics Specialisation stream, and hosts the undergraduate Mechatronics Specialisation stream, and hosts the undergraduate Mechatronics Specialisation stream, and hosts the undergraduate Mechatronics Specialisation stream, and hosts the undergraduate Mechatronics Specialisation stream, and hosts the undergraduate Mechatronics Specialisation stream. It strives to support the School’s initiative in maximising students’ potential.

Faculty members undertake research in biomedical robotics and biomechatronics; robotic rehabilitation technology; unmanned mobile robots; underwater robotic vehicles; modular re-configurable robots; artificial intelligence; innovative product design; informatics, medical and bio-informatics; and virtual reality. Staff members have been awarded research funds from the industry, the University and research agencies such as A*STAR. They are active in transferring the outcomes of their research to industry. Internationally, Staff members are recognised for their contributions to research and they continue to forge strategic alliances with colleagues from renowned overseas universities and research institutes.

**Systems and Engineering Management**
The division deals with systems engineering, human factors engineering, operations research, quality, reliability and design studies. Faculty members typically specialise in one of these knowledge areas. This diversity gives much strength in dealing with complex design problems, where a systems approach is necessary to:
1) obtain systems overview,
2) specify design goals,
3) conceptualise the problem
4) specify methods for systems analysis,
5) design of the system or artifact, and
6) manage and maintain the system.

There are large and complex design problems – such as designing a power distribution system or a large seaport in Singapore. There are also smaller problems such as designing a process control display that is useful and informative for process controllers. The interest in design permeates the teaching and research at both undergraduate and graduate levels.

Undergraduate and graduate levels courses are offered in engineering management, logistics, operations research, smart product design, computer integrated manufacturing and human factors engineering.

There are many Ph.D. students with research interests in a variety of topics, including: modelling of intelligent manufacturing systems and supply chain management, human errors in medical practice, manufacturing optimization, and strategic studies in manufacturing. Faculty members continue to receive external research grants as well as government research funding in areas such as additive manufacturing, human factors engineering, manufacturing optimization and logistics, networks reverse engineering, cognitive engineering, affective design and tissue engineering.

**Thermal and Fluids Engineering**
Rapid advances in technologies in the last decade have brought forth new challenges in thermal sciences and fluid mechanics. For instance, thermal management of electronic packaging is critical as we approach the sub-micron and even nano-scale levels. The realms of bioengineering and nanotechnology have opened up a myriad of opportunities for engineers working in the thermal and fluids engineering. Increasingly, we find that existing knowledge is insufficient to deal with such complex systems.

Faculty members in the Thermal and Fluids Engineering division have responded to these challenges by undertaking research projects in the areas of computational modelling of the physiological systems, DNA modelling, biomedical engineering, transport phenomena in micro-channels and micro-fluidics, thermal management of advanced electronic packages, fuel cells, hydrogen production, green buildings and gas separation technology.

The division is involved in teaching the fundamentals of thermodynamics, fluid mechanics and heat transfer. The expertise within the division is manifested in final year options that are offered, namely, aeronautical engineering and energy and the
environment. In addition, faculty members within the division are also involved in teaching several postgraduate courses offered by the school. Teaching and research in the division are supported by several well-equipped laboratories providing all the essential facilities.

For more information, please visit our website at www.mae.ntu.edu.sg

Programmes
Undergraduate programmes offered at MAE:

- **Degree in Mechanical Engineering or Aerospace Engineering**
  For current students:
  http://www.mae.ntu.edu.sg/ProspectiveStudents/Undergraduate(Full-Time)

  For prospective students:
  http://www.mae.ntu.edu.sg/CurrentStudents/Undergraduate(Full-Time)

- **Double Degree in Engineering (Mechanical / Aerospace) and Business**
  For current students:
  http://www.mae.ntu.edu.sg/ProspectiveStudents/Undergraduate(Full-Time)/Pages/DoubleDegree.aspx

  For prospective students:
  http://www.mae.ntu.edu.sg/CurrentStudents/Undergraduate(Full-Time)/Pages/DoubleDegree.aspx

- **Minor in Systems Management**
  The Minor is open to all current students of NTU except those from MAE students.
  http://www.mae.ntu.edu.sg/CurrentStudents/Undergraduate(FullTime)/Pages/MinorinSystemsManagement.aspx

- **Degree in Mechanical Engineering (Part-Time Programme)**
  For current students:
  http://www.mae.ntu.edu.sg/CurrentStudents/Undergraduate(PartTime)

  For prospective students:
  http://www.mae.ntu.edu.sg/ProspectiveStudents/Undergraduate(Part-Time)/Pages/Curriculum.aspx

- **Degree in Aerospace Engineering**
  http://www.mae.ntu.edu.sg/ProspectiveStudents/Undergraduate(Full-Time)/Pages/AerospaceEngineeringProgramme.aspx

  http://www.mae.ntu.edu.sg/CurrentStudents/Undergraduate(FullTime)/AerospaceEngineeringCurriculum/Pages/BRCCurriculum.aspx

- **Double Degree in Engineering (Mechanical / Aerospace) and Business**
  http://www.mae.ntu.edu.sg/ProspectiveStudents/Undergraduate(Full-Time)/Pages/DoubleDegree.aspx

  http://www.mae.ntu.edu.sg/CurrentStudents/Undergraduate(FullTime)/Pages/DoubleDegree.aspx

- **Minor in Systems Management**
  The Minor is open to all current students of NTU except those from MAE students.
  http://www.mae.ntu.edu.sg/CurrentStudents/Undergraduate(FullTime)/Pages/MinorinSystemsManagement.aspx

Description of Courses
Please visit our website at http://www.mae.ntu.edu.sg/CurrentStudents/Pages/Home.aspx for the information on Description of Courses.
College of Humanities, Arts, and Social Sciences

Undergraduate Programmes
The college offers a wide range of undergraduate programmes through its three Schools:

School of Art, Design & Media
Bachelor of Fine Arts in Digital Animation
Bachelor of Fine Arts in Digital Filmmaking
Bachelor of Fine Arts in Photography and Digital Imaging
Bachelor of Fine Arts in Interactive Media
Bachelor of Fine Arts in Product Design
Bachelor of Fine Arts in Visual Communication

School of Humanities & Social Sciences
Bachelor of Arts (Honours) in Chinese
Bachelor of Arts (Honours) in Economics
Bachelor of Arts (Honours) in English Literature
Bachelor of Arts (Honours) in History
Bachelor of Arts (Honours) in Linguistics and Multilingual Studies
Bachelor of Arts (Honours) in Psychology
Bachelor of Arts (Honours) in Sociology
Bachelor of Arts (Honours) in Economics and Bachelor of Engineering (Honours)
(A double degree programme offered by the School of Humanities & Social Sciences and the College of Engineering)

Bachelor of Science (Honours) in Mathematics and Economics
(A joint degree programme offered by the School of Physical & Mathematical Sciences and the School of Humanities & Social Sciences)

Wee Kim Wee School of Communication & Information
Bachelor of Communication Studies with Honours – with concentrations in the areas of Journalism, Broadcast and Cinema Studies, Advertising, Public Relations and Communication Policy & Research.

School of Art, Design & Media

Undergraduate study

(1) Programmes offered
Bachelor of Fine Arts in Digital Animation
Bachelor of Fine Arts in Digital Filmmaking
Bachelor of Fine Arts in Photography and Digital Imaging
Bachelor of Fine Arts in Interactive Media
Bachelor of Fine Arts in Product Design
Bachelor of Fine Arts in Visual Communication

(2) Curriculum structure
The curriculum is based on a common Foundation core. Specialised programmes begin in the second year. The curriculum encourages interdisciplinary study and incorporates the University’s general education requirements.

Curriculum structure for students admitted before AY2011-12:

<table>
<thead>
<tr>
<th>Type of Courses</th>
<th>Number of AUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core</td>
<td>PE</td>
</tr>
<tr>
<td>Foundation Core</td>
<td>24</td>
</tr>
<tr>
<td>Major Area Core</td>
<td>24</td>
</tr>
<tr>
<td>Art History</td>
<td>12</td>
</tr>
<tr>
<td>Prescribed Electives</td>
<td>-</td>
</tr>
<tr>
<td>Final Year Project</td>
<td>9</td>
</tr>
<tr>
<td>General Education Requirement (GER)</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>81</td>
</tr>
</tbody>
</table>

Curriculum structure for students admitted in and after AY2011-12:

<table>
<thead>
<tr>
<th>Type of Courses</th>
<th>Number of AUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core</td>
<td>PE</td>
</tr>
<tr>
<td>Foundation Core</td>
<td>21</td>
</tr>
<tr>
<td>Major Area Core</td>
<td>24</td>
</tr>
<tr>
<td>Art History</td>
<td>9</td>
</tr>
<tr>
<td>Prescribed Electives</td>
<td>-</td>
</tr>
<tr>
<td>Final Year Project</td>
<td>12</td>
</tr>
<tr>
<td>General Education Requirement (GER)</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>78</td>
</tr>
</tbody>
</table>

Description of Courses
Please visit our website at http://www.adm.ntu.edu.sg/Current ADM/Undergraduate/Pages/Home.aspx for the information on Description of Courses.

School of Humanities and Social Sciences

Chinese Division
The Division of Chinese at Nanyang Technological University (NTU) has its roots in Nanyang University, which was established in 1955, as well as the Centre for Chinese Language and Culture (CCLC), which was established in 1994.

In July 2004, the Division of Chinese began to offer the Minor in Chinese and General Electives, which had been offered until then by the CCLC. The Division also launched its graduate programmes, and offered scholarships to full-time M.A. and Ph.D research students. In July 2005, it expanded into a full-fledged Division and started offering the B.A. in Chinese programme.

The Division of Chinese is one of the seven divisions of the School of Humanities and Social Sciences, which was established as part of NTU’s plan to become a comprehensive university. It is the flagship division in the field of humanities and has full support from the University.

The Division’s mission is to inherit the Chinese traditions, to understand the contemporary world, and to encompass the local and the regional.
Curriculum for the Bachelor of Arts in Chinese

The B.A. in Chinese at NTU is a four-year programme. The objectives of the four-year B.A. in Chinese programme are:

- To establish a concrete foundation in the reading of both classical and modern texts. With this foundation, the students will be able to pursue critical study of courses in various specialisations with depth and breadth.
- To prepare students with knowledge in primary areas deemed essential to an undergraduate programme in Chinese by offering general survey courses and study in these areas. Courses in these two groups are called the Chinese Major courses.
- To offer an education that not only specialises in selected areas within the traditional disciplines of Chinese studies or Chinese language and literature but also provides interdisciplinary perspectives and cross-cultural approaches, which are part and parcel of the present age of globalisation and frequent intercultural exchanges. There is a list of Chinese Prescribed Electives in five categories that serve this objective.

NTU already offers an unrivalled choice of Minors. Starting from AY05/06, the Chinese Division also offers qualified students the option to pursue a double major. The second major may be in any of the disciplines offered at the School of Humanities and Social Sciences.

The Curriculum (For AY2011/12 Intake onwards)

To graduate, students must complete two categories of requirements, totaling at least 126AUs:

- Major Requirements (69AUs)
- General Education Requirements (GER) (57AUs)

(a) Major Requirements 69AUs

The major requirements for a Chinese Major are:

1. Chinese Major Core (35 AUs)
2. Major Prescribed Electives (34 AUs)**

Students must take at least 2 courses at HC3XXX, and 4 courses at HC4XXX.

(b) General Education Requirements

All HSS students will be required to complete nine courses as part of the General Education Requirements.

1. Two courses from GER – Core (6AUs)
   - HW0100 The Craft of Writing
   - HW0300 Mastering Communication
2. One course from Singapore Studies Course (3AUs)
3. One course from Environmental Sustainability Course (3AUs)
4. Five courses from a list of GER – Prescribed Electives (PEs) (15AUs) in the following categories with at least one course in each category
   - Science and Technology
   - Humanities and Social Sciences
   - Business and Management
   - Liberal Studies
5. GER – Unrestricted Electives (30AUs) to be chosen from any school

Students may fulfill the remaining 30 AUs from any school. They may make use of unrestricted electives to fulfill the requirements for a second Major, one or two Minor(s), or to read more courses from the Chinese Division.

Students doing the Chinese Major programme are strongly encouraged to take up a Minor programme. They are especially encouraged to take up the Minor in Translation. Upon completion, they will be recognised as having successfully completed a Major in Chinese and a Minor in Translation although the two programmes are offered by the same Division.

Major Core (compulsory) Subjects

HC1001 Introduction to the Study of Literature and Culture (3AUs)
HC1002 Introduction to Chinese Language (3AUs)
HC2001 Literature of Pre-Qin, Han, Wei and Jin (3AUs)
HC2003 Literature of Tang and Song (3AUs)
HC2004 Literature of Yuan, Ming and Qing (3AUs)
HC2005 General History of China (3AUs)
HC3001 Modern Chinese Literature (3AUs)
HC3002 History of Chinese Thought (3AUs)
HC3003 Southeast Asian Chinese (3AUs)
HC4099 Graduation Project (8AUs)

Prescribed Electives

Category A: Chinese Literature and Culture

HC1010 Literature in Taiwan and Hong Kong (3AUs)
HC2010 Classical Chinese Fiction (3AUs)
HC2011 Tang Poetry (3AUs)
HC2012 Chinese Folk Literature (3AUs)
HC2013 Critical Approaches to Chinese Literature and Culture (3AUs)
HC2014 Chinese Theatre and Performance (3AUs)
HC3010 Classical Chinese Drama (3AUs)
HC3011 Studies of Selected Poets (3AUs)
HC3012 Creative Writing Workshop (3AUs)
HC3013 Modern Poetry, Modernism and Modernity (3AUs)
HC3014 Cultural Study of Chinese Cinemas (3AUs)
HC4010 Classical Chinese Literary Theory (4AUs)
HC4011 Love and Desire in Late Ming Culture (4AUs)
HC4012 Fictional Narratives in Chinese Fiction (4AUs)
HC4013 Gender and Sexuality in Chinese Literature (4AUs)
HC4014 Special Topics in Chinese Literary and Cultural Studies (4AUs)
HC4015 Special Topics in Classical Chinese Literature (4AUs)

Category B: Chinese History and Thought

HC2030 Pre-Qin Thought (3AUs)
HC2031 Confucian Thought (3AUs)
HC2032 Division and Integration: From the Spring-Autumn/ Warring States to Sui, Tang and the Five Dynasties (3AUs)
HC2033 Chinese Buddhism and Daoism (3AUs)
HC2034 Conquering and Conquered Dynasties: From Song to Qing (3AUs)
HC2035 War and Memory in Modern China (3AUs)
HC4030 Modern Chinese Intellectuals and Political Movements (4AUs)
HC4031 Interculturalism in Chinese History (4AUs)
HC4032 Special Topics in Chinese History and Thought (4AUs)
Economics Division

The Division of Economics has its roots in the Division of Applied Economics in the Nanyang Business School that was established in 1993. Economics as a course offering however goes back to the historical days of Nanyang University (1955).

The Division is currently supported by a large mix of local and international faculty comprising more than 30 academic staff, many of whom have Ph.D.s from renowned universities from around the world. Moreover, faculty members have also contributed and participated regularly in major international conferences and have served as consultants to prominent international organisations such as the United Nations, World Bank, International Monetary Fund and Asian Development Bank.

Faculty members have also locally provided advice and expertise to government ministries such as the Ministry of Finance, the Ministry of Trade and Industry, the Ministry of Manpower, the Ministry of the Environment and Water Resources and the Ministry of Health as well as to statutory boards like the Monetary Authority of Singapore, the Economic Development Board, IE Singapore and the Maritime and Port Authority.

Our goals are to: (1) provide a good well-rounded undergraduate education in economics with breadth, depth, rigor and flexibility, (2) provide specialised graduate training in chosen areas, (3) create a thriving research environment among faculty that will establish the Division as the hub of intellectual excellence in various areas of research with a focus on Singapore, ASEAN and Asia in general.

The B.A. Hons in Economics is designed as a four-year programme. To graduate, students are required to complete at least 126AUs.

Major Core (Compulsory) Subjects

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>HE1001</td>
<td>Microeconomics Principles (Year 1)</td>
</tr>
<tr>
<td>HE1002</td>
<td>Macroeconomics Principles (Year 1)</td>
</tr>
<tr>
<td>HE2001</td>
<td>Intermediate Microeconomics</td>
</tr>
<tr>
<td>HE2002</td>
<td>Intermediate Macroeconomics</td>
</tr>
<tr>
<td>HE4010</td>
<td>Singapore Economy in a Globalised World</td>
</tr>
</tbody>
</table>

Choose at least ONE from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>HE1004</td>
<td>Introduction to Statistical Theory &amp; Methods or</td>
</tr>
<tr>
<td>HE1005</td>
<td>Introduction to Probability and Statistical Inference</td>
</tr>
</tbody>
</table>

Choose at least ONE from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>HE2004</td>
<td>Introductory Econometrics or</td>
</tr>
<tr>
<td>HE2005</td>
<td>Principles of Econometrics</td>
</tr>
</tbody>
</table>

Others

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>HE4099</td>
<td>Graduation Project</td>
</tr>
</tbody>
</table>

Prescribed Electives

Choose FOUR from Group A

Group A

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>HE1003</td>
<td>Basic Mathematics for Economists</td>
</tr>
<tr>
<td>HE2013</td>
<td>International Trade</td>
</tr>
<tr>
<td>HE2006</td>
<td>International Monetary Economics</td>
</tr>
<tr>
<td>HE2007</td>
<td>Money and Banking</td>
</tr>
<tr>
<td>HE2008</td>
<td>Public Finance</td>
</tr>
<tr>
<td>HE2009</td>
<td>Industrial Organisation</td>
</tr>
<tr>
<td>HE2010</td>
<td>Development Economics</td>
</tr>
<tr>
<td>HE2011</td>
<td>Labour Economics and Labour Relations</td>
</tr>
</tbody>
</table>
Choose EIGHT from Group B of which THREE have to be HE4xxx

Group B
HE2012 Economic Thought
HE2015 Macroeconomic Issues and Policies in Contemporary China
HE2020 Survey Methods & Sampling Techniques
HE3001 Mathematical Economics
HE3002 Game Theory & Applications to Social Sciences
HE3003 The Chinese Economy
HE3004 Health Economics
HE3005 Environmental Economics
HE3006 Urban & Transport Economics
HE3007 Financial Economics
HE3009 Population Economics
HE3010 Energy Economics
HE3011 Cost-benefit Analysis
HE3012 Political Economy of East Asia
HE3020 Applied Econometrics
HE3021 Intermediate Econometrics
HE3022 Econometric Modelling & Forecasting
HE3023 Econometric Analysis of Financial Data
HE4001 Advanced Microeconomics
HE4002 Advanced Macroeconomics
HE4003 Advanced International Finance
HE4004 Behavioural Economics
HE4005 Growth Theory and Empirics
HE4011 Current Topics in Economics
HE4020 Econometric Time Series Analysis
HE4021 Advanced Econometrics

Students are encouraged to group their courses such that they specialise in one of the following specific areas:
(1) Development and Public Policy,
(2) Finance and Business,
(3) Quantitative Economics.

John Maynard Keynes once wrote, “The ideas of economists and political philosophers, both when they are right and when they are wrong, are more powerful than is commonly understood. Indeed the world is ruled by little else.” Living in a world that is constantly torn by economic problems, economic ideas can definitely shape and sway people’s minds, and economic inquiries can be truly exciting and rewarding.

English Division
The Division of English currently offers a major and a minor in English literature, both the M.A. and the Ph.D. by research, a minor in Creative Writing, and general elective courses for all NTU students. By contributing to the university at large, and to students who choose English Literature as their major, we provide a significant contribution to the New Undergraduate Experience.

B.A. (Hons) in English Literature
This four-year direct honours Bachelor’s degree in English Literature focuses on traditional areas of English literary studies while also accommodating contemporary innovative approaches to literary study. Significant elements of this B.A. degree include comparative literature, Singapore literature and culture, international Asian literature, contemporary literature, dramatic literature, critical and literary theory, cultural studies, film studies, postmodernism, new literatures in English and gender studies. Furthermore, students are also given the opportunity to specialise in one or more of these areas during their undergraduate education. The direct honours degree includes a final year essay, which will allow students to give expression to their chosen area(s) of literature.

The Division of English encourages innovative thought, scholarly rigour, open expressions, and high levels of interaction and debate between lecturers and students with the aim of developing a thriving and exciting community of ideas and creative pursuits.

Major Core (compulsory) Subjects
HL1001 Introduction to the Study of Literature
HL1002 Survey of English Literature I
HL1003 Survey of English Literature II
HL1004 Classical Literature
HL1005 Singapore Literature & Culture I
HL2024 Approaches to Literature
HL2038 Introduction to American Literature

Prescribed Electives
Choose at least THREE from Category A, ONE each from Categories B to G, and the remaining 3 from any category. (At least FOUR courses must be of HL4xxx).

Category A - Period Studies
HL2001 Medieval Literature
HL2002 Renaissance
HL2003 Restoration and Eighteenth-Century Literature
HL2004 Sensibility and Romanticism
HL2005 Victorian Literature
HL2006 Modernism
HL2007 Contemporary Literature

Category B - Asian Literature and Culture
HL2008 Singapore Literature and Culture II
HL2009 Southeast Asian Literature and Culture
HL2010 East Asian Literature
HL2011 Representations of Asia
HL2012 Asian-American Literature
HL2013 British-Asian Literature
HL2014 Urban Culture Asia

Category C - Film & Theatre
HL2026 Reading Drama
HL2037 History of Film
HL3001 Film Theory
HL3002 Film, Politics and Ethics
HL3003 Film & Literature
HL3004 World Cinema
HL3006 Modern Drama
HL3033 Performance and Cultural Industry
HL4012 Advanced Studies in Drama
HL4014 Advanced Studies in Film

Category D - World Literature
HL2022 South Asian Literature
HL2032 African Literature
HL3007 Postcolonial Literature
HL3008 Postcolonial Women’s Writing
HL3009 Comparative Literature
HL3010 European Literature
HL3014 Latin American Literature
HL3026 Australasian Literature : Colonial to 1945
HL3027 Australasian Literature : 1945 to the Present
HL3028 Writing the Pacific Rim in the Nineteenth Century
HL3034 Irish Literature
that they encounter, and communicate their findings in a well-
independent research, exercise critical judgment about the texts
secondary literature in their chosen areas of study, engage in
an argument persuasively. To be awarded the BA (Honours),
their capacities to conduct independent research and advance
in the final year research project, where students showcase
also cultivates interdisciplinarity. All of the training will culminate
advance in their coursework. The undergraduate programme
concentrate their studies on what most appeals to them as they

The History BA (Honours) programme is designed to equip
students with the breadth of knowledge about major historical
subjects. The structure of the programme enables students to
concentrate their studies on what most appeals to them as they
advance in their coursework. The undergraduate programme
also cultivates interdisciplinarity. All of the training will culminate
in the final year research project, where students showcase
their capacities to conduct independent research and advance
an argument persuasively. To be awarded the BA (Honours),
students should demonstrate the capability to master the
secondary literature in their chosen areas of study, engage in
independent research, exercise critical judgment about the texts
that they encounter, and communicate their findings in a well-
reasoned and scholarly manner.

The Curriculum
To graduate, students must complete two categories of
requirements, totalling at least 126 Academic Units (AUs):

I. Major Requirements (69 AUs)
The History Major Requirements comprises three components:
1. History Core Courses (24 AUs)
2. History Prescribed Electives (37 AUs)
3. Graduation Project (FYP) (8 AUs)

Major Core (Compulsory) Subjects
HH1001 What is History?
HH1002 Asia-Pacific in Global History: Pre-1800
HH1003 Asia-Pacific in Global History: From 1800
HH1004 Science and Technology in Historical Perspective
HH2001 Singapore: The Making of a Cosmopolitan City-State
HH2002 Gender in History
HH3001 Historiography: Theory and Methods
HH3002 Science, Technology, and Medicine in Modern East Asia
HH4099 Graduation Project

Major Prescribed Electives
Students must complete ELEVEN (11) prescribed electives—at least
SEVEN (7) at HH1000, HH2000 and HH3000 levels and at least
FOUR (4) at HH4000 level.

Students must choose at least THREE (3) courses from each of the
following three categories.

Category A: Global Asia
HH1008 The Emergence of Modern Southeast Asia
HH2105 East Asia: Tradition and Modernity
HH2009 China: From Revolution to Reform
HH2011 Ancient and Medieval South Asia
HH3003 Migration and Diaspora: Chinese Experiences in Historical
and Comparative Perspective

HH3007 Southeast Asian-China Interactions
HH3008 Modern South Asia
HH4003 The Silk Road: Old and New
HH4004 The Transnational Sea: The Indian Ocean in History
HH4090 Special Topics in History – Global Asia

Category B: Interdisciplinary History
HH1009 Culture and Media in History
HH2007 A Modern History of Global Health
HH2012 Feasting and Fasting: Food and Drink in History
HH2012 Cybersociety
HH3004 Comparative Business History
HH3010 Biotechnology and Society
HH4005 Culture and Heritage: Perspectives from History
HH4006 The Green Earth: Issues in Environmental History
HH4091 Special Topics in History – Interdisciplinary History

Category C: World History
HH1006 The West in Global History
HH1007 The Making of Civilizations
HH2004 The Islamicate World
HH2006 Modern European History
HH3006 The United States and the Modern World
HH4007 International History of the Cold War
HH4008 Revolutions and Social Changes in the Modern Times
HH4092 Special Topics in History – World History

B.A. (Hons) in History
The History BA (Honours) programme is designed to equip
students with the breadth of knowledge about major historical
subjects. The structure of the programme enables students to
concentrate their studies on what most appeals to them as they
advance in their coursework. The undergraduate programme
also cultivates interdisciplinarity. All of the training will culminate
in the final year research project, where students showcase
their capacities to conduct independent research and advance
an argument persuasively. To be awarded the BA (Honours),
students should demonstrate the capability to master the
secondary literature in their chosen areas of study, engage in
independent research, exercise critical judgment about the texts
that they encounter, and communicate their findings in a well-
reasoned and scholarly manner.
Graduation Project
The graduation project trains students in independent research. Guided by their supervisors, students identify their topics, formulate research questions, engage in archival and secondary source research, and present their findings and arguments in research papers. Students have the flexibility to opt out of the graduation project and read a class instead. To obtain a 1st or 2nd class upper honours degree, students must complete the assigned projects.

II. General Education Requirements (GER) (57 AUs)
All HSS students are required to fulfil their GER. They should read:

GER – Core (12 AUs)
Two courses from Communication Skills:
- HW0101 Introduction to Critical Writing
- HW0221 Essay Writing: Crafting an Argument

One course from Singapore Studies
One course from Environmental Sustainability

GER – Prescribed Electives (PEs) (15 AUs)
Students are required to complete at least one course from each category:
- Arts, Humanities, and Social Sciences (AHSS)
- Business and Management (BM)
- Science, Technology, and Society (STS)
- Liberal Studies (LS)

GER – Unrestricted Electives (UEs) (30 AUs)
Students can select any courses offered by any School.

Minor in History
To fulfil a minor in History, students must complete at least FIVE courses, including the required course, HH11001 What is History. Even though these FIVE courses can be taken in any sequence and at any time within the four year degree program, students are advised to complete HH11001 prior to taking other history courses.

For descriptions of our course offerings, please visit our website: http://history.hss.ntu.edu.sg/Undergraduate/Pages/UndergraduateCourseDescriptions.aspx#HH1008

Linguistics and Multilingual Studies Division
The Division of Linguistics and Multilingual Studies is the first of its kind in Singapore and the region. The study of Linguistics and Multilingual Studies allows students to explore the many interesting facets of language, from the properties of speech sounds to word and sentence structure, from children's language development to communication in bilingual and multilingual societies. It encompasses a very wide range of topics: how a finite inventory of basic linguistic units is deployed to express an infinite variety of meanings, how sentences are processed and decoded, how the bilingual and multilingual mind is structured, how sociological or cultural factors govern the simultaneous use of two or more languages in a community, and how technology impacts upon people's everyday use of language, to mention just a few.

B.A. (Hons) in Linguistics and Multilingual Studies
This four-year direct honours Bachelor's degree in Linguistics and Multilingual Studies contains a focus or a component part that addresses questions central to our understanding of language and multilingualism. Students majoring in LMS may organise their studies around the programme's five areas of concentrations: Psycholinguistics; Sociolinguistics; Computational Linguistics; General Linguistics and Applied English Linguistics. All of these concentrations share a common focus on the application of linguistic knowledge to practical issues related to languages in modern society.

The Curriculum
To graduate, students must complete two categories of requirements, totalling at least 126 AUs:
- General Education Requirement (GER) (57 AUs)
- LMS Major Requirements (69 AUs)

(a) General Education Requirement (GER) (57 AUs)
The GER consists of 3 sub-areas:
(i) GER – Core (12 AUs)
- 2 Communication Skills Courses (6 AUs)
- HW0101 Introduction to Critical Writing
- HW0201 Research Writing in the Social Sciences

1 from Singapore Studies Course (3 AUs)
1 from Environmental Sustainability Course (3 AUs)

(ii) GER - Prescribed Electives (PEs) (15 AUs)
Students are required to complete a distribution of GER-PEs consisting of:
- 1 course in Humanities and Social Sciences
- 1 course in Business and Management
- 1 course in Science and Technology
- 1 course in Liberal Studies
- 1 course from one of the 4 categories

(iii) GER - Unrestricted Electives (UEs) (30 AUs)
There are no restrictions on the selection of courses to make up unrestricted electives.

Students can:
- Complete a Minor in another discipline;
- Earn AUs under an International Exchange programme;
- Earn AUs under the optional Professional Attachment programme offered under HSS;
- Enrol in any course offered by any School as long as the pre-requisites are satisfied.

(b) Major Requirements (69 AUs)
The Major Requirements for a Linguistics and Multilingual Studies major consists of 2 components:
- Linguistics and Multilingual Studies Core courses (32 AUs)
- Linguistics and Multilingual Studies Prescribed Electives (37 AUs)

Major Core (compulsory) Subjects
HG1001 Fundamentals of Linguistics (A): Mind and Meaning
HG1002 Fundamentals of Linguistics (B): Structure and System
HG2001 Morphology and Syntax
HG2002 Semantics and Pragmatics
HG2003 Phonetics and Phonology
HG2005 Research Methodology
HG2010 Bilingualism and Multilingualism
HG2020 Language in Society

Others
HG4099 Graduation Project

Prescribed Electives
Choose 11 from the following concentrations (of which at least FOUR must be HG4xxx)

Language, Mind and Multilingualism
HG2012 Cognitive Linguistics
HG2013 Child Language
HG2014 Second Language Acquisition
HG2030 Reading Development and Disorders

Nanyang Bulletin 2012/13
We strongly encourage students to complete their Core Courses and take them as soon as they are offered, as these may constitute prerequisites for some courses offered in subsequent semesters. A failure to clear the Core Courses as early as possible will impose restrictions on the choice of courses that can be read in later years.

(c) Graduation Project (8AUs)

The objective of HG4099 Graduation Project is to provide students with independent research work under the guidance of a supervisor. They are expected to read widely to develop an in-depth understanding of a topic, and then identify research objectives, isolate new research questions, collect and analyse information or data and write up their findings as a research report. The graduation project integrates linguistic knowledge and analytical skills that the students have acquired throughout their degree programme.

Students must read the graduation project to obtain a 1st or 2nd class upper honours.

Psychology Division

The Division of Psychology offers undergraduate and graduate degrees in psychology. Balanced between scientific and professional emphases, the Division offers a comprehensive integrated curriculum for the undergraduate programme. The graduate programme currently consists of the M.A. and Ph.D. degree by Research. The division has active research in various areas including Behavioural and Cognitive Neuroscience; Clinical Psychology; Cognitive Science; Cultural and Social Psychology; Personality Psychology; Humans and Technology; Evolutionary Psychology and Animal Behaviour; Lifespan Development; Organizational Psychology; and Quantitative Psychology.

B.A. (Hons) in Psychology

The B.A. in Psychology (Hons) is a four-year programme for undergraduates interested in a major in Psychology in NTU. It has been offered from July 2005 onwards. Psychology is the scientific study of human behaviour. Its roots lie in the humanities, social sciences, as well as life sciences. It covers a wide spectrum of topics that range from the human nervous system to complex social cultural systems of contemporary societies. This rigorous training in Psychology is conducted in conjunction with a series of broadening courses in social sciences, humanities and business. The curriculum of B.A. (Hons) in Psychology at NTU is designed with both depth and breadth in mind to facilitate the student’s development into an intelligent global citizen.

To graduate, students must complete two categories of requirements, totalling at least 126AUs:

(1) Major Requirements (69AUs)

- Psychology Core (27AUs)
- Psychology Electives (34AUs)
- Graduation Project OR two 4AU 4000-level courses (8AUs)

Major Core (compulsory) Subjects

HP1000 Introduction to Psychology
HP1100 Fundamentals of Social Science Research
HP2100 Research Design and Data Analysis in Psychology
HP2200 Biological Psychology
HP2300 Developmental Psychology
HP2400 Social Psychology
HP2500 Personality and Individual Differences
HP2600 Cognitive Psychology
HP2700 Abnormal Psychology

Students should avoid delaying the reading of Core Courses and take them as soon as they are offered, as these may constitute prerequisites for some courses offered in subsequent semesters. A failure to clear the Core Courses as early as possible will impose restrictions on the choice of courses that can be read in later years.
Prescribed Electives
Choose at least SIX courses from the following:

HP3XXX courses Level 3000
HP3001 Learning and Behavioral Analysis
HP3002 Positive Psychology
HP3003 Engineering Psychology
HP3101 Applied Statistical Methods for Psychological Research
HP3201 Evolutionary Psychology
HP3202 Alcohol, Drugs and Behaviour
HP3203 Conservation Psychology
HP3301 Issues and Concerns in Adolescence
HP3302 Cognitive Development
HP3401 The Social Psychology of Human Communication
HP3501 Human Motivation
HP3601 Human Memory
HP3701 Psychological Adjustment and Mental Health
HP3702 Child Psychopathology
HP3703 Health Psychology
HP3704 Introduction to Clinical Neuropsychology
HP3705 Clinical Community Psychology
HP3801 Psychology in the Workplace
HP3802 Personnel Psychology
HP3803 Negotiation and Conflict Resolution
HP3804 Psychological Testing
HP3805 Managing Organisational Behaviour
HP3901 Cultural Psychology
HP3902 Psychology in the Asian Context

Choose at least FOUR from the following HP4XXX courses.(One must be HP4001 to qualify for Graduation Project)

Psychological Laboratory
HP4001 Research Laboratory in Psychology

Professional Modules
HP4101 Clinical Psychology
HP4102 Trauma Psychology, Crisis Intervention and Management
HP4103 The Forensic Psychology of Crime, Terrorism and Disasters

Seminars
HP4201 Technology and Social Behaviour
HP4221 Primate Psychology
HP4231 Social and Emotional Development
HP4241 Interpersonal relations and family studies
HP4242 Social Cognition
HP4261 Computational and Cognitive Neuroscience of Vision
HP4271 Cognitive Neuropolasticity
HP4272 Neuropsychology
HP4281 Psychology of Leadership

Graduation Project (HP4099)
The graduation project is undertaken during a student's final year. The objective of the Graduation Project in Psychology is to expose students to many of the elements that are inherent in independent research work in psychology.

(2) General Education Requirement (GER) (57AUs)
The GER consists of three sub-areas:

(i) GER – Core (12AUs)
2 Communication Skills Courses (6AUs)
- HW0101 Introduction to Critical Writing
- HW0201 Research Writing in the Social Sciences

(ii) GER – Prescribed Electives (PEs) (15AUs)
Any 5 courses from the following 4 subjects with at least one from each category:
- Arts, Humanities and Social Science
- Business and Management
- Liberal Studies
- Science and Technology

(iii) GER – Unrestricted Electives (30AUs)

Minor in Psychology
To successfully complete a minor in Psychology, students need to read and pass five Psychology courses. These courses include HP1000, HP100, at least one Foundation course, and at least two psychology electives.

Prerequisites to minor in Psychology:
- An GCE ‘O’ level pass in Additional Mathematics or an GCE ‘AO’ level pass in Mathematics at GCE ‘A’ level (for entry to HP1100)
- Minimum grade of B- for HP1000

Sociology Division
Sociology is the study of social relations, how they are formed and what their consequences are.

Sociology is the broadest of all social science disciplines: all spheres of social life – the cultural, the economic, and the political – are open to sociological inquiry. Sociologists strive to understand, for example, how norms and values shape peoples’ lives; how people organize themselves to forge collective action; how power works in a political system and in everyday life; and how social inequalities are maintained or how social equity is achieved. Sociologists also study past and foreign societies and engage in cross-cultural comparison, deepening our understanding of human diversity.

In practicing Sociology, we – and our students – learn to analyze the social conditions that make a significant impact on human lives. In understanding the causes and consequences of social change, we confront difficult issues affecting different people in different ways. These may include moral issues concerning human wellbeing, social justice, and the quality of life. But they may also include strategic issues concerning the effectiveness of how organizations are run or how policies are made and implemented.

Undergraduate Admissions
The Sociology Division looks out for candidates with strong critical thinking and writing skills. There is no single subject that gives you these skills: you can develop them by studying biology, chemistry, economics, geography, history, language, literature, mathematics, physics, etc – any subject that requires you to think through the material and write about it. In addition, we regard an active interest in current affairs, both within Singapore and internationally, as essential in a Sociology applicant.

You need to meet NTU's general admission requirements, and a good Polytechnic diploma OR strong ‘A’ levels (including a good pass in GP or K&B). If you are a Polytechnic candidate, you'll need to have at least a pass in GCE ‘O’ Level English Language and your other GCE ‘O’ level subjects may be considered. Applicants are assessed on a case-by-case basis, and the division also interviews and administers writing tests for select candidates.

For more details on admission requirements, refer to link below: http://admissions.ntu.edu.sg/UndergraduateAdmissions/Pages/ApplytoNTU.aspx
Career Prospects
Our graduates will enter the job market equipped with a set of critical thinking skills and practical experience in analyzing many aspects of social life – which they have developed through research training in both qualitative and quantitative methods. Their skills and attitudes make them valuable to potential employers and institutions in areas such as the following:

• Social Research
• Civil Service and Public Administration
• Management (including Human Resources, Corporate Communications, etc.)
• Education and Training
• Media (including Public Relations, Advertising, Journalism, and Broadcasting)
• Business, Marketing, and Private-Sector/Commercial Organizations
• Creative Industries (including the Arts, Arts Management, Heritage, Design, etc.)
• Voluntary Organizations (Non-governmental Organizations, Foundations, etc.)

International Organizations (Embassies, MNCs or TNCs, Regional Bodies, etc.)

In addition to pursuing careers in a wide variety of fields, an NTU Honours degree in Sociology enables you to continue on to graduate-level studies in the social sciences or other relevant fields such as business, law, and government. (Entry requirements for such programmes are established by the respective universities.)

Prospective Students
The Division of Sociology offers BA(hons), BA minor courses, and Graduate degrees up to the PhD level.

The BA in Sociology (Hons) is a four-year degree programme for undergraduates interested in pursuing a Major in Sociology at NTU. Students taking up Sociology as a minor are encouraged to read courses which complement their interests and open up new intellectual horizons. Those interested in graduate studies can find the information they need under the graduate programme link.

The Bachelor of Arts in Sociology at NTU is a four-year direct Honours degree programme. A degree in Sociology at NTU provides graduates with a vast array of job opportunities in both the public and private sectors. Sociology majors are valued for their critical thinking and analytical skills. They also benefit from an in-depth understanding of social organizations, culture and other social phenomena.

The curriculum provides an intellectually stimulating and rigorous experience for Major students. The academic foundation consists of three core areas: Economy, Technology and Society; Culture, Self and Identity; and Organisations and Organisational Change. It provides both breadth of exposure and depth of engagement that emphasizes both theoretical reasoning and empirical analysis. Students should graduate with not just a body of knowledge and skills but also a ‘sociological imagination’ that will enable them to make the critical and creative difference in the workplace and in society.

Key features of our programme include:
• Stimulating courses, providing both breadth of exposure and depth of engagement
• Immersion in all core substantive areas and research methodologies
• Training and practice in analytical thinking and empirical reasoning
• Informed investigations of Singapore society, Asian societies, and beyond
• Critical perspectives on social change at the local, regional, and global levels.

Programme outline: The Curriculum
To graduate, students must complete 2 categories of requirements, totaling 126 Academic Units (AUs): General Education Requirement (GER) (57AUs) Major Requirements (69 AUs)

(a) General Education Requirement (GER) (57 AUs):
The GER consists of 3 sub-areas:

(i) GER-Core (12 AUs):
Compulsory:
HW0101 Introduction to Critical Writing
HW0201 Research Writing in the Social Sciences

Singapore Studies: Choose ONE from the following:
HS8016 Understanding Singapore Society
HP8003 Are You Okay? Mental Health in Singapore

Environmental Sustainability:
Choose ONE from the following:
HS8019 Living in Contemporary Cities
HU1001 Introduction to Environmental and Urban Studies

(ii) GER Prescribed Electives (GER-PE) (15 AUs):
1. Arts Humanities and Social Sciences (3 AUs)
2. Business & Management (BM) (3 AUs)
3. Science, Technology and Society (3 AUs)
4. Liberal Sciences (3AUs)
5. Choose one more from the above 4 categories (3AUs)

(iii) GER Unrestricted Electives (UE) (30 AUs):
There is no restriction on the selection of courses to make up the Unrestricted Electives. Students may choose any course offered by any School so long as any pre-requisites are satisfied. Students are also encouraged to take up a Minor in another discipline, which they can fulfill using Unrestricted Electives.

(b) Major Requirements (69 AUs):
The Major Requirements consists of 3 sub-areas:
• Major Core (25 AUs)
• Major Electives (36 AUs)
• Graduation Project (8 AUs)

Requirements for the Sociology Major
Each course (except the 4000 levels) is equivalent to 3 AUs. Every 4000 level course is equivalent to 4 AUs each.
(A) Major Core – compulsory courses (25 AUs):

Core (compulsory) Subjects:
- HS1001 Person and Society
- HS2001 Classical Social Theory
- HS2002 Doing Social Research
- HS2003 Economy and Society OR
- HS2004 Culture, Self and Identity OR
- HS2005 Organisations and Organisational Change

(Choose 2 from the above 3)
- HS3001 Contemporary Social Theory
- HS3002 Understanding Social Statistics

Chooses ONE from the following:
- HS4001 Research Practicum I : Qualitative Social Research
- HS4002 Research Practicum II : Quantitative Social Research

Prerequisites for enrolling in 3000-level courses are as follows: All students must have completed at least two 2000-level core courses, i.e. any two of following: HS2001, HS2002, HS2003, HS2004, and HS2005. Except for HS4001 and HS4002, you must complete all Major Cores to enroll in any of the 4000 level courses. Some of the 4000 level courses may also have additional prerequisites.

For more details on our courses, please refer to: http://sociology.hss.ntu.edu.sg/ProspectiveStudents/Pages/CourseDescriptions.aspx

(B) Major Electives (PE) (36 AUs):

Core Electives:
Students are to take 11 Sociology Core Electives comprising:
- 2 PEs at 1000-level
- 4 PEs at 2000-level
- 2 PEs at 3000-level
- 3 PEs at 4000-level

Economy, Technology and Social Change:
- HS2007 Understanding Globalization
- HS2008 Social Class and Inequality
- HS2009 Sociology of Life Course
- HS2019 Science, Technology and Society
- HS2022 Social Demography Population and Society
- HS2023 Environmental Sociology
- HS3004 Cities and Urban Life
- HS3005 Sociology of Migration
- HS3006 Sociology of Risk and Crisis
- HS3015 Development and Social Change
- HS4007 Sociology of Entrepreneurship
- HS4015 Sociology of Reproduction

Culture, Identity and Social Relations:
- HS2011 Ethnicity and Ethnic Relations
- HS2012 Sociology of Language
- HS2017 Social Psychology
- HS2018 Media and Society

(C) Graduation Project HS4099 (8AUs)

The aim of HS4099 Graduation Project is to provide training in independent scholarly work. With the guidance of a supervisor, each student will identify a research problem, formulate research questions, develop a theoretical framework and design a methodological approach. By the completion of the project, the student will have gained experience in theoretical reasoning, empirical research (especially the collection, interpretation and analysis of data), and the writing and presentation of research findings.

Students have the flexibility to opt out for graduation project and replace with two 4000-level courses.

Students must read graduation project to obtain a 1st or 2nd class upper honour.

Minors in Sociology

Students taking up sociology as a minor are encouraged to read subjects which complement their interests and open up new intellectual horizons. A minor in sociology requires reading five subjects, including one required subject (HS1001 Person and Society) and four Electives. Students are required to achieve a “C” grade or better in HS1001 Person and Society to continue in the Sociology Minor. Students are also required to maintain a GPA of “C” for their Sociology subjects to graduate with a Minor in Sociology.

Description of Courses

Please visit our website at http://www.hss.ntu.edu.sg/CurrentStudents/Undergraduate/Pages/Undergraduate.aspx for information on the Description of Courses.
Wee Kim Wee School of Communications and Information

What You Can Become (Careers Available to You)
The media industry offers a host of viable career opportunities. In Singapore, we have an increasingly vibrant media scene. Media production companies are sprouting not only locally but globally. All across the world, there is a growing demand for entertainment and news. All of which are part of the mass media.

Your education at WKWSCI will give you a taste of what a genuine media environment demands. Upon graduation, you will be conferred the Bachelor of Communications Studies (Honours) degree. This qualification will put you in good stead to take on the real world. Our curriculum is designed to equip you with the necessary skills for a full range of careers in media. The job possibilities are many and examples include the following:

Journalism - What you can be:
Reporter, Columnist, Editor, Photojournalist, International Correspondent, Publisher, News Analyst, Broadcast Journalist

Prepare students for careers in the print media industry and its associated online media. Within the Concentration, students can specialise in News, Magazine Publishing or Photojournalism. They must take both “front-end” (writing) and “back-end” (editing and design) subjects. As part of their total intellectual development, students must also develop a substantive knowledge base in chosen “beat” areas such as business or the arts, and will be strongly encouraged to take Minors in these areas.

Broadcast and Cinema Studies - What you can be:
Producer, Director, Broadcast Reporter, Interactive Media Coordinator in media, business, industry and government, audio-video producer

Provides students with the conceptual skills and intellectual training for a multi-skilled television or film producer who can keep pace with rapid changes in media industries. Subjects cover a range of genres, styles, audiences and technologies. Students will be trained in the professional skills necessary for content production and distribution, and gain exposure to various theoretical approaches and disciplines that inform the creation of original content for television and cinema.

Advertising - What you can be:
Media Planner, Advertising Account Exec or Planner, Art Director, Copywriter, Creative Director, Marketing Communications Manager and Consultant, Brand Manager

Prepare students for careers in advertising, media and marketing, and corporate communications. The curriculum introduces students to the theoretical and practical applications of advertising and marketing. Subjects include integrated marketing communication, creative writing skills, copywriting, graphic communication, campaign planning, media planning and marketing, issues and ethics in advertising, and a faculty-guided campaign portfolio.

Public Relations - What you can be:
Public Relations Executive, Public Affairs Manager, Corporate Communication Director; Consultant, Events Specialist

Prepare students for careers in corporate and public communication, issues and events management, as well as promotional communication and investor relations. Subjects include public relations writing, campaign development, crisis communication, issues and ethics in public relations, as well as a faculty-guided portfolio practicum.

Communication Policy and Research - What you can be:
Media Consultant, Public Opinion and Market Researcher, Media Audience Analyst, Research Manager in public and private sector

Develops competency in the analysis and interpretation of communication and media. Students will be prepared for management and policy-making positions in public, private and non-profit organisations. Students will also receive the grounding to pursue advanced degrees. Subjects engage the multidisciplinary perspectives of the social sciences, liberal arts, and law and policy, and promote systematic inquiry through empirical, interpretive, and critical methods.

Inter-Disciplinary Concentration
Allows students to tailor the curriculum of their choice to meet their specific needs. Students can select subjects from all available Concentrations to build up a distinctive broad-based profile for their future. This Concentration is particularly suited for sponsored students where their employers may have specific needs, skills and competencies that they wish the students acquire from the Programme.

Divisions
(1) Division of Journalism and Publishing
The Division offers modules in print and broadcast journalism, newswriting and reporting, editing, specialized writing, news writing in Chinese, feature writing, and specialized writing in various news areas.

(2) Division of Broadcast & Cinema Studies
The Division offers modules in television, digital/video and radio/audio production, editing, scriptwriting, broadcast journalism, film studies, media and culture analyses, and visual communication.

(3) Division of Communication Research
The Division offers modules in research methods, qualitative and quantitative analysis, public opinion, audience research, cultural studies, information society, and psychology of communication.

(4) Division of Public and Promotional Communication
The Division offers modules in advertising copywriting and creativity, public relations writing, media and marketing, communication campaigns, and integrated marketing communications.

(5) Division of Information Studies
The Division offers graduate modules in digital data mining, systems analysis and design, knowledge management, information storage, archival informatics, information systems, and electronic commerce.
Degree Programmes and Requirements

Wee Kim Wee School of Communication and Information
Curriculum for 2012/2013

Lower Level Subjects Pre-req
CS0201 Foundations of Communication Studies -
CS0203 Media in Singapore -
CS0900 Communication Strategies for Sustainability and Social Changes -
CS2002 Information Literacy and Interpretation -
CS0204 Basic Media Writing -
CS2005 Speech and Argumentation -
CS2006 Visual Literacy and Communication -
CS2007 Communication History and Theories CS0201
CS2008 Fundamentals of Research -
CS2021 News Reporting and Writing CS0204
CS2022 Basic Media Writing in Chinese -
CS2023 Publication Design CS0204
CS2024 Web Design and Technologies -
CS2025 Image and Sound Production CS2006
CS2026 Media Presentation and Performance -
CS2027 Genre and Narrative Strategies -
CS2028 Production Management for TV and Cinema -
CS2029 Broadcast Journalism: Concepts and Applications CS2006
CS2030 Audio in Media -
CS2031 Creative Strategies -
CS2032 Graphic Communication CS2006
CS2051 Comparative Press Systems -
CS2052 Cultural Studies -
CS2053 Cinema Studies -
CS2054 Interpersonal Communication -
CS2055 Organisational Communication -
CS2056 Psychology and Communication -
CS2057 Media Effects -
CS2058 Integrated Marketing Communication -
CS2044 Photojournalism CS2021
CS2045 Online journalism CS2024
PRACTICUM: 3 or 4 AUs
CS2061 Newspaper Practicum (3 AUs) CS0204
CS2061A Newspaper Practicum (4 AUs) CS0204
CS2062 Magazine Practicum (3 AUs) CS0204
CS2062A Magazine Practicum (3 AUs) CS0204
CS2063 Short Overseas Journalism Practicum (3 AUs) CS2021
CS2064 Television Practicum (3 AUs) CS2029
CS2064A Television Practicum (4 AUs) CS2029
CS2065 Radio Practicum (3 AUs) CS2069
CS2065A Radio Practicum (4 AUs) CS2069
CS2066 Film Festival Practicum (3 AUs) -
CS2166 Film Festival Practicum (4 AUs) -
CS2068 Newsletter Practicum (3 AUs) -

Higher Level Subjects Pre-req
COM401 Media Management -
COM402 Media Law, Ethics and Policy -
COM403 Professional Internship -
COM404 Final Year Project -
COM411 Newspaper Sub-Editing CS2021
COM415 News Reporting and Writing in Chinese -
COM418 Specialised Journalism: Business and Economics CS2021
COM419 Specialised Journalism: Contemporary Topics CS2021
COM420 Magazine Publishing CS2021
COM423 Advanced Photojournalism CS2044
COM424 Writing for Cinema and TV -
COM425 Creative Practices and New Technologies -
COM426 Documentary Film and TV: Concepts & Applns CS2025
COM427 Narrative Film and TV: Concepts and Applications CS2025
COM428 Public Relations Writing -
COM429 Advertising Creativity and Copywriting CS2032
COM430 Crisis Management CS2058
COM431 Market Segmentation and Media Planning -
COM432 Communication Campaigns -
COM433 Corporate Communications Management -
COM434 Brand Management CS2058
COM435 Strategic Marketing Communication Management CS2008 OR CS2058
COM436 Statistics and Data Analysis -
COM437 Audience Research Methods CS2008
COM453 Popular Cinema -
COM454 Asian Cinema -
COM455 TV Studies: Critical Approaches -
COM458 Intercultural Communication -
COM459 Public Opinion -
COM460 Persuasion and Social Influence -
COM442 Advanced Research Methods CS2008
COM461 Global Media Issues and Policy -
COM462 Information Society and Policy -
Description of Courses

Please visit our website at http://www.wkwsci.ntu.edu.sg/CurrentStudents/Undergraduate/Pages/CourseInfo.aspx#221 for the information on Description of Courses.

College of Science

School of Biological Sciences

We provide a 3 to 4 year honours programme that equips graduates with in-depth knowledge and job-relevant and transferrable skill-sets for rewarding careers in the Biomedical industries, Health Care services, and Biomedical Research.

The programme distinguishes itself from others by providing students intensive trainings in Molecular and Cell biology, Genetics and Genomics, Immunology and Microbiology, Stem cell biology, Neurobiology, Infectious diseases, Biochemistry, Structural and Computational biology. These areas are the cornerstones for understanding human diseases and are crucial for the development of therapeutics and medical devices.

The programme is designed and delivered by an international team of experienced academics and leading researchers in these fields. Coupled with conducive teaching and state-of-the-art research facilities in the School, students will have an exciting and engaging learning experience that promotes innovation, critical and creative thinking. The programme also incorporates elective courses starting from the second year. This allows students to specialize in areas of biological sciences that match their interests and strengths.

Programmes offered:
• Bachelor of Science (Honours) in Biological Sciences
• Bachelor of Science (Honours) in Biological Sciences with Business Minor
• Bachelor of Science (Honours) in Biological Sciences and Bachelor of Medicine (Chinese Medicine) – a double degree programme jointly offered by the School of Biological Sciences and Beijing University of Chinese Medicine, China

For more information, visit http://www.sbs.ntu.edu.sg/.

School of Physical and Mathematical Sciences

Honours graduates learn more and earn more! The School is the only institution that offers three- to four-year direct honours programmes in Chemistry & Biological Chemistry, Physics & Applied Physics, Mathematical Sciences, and combined Economics with Mathematics in Singapore. You will be equipped and well prepared for exciting careers and leadership in all echelons of industry and society, by our highly qualified, international faculty members.

At the School of Physical and Mathematical Sciences, you will receive a thorough understanding of the principles and applications of your chosen subject, as well as a rigorous training in the experimental techniques in our new state-of-the-art laboratories. You will develop strong skills in qualitative and quantitative reasoning, and problem solving.
We will stimulate your curiosity, maximise your learning opportunities, and prepare you to be a life-long learner. There will be opportunities for you to pursue elective courses in subjects outside of your major, to suit your personal interests and your career goals.

Programmes offered:
- Bachelor of Science (Honours) in Chemistry & Biological Chemistry
- Bachelor of Science (Honours) in Mathematical Sciences
- Bachelor of Science (Honours) in Mathematics & Economics
- Bachelor of Science (Honours) in Mathematical Sciences with Minor in Finance
- Bachelor of Science (Honours) in Physics
- Bachelor of Science (Honours) in Applied Physics
- Bachelor of Science (Honours) in Physics with second major in Mathematical Sciences

For more information, visit http://www.spms.ntu.edu.sg/.

School of Biological Sciences

Undergraduate Study

Bachelor of Science in Biological Sciences (Honours)
This undergraduate programme provides students with fundamental knowledge in Chemical Biology, Structural and Computational Biology, Molecular and Cell Biology, Genetics and Genomics. A variety of electives are available in the third and fourth years for in-depth study and specialisation. Contact hours are distributed among weekly lectures, tutorials and laboratory sessions.

Bachelor of Science in Biological Sciences (Honours) with Business Minor
In addition to the major degree, the Biological Sciences (Honours) Programme can be taken with a Minor in Business Studies in partnership with Nanyang Business School (NBS). The Business Minor Programme is taught by NBS professors to prepare students with essential financial, management and business skills and tools. This is especially important in a rapidly changing economy where our biological sciences graduates will have the flexibility to become entrepreneurs or cross-over from the biomedical sector to work in the financial and banking sector. In the future, these graduates can enrol in postgraduate business degrees, for example, Master’s degree in Business Administration (MBA). Students can choose any 5 courses from the list of Minor in Business courses and fulfil it as Unrestricted Electives (UE) to earn the minor.

Both programmes are four-year direct B.Sc (Hons) and require 132 AUs for graduation distributed over four compulsory components in the curriculum:

B.Sc (Hons) in Biological Sciences

<table>
<thead>
<tr>
<th>Course Type</th>
<th>Academic Unit (AU) Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core</td>
<td>48</td>
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<tr>
<td>Major Prescribed Elective (Major PE)</td>
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<tr>
<td>Core</td>
<td>12</td>
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<tr>
<td>General Education Requirement (GER)</td>
<td>Art, Humanities &amp; Social Sciences (AHSS) 3</td>
</tr>
<tr>
<td></td>
<td>Business &amp; Management (BM) 3</td>
</tr>
<tr>
<td></td>
<td>Liberal Studies (LS) 3</td>
</tr>
<tr>
<td></td>
<td>Science, Technology &amp; Society (STS) 3</td>
</tr>
<tr>
<td></td>
<td>Any Category (AHSS,LS,BM or STS) 3</td>
</tr>
<tr>
<td>Unrestricted Electives (UE)</td>
<td>15</td>
</tr>
<tr>
<td>Total</td>
<td>132</td>
</tr>
</tbody>
</table>

Double Degree: Bachelor of Science in Biomedical Sciences (Honours) and Bachelor of Medicine (Chinese Medicine)
This five-year double degree programme is conducted in collaboration with the Beijing University of Chinese Medicine (BUCM), People’s Republic of China, and uses an innovative approach to fuse Western biomedical sciences with traditional Chinese medicine (TCM).

The biomedical components are built on the disciplines of Chemical, Molecular and Cell Biology, leading to thorough understanding of complex systems in courses such as Immunology and Physiology. The theoretical and clinical aspects of TCM are taught by BUCM professors. The first three years of this programme are at NTU which covers Western biomedical topics and laboratory classes, as well as a TCM foundation course and clinical internships at local Chinese medicine clinics. The fourth and fifth years are spent in Beijing for advanced TCM clinical training and study of TCM principles. The B.Sc. in Biomedical Sciences (Honours) will be awarded by NTU while the Bachelor of Medicine (Chinese Medicine) will be awarded by BUCM.

The total number of AUs required in the NTU component of the double degree programme to qualify for graduation is 152 AUs.
**B.Sc (Hons) in Biomedical Sciences**

<table>
<thead>
<tr>
<th>Course Type</th>
<th>Academic Unit (AU) Requirement</th>
</tr>
</thead>
<tbody>
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<td>Core</td>
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<tr>
<td>General Education Requirement (GER)</td>
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<td>Core</td>
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<tr>
<td>Prescribed Elective (PE)</td>
<td>Art, Humanities &amp; Social Sciences (AHSS) -</td>
</tr>
<tr>
<td></td>
<td>Business &amp; Management (BM) - 3</td>
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<tr>
<td></td>
<td>Liberal Studies (LS) -</td>
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<tr>
<td></td>
<td>Science, Technology &amp; Society (STS) -</td>
</tr>
<tr>
<td>Unrestricted Electives (UE)</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>152</strong></td>
</tr>
</tbody>
</table>

**Core courses**

These are compulsory courses offered throughout the programme of study. Core courses are designed to provide students with an essential foundation in life sciences.

**Prescribed electives**

The prescribed electives give students an opportunity to explore specialised areas of biology in more depth and intensity according to their own interests and career goals. Emphasis is on discussion of research papers. Students are expected to read, discuss and present relevant primary research papers.

**Company Internship Programme (only applicable for Biological Sciences students), Final Year Project**

In their final year of study, students are required to undertake either a one-semester of a company internship programme or a final year project.

The company internship is a non-research programme enabling students to experience the administrative and management chores and duties in multi-national companies, for example, Abbott Manufacturing Pte Ltd, Biosensors Pte Ltd, Pfizer Pharmaceuticals Pte Ltd, Exxon-Mobil Pte Ltd, Hyflux Pte Ltd and many more.

The final year project is a research programme where students undertake laboratory projects offered by and supervised by faculty from the school as well as from national research institutions, such as IMCB, GIS and IMB, and health-care laboratories such as at NEA, AVA and HSA.

**General Education Requirement (GER)**

GER covers a wide spectrum of broadening courses. Students are required to complete 36 AUs of GER to fulfill the requirement to graduate. There are three categories of GER courses:

GER Core courses. Read during the specific period assigned by the school as indicated in the curriculum.

GER Unrestricted electives. Courses can be specified by the students within the four years of the programme.

GER PE. Courses can be specified by the students within the four years of the programme. The GER PE courses are sub-categorized into four fields:

- Art, Humanities & Social Sciences (AHSS)
- Business & Management (BM)
- Liberal Studies (LS)
- Science, Technology & Society (STS)

**Description of Courses**

Please visit the following webpages for Description of courses.

http://www.sbs.ntu.edu.sg/Undergrad/BSc/Pages/Home.aspx

http://www.sbs.ntu.edu.sg/Undergrad/BSBiz/Pages/Home.aspx


**School of Physical and Mathematical Sciences**

**Undergraduate study**

SPMS offers an interdisciplinary education, allowing for flexibility and innovation without compromising on in-depth knowledge and training for our students’ specialisations. In addition, to stay relevant and to meet the career needs of the students, SPMS offers opportunities, both globally and locally, for industrial and R&D attachments in industries, universities or research institutes that will count towards graduation requirements.

The four-year direct B.Sc. (Hons) programme of Chemistry & Biological Chemistry, Mathematical Sciences and Physics & Applied Physics will require 132AUs for graduation distributed over four levels:

- 84AUs, effectively two and a half years, in a major (depth components) - Chemistry, Physics or Mathematics which cover the interfaces, with more majors to be defined in future years – including Honours project work;
- 21AUs of electives which can be used to fulfill a minor or a concentration requirements;
- 27AUs of broadening (breadth components) including writing and communication courses.

The major in Mathematics and Economics, integrating two disciplines, has a heavier proportion in the depth requirements:

- 102AUs, effectively three years, in the major (depth components) including Honours project work;
- 9AUs of electives which can be used to fulfill a minor requirements;
- 21AUs of broadening or distribution including writing and communication courses.

The major in Physics with second major in Mathematical Sciences will require 176 AUs for graduation distributed over four levels:

- 149AUs in both Physics and Mathematical Sciences majors (depth components) including Honours project work in Physics;
- 27AUs of broadening (breadth components) including writing and communication courses.
The three-to four-year programme leads to a B.Sc. (Hons) in the following programmes:

1. **Division of Chemistry and Biological Chemistry**
   - B.Sc. (Hons) in Chemistry and Biological Chemistry
   - B.Sc. (Hons) in Chemistry and Biological Chemistry with concentration in Green Chemistry or Medicinal Chemistry or Food Science and Technology

The major in Chemistry and Biological Chemistry is modelled on the rigorous American Chemical Society accredited Chemistry programs at major US universities for professional training in the field.

2. **Division of Mathematical Sciences**
   - B.Sc. (Hons) in Mathematical Sciences
   - B.Sc. (Hons) in Mathematical Sciences with concentration in Mathematics of Information and Communication or Computational Mathematics

The major in Mathematical Sciences will cover a good mix of fundamental, as well as applied, computational, and industrial aspects of mathematics and statistics.

3. **Division of Physics and Applied Physics**
   - B.Sc. (Hons) in Physics
   - B.Sc. (Hons) in Applied Physics
   - B.Sc. (Hons) in Physics with concentration in Nanotechnology
   - B.Sc. (Hons) in Applied Physics with concentration in Nanotechnology or Optical Technology or Semiconductor Technology or Biophysics
   - B.Sc. (Hons) in Physics with second major in Mathematical Sciences

The majors in Physics and Applied Physics prepare graduates for a variety of challenging careers through strong theoretical and experimental training. These careers include R&D and engineering positions in industry, management, banking and finance, and professional and scientific positions. Students enjoy the rigorous yet flexible curriculum, and the friendly and stimulating exchanges with professors add to a conducive and thriving environment. Graduates can look forward to fruitful and rewarding prospects in their work, while those who intend to pursue postgraduate degrees will find that the curriculum provides thorough preparation for GRE papers. The Applied Physics concentrations highlight how science advances technologies, and illustrate the applications of physical principles in interdisciplinary fields ranging from materials and engineering, to the life sciences. Students in the Physics programme who possess excellent entrance qualification may also apply for second major in Mathematical Sciences.

* The award of honours degree is based on the Cumulative Grade Point Average (CGPA) achieved at the point of graduation. Please refer to http://www.ntu.edu.sg/Services/Academic/undergraduates/Examination/Pages/GradePointAverage.aspx

**Description of Courses**

Please visit the following webpages for the description of courses.

**Chemistry and Biological Chemistry**
http://www.spms.ntu.edu.sg/cbc/Undergraduates/CoreCompulsoryElectives_AY1011.html

**Mathematical Sciences**
http://www.spms.ntu.edu.sg/mas/Undergraduates/MASUndergradModules.html

**Physics and Applied Physics**
http://www.spms.ntu.edu.sg/pap/Undergraduates/CourseInformation.html
National Institute of Education

Undergraduate study
The Institute offers a variety of programmes leading to a range of qualifications from diplomas to bachelor's degrees to postgraduate degrees. The bachelor's degree programmes aim to provide rigorous university education and to produce graduates with the skills to teach in schools. The programmes lead to the award of the following degrees:

- Bachelor of Arts (Education) [BA (Ed)] (Full-Time)
- Bachelor of Science (Education) [BSc (Ed)] (Full-Time)
- Bachelor of Education [B Ed] (Part-Time)

Candidates may be awarded honours degrees based on excellent overall performance in these programmes.

Structure programmes
The BA (Education) / BSc (Education) / B Ed programmes comprise the following areas of study.

a) Education Studies*
Student teachers will learn the key concepts and principles of education that are necessary for effective teaching and reflective practice in schools. They will also have the opportunity for in-depth study of some significant aspects of education.

b) Curriculum Studies
BA (Ed)/BSc (Ed) student teachers will specialise in the methodology for teaching at either the primary or secondary school level. These are designed to give student teachers the pedagogical skills in teaching specific subjects in Singapore schools. The choice of Curriculum Studies subjects depends on the track and strand to which the student teacher belongs.

c) Subject Knowledge
This group of courses helps to reinforce subject content mastery for primary school teaching. Student teachers in the primary track must offer Subject Knowledge subjects aligned with their choice of Curriculum Studies subjects.

For PESS specialization in the primary track, student teachers will offer SK subjects aligned with the CS2 and CS3 subjects and will read 3 SK courses per subject.

Those in the Secondary track will not be reading SK courses as it is assumed that they would have obtained this knowledge from the 2 AS subjects offered.

d) Pedagogical Content Knowledge*
In this area of study, student teachers are to offer English, Math and Science but can opt to exchange one of these subjects with Social Studies, Special Needs, and Gifted and Talent Education.

e) Essential Course**
There will only be 1 essential course that introduces student teachers to the implications of living in a diverse society entitled ‘Multicultural Studies: Appreciating and Valuing Differences’.

f) Practicum
Student teachers will be attached to schools for 2, 5, 5, 10 week blocks so that they can develop teaching competencies in a variety of contexts and at different levels.

- School Experience (SE): This is 2 weeks long, with 1 week in a primary school and 1 in a secondary school. The purpose for this is to provide student teachers opportunities to observe lessons in the primary and secondary classrooms.

- Teaching Assistantship (TA): This comprises 5 weeks and its purpose is to provide student teachers opportunities to observe their Cooperating Teachers (CTs) teach and to reflect on the roles and responsibilities of a teacher. They will also be given the practical experience of helping their CTs plan lessons, prepare resources, manage pupils and to do some assisted teaching.

- Teaching Practice 1 (TP1): This is 5 weeks long and its purpose is to help student teachers to begin to teach independently. They will learn to plan their own lessons to teach, prepare relevant resources and to manage pupils independently while still being able to consult their CTs and to observe their CTs teach.

- Teaching Practice 2 (TP2): This is the final component and it lasts for 10 weeks. Besides focusing on independent teaching, TP2 allows for a more holistic school attachment experience which could include exploring other aspects of a teacher’s life, such as, the management of CCAs.

For all teaching attachments, student teachers will be closely supervised by NIE’s lecturers and will also learn from experienced teachers in the schools about the schooling process. They will use the knowledge and skills obtained from the Education Studies and Curriculum Studies courses to integrate theory with practice.

g) Language Enhancement and Academic Discourse Skills*
The courses in this component equip student teachers with the basic language and voice skills that they require for teaching, as well as for successfully engaging in academic writing of assignments and theses. BA (Ed)/BSc (Ed) student teachers will have to offer 2 compulsory courses; Communication Skills for Teachers (CST) and Academic Discourse Skills (ADS).

h) Group Endeavours in Service Learning Group
Group Endeavours in Service Learning (GESL) is a service-learning community engagement project which all student teachers will complete. Student teachers work in groups of about 20 on a service-learning project they craft together with a partner organization or organizations. Service and learning objectives are determined before the group starts on their project. Each group has a staff facilitator who mentors and guides the group, and eventually assesses the group on their project. GESL seeks to empower student teachers with the skills of conducting service-learning projects while getting in touch with the community around us. It is hoped that through the experience of conducting a service-learning project, each student teacher would have practiced, among other things, project management skills, teamwork, needs analysis, decision-making, empathy, and learnt more about the community around us.

i) Academic Subjects
This area of study covers knowledge of the content and fundamental concepts and principles of either one or two subjects depending on the programme enrolled for.
In the case of a BA (Ed) (Primary) student, the choice of the first Academic Subject must be an Arts subject while in the case of a BSc (Ed) (Primary) student teacher, the Academic Subject must be a Science Subject.

All BA (Ed) (Secondary) student teachers must read an arts subject as Academic Subject 1 but can choose an Arts or Science subject as Academic Subject 2. Similarly, all BSc (Ed) (Secondary) student teachers must choose a Science subject as Academic Subject 1 but can choose an Arts or Science subject as Academic Subject 2. However, due to the nature of workload for some subjects, the subject combinations allowed will have to be necessarily limited and may vary for different intakes.

**j) General Electives**

Only BA (Ed)/BSc (Ed) student teachers in the Secondary track have the option of taking 3 AUs of General Electives.

* Part-time B Ed student teachers are only required to do these areas of study.
+ Part-time B Ed student teachers have to read 3 essential courses as below:

1. Integrated Arts Approach which aims to introduce the key concepts in an integrated art, music and drama approach with primary school children;
2. Education Research Methodology which serves to prepare student teachers to conduct education research; and
3. There are two Prescribed Electives of which student teachers will have to select one:
   - Action Research Project which prepares the student teachers to continue as reflective practitioners and to investigate issues in their teaching;
   - Inter-disciplinary Approach which looks at how student teachers can teach a subject matter in an integrated fashion across different subjects.

**Description of Courses**

Please visit our website at http://www.nie.edu.sg/studynie/admissions/teacher-education-undergraduate-studies/degree-programmes for the information on Description of Courses.

**Nanyang Technopreneurship Center**

**Undergraduate study**

**Minor in Entrepreneurship programme**

The Minor in Entrepreneurship is open to undergraduate students from across all disciplines of study. All students are required to undergo an interview before they are selected for this programme. Each class size is kept at the maximum of 50 students per class.

This minor is purposefully and uniquely designed to equip and empower students with basic entrepreneurship skills, business acumen, and the stamina to grow businesses. Students will develop an open mindset and realise that ideas that may appear like impossible dreams can be shaped into small and realisable phases. The course offers new perspectives, possibilities, and has been described as a ‘transformational learning experience’ by many past students.

Students will learn to appreciate that entrepreneurship is not just about starting a new business; it is a mindset. It is about taking advantage of opportunities that change brings along. Working with classmates from different schools, disciplines and stages of study, students learn to work in teams and are able to benefit from the exchange of ideas and opinions. Students will have the opportunity to present their business plans to real life entrepreneurs, business angels and venture capitalists. They are also encouraged to present their analyses on case studies and team-based projects through creative means, such as role play, skit and drama.

We take pride in our interactive teaching seminars, which are conducted by business leaders, entrepreneurs, intellectual property lawyers and dedicated academics with venture experience. As part of the course, students are exposed to social settings where one can meet and mingle with working professionals, government officers and successful entrepreneurs.

The first phase of the minor takes the form of a high impact team building specially designed for NTC by Outward Bound Singapore. Five intensive modules (ET9101 – ET9105) follow, all of which can be completed in a calendar year.

**Minor in Entrepreneurship**

The curriculum structure is depicted as follows:

- ET9101 Entrepreneurship and Accounting for New Ventures
- ET9102 Marketing and Finance for New Ventures
- ET9103 Managing New and On-going Ventures
- ET9104 New Venture Creation and the Business Plan
- ET9105 Entrepreneurship Seminars, Workshops and Projects

**ET9121 Introduction to Entrepreneurship**

This course is an exploration into the fundamentals of entrepreneurship. Upon successful completion of the course, students would have a good understanding of entrepreneurship; the issues encountered on the entrepreneurial journey; and most importantly, how they can become an entrepreneur themselves.

**Entrepreneurship module for School of Biological Sciences BS402 Bioentrepreneurship**

Singapore has a huge capital and energy outlay to develop life sciences as one of the main sources of the country’s economy. There is tremendous growth potential which makes Singapore an exciting place for business and bio-enterprise. While entrepreneurship and new ventures lead to improved products and services, create jobs and add value for owners, the start up process is most challenging.

This course aims to equip final year students from the School of Biological Sciences with entrepreneurial skills. This course is taught by entrepreneurs who has been in the Bioscience Industry itself.

The Minor in Entrepreneurship website link: http://www.ntc.ntu.edu.sg/undergraduateprograms/mie/Pages/Home.aspx

**Description of Courses**

Please visit our website at http://www.ntc.ntu.edu.sg/undergraduateprograms/Pages/default.aspx for the information on the Description of Courses.
Overview
As a comprehensive university with a proven R&D track record and a robust research infrastructure, NTU is well-positioned to provide Singapore and the region with quality manpower training through graduate education. We offer graduate students the opportunity to develop themselves as leaders and scholars as they work alongside and learn from distinguished academics and researchers.

The University offers a comprehensive range of graduate programmes leading to the awards of the degrees of Master's and Doctor of Philosophy as well as Graduate Diplomas. Graduate degree programmes are either by research or coursework and dissertation.

For details of programmes and courses, please visit the respective school's website.

College of Business
• Nanyang Business School
  http://www.nbs.ntu.edu.sg/Graduate/Pages/Home.aspx

College of Engineering
• School of Chemical and Biomedical Engineering
  http://www.scbe.ntu.edu.sg/Prospective_Students/Pages/Prospective_Students.aspx
• School of Civil and Environmental Engineering
  http://www.cee.ntu.edu.sg/ProspectiveStudents/Graduate/Pages/GraduateStudies.aspx
• School of Computer Engineering
  http://www.sce.ntu.edu.sg/CurrentStudents/Graduate/Pages/GraduateProgrammes.aspx
• School of Electrical and Electronic Engineering
  http://www.eee.ntu.edu.sg/CurrentStudents/Graduate/Pages/Graduate.aspx
• School of Materials Science and Engineering
  http://www.mse.ntu.edu.sg/CurrentStudents/Graduate/Pages/default.aspx
• School of Mechanical and Aerospace Engineering
  – Graduate Programmes (by Coursework)
    http://www.mae.ntu.edu.sg/CurrentStudents/GraduateProgrammeCoursework/Pages/Home.aspx
  – Graduate Programmes (by Research)
    http://www.mae.ntu.edu.sg/ProspectiveStudents/GraduateProgrammesResearch/Pages/GraduateProgrammes(byResearch).aspx

College of Science
• School of Biological Sciences
  http://www.sbs.ntu.edu.sg/Graduate/Pages/Introduction.aspx
• School of Physical and Mathematical Sciences
  – Chemistry & Biological Chemistry
    http://www.spms.ntu.edu.sg/cbc/Graduates/ProgramOverview.html
  – Mathematical Sciences
    http://www.spms.ntu.edu.sg/mas/Graduates/ProgramOverview.html
  – Physics and Applied Physics
    http://www.spms.ntu.edu.sg/pap/Graduates/CourseInformation.html

National Institute of Education
http://www.nie.edu.sg/studynie/higher-degree-programmes

Nanyang Technopreneurship Center
Master of Science in Technopreneurship & Innovation Program (M.Sc.TIP)(English)

S. Rajaratnam School of International Studies
http://www.rsis.edu.sg/grad/

Earth Observatory of Singapore
http://www.earthobservatory.sg/programmes/degree-programmes.html

Singapore Centre on Environmental Life Sciences Engineering
• PhD Scholarship
  http://www.scelse.sg/index.php/programs/phd-scholarships
• NTU-HU Joint PhD Program

Interdisciplinary Graduate School
http://igs.ntu.edu.sg/Divisions/Pages/Home.aspx
CN Yang Scholars Programme

An outstanding opportunity for students passionate about Science and Engineering.

The CN Yang Scholars Programme is one of the premier undergraduate programmes at Nanyang Technological University for science and engineering students. The programme is named in honour of Professor CN Yang, Nobel Laureate in Physics (1957) and one of the greatest scientists of our era.

The programme is designed to prepare exceptional students who have a deep passion for science and engineering, for the high-technology world of the 21st century. It shares the same philosophy as the Caltech Core Curriculum and the MIT General Institute Requirements in providing a strong and broad foundation in the basics of science and mathematics so as to empower the student to delve deeper into any discipline in science, technology, engineering and mathematics, and to develop an interest in leading edge research.

Students graduating from the challenging undergraduate programme will be awarded a special certificate on top of the degree certificate. CN Yang Scholar graduates who meet the admission requirements are given an option to pursue accelerated post-graduate study (PhD) with a top scholarship as well as overseas attachment. It is however not mandatory for students to pursue this option after graduating as a CN Yang Scholar with a Bachelor’s Degree.

Benefits:

- Guaranteed overseas exchange for one semester with one-time award of $S5,000.
- Guaranteed four years of stay in NTU halls of residence.
- Opportunities for research attachment with monetary allowance from year one.
- Opportunities for accelerated post-graduate study (PhD).
- Opportunities for attending an international conference with full subsidy.
- Opportunities to meet top leading scientists and academics.
- Participation in programmes offered by the NTU Institute of Advanced Studies.
- A mentor will be assigned to each student to provide academic guidance during his/her course of study.

The Nanyang Scholarship will be awarded to successful local applicants.

Eligibility of international students to apply for one of the following scholarships:

- ASEAN Undergraduate Scholarship (for Citizens or Singapore Permanent Residents of ASEAN countries, except Singapore)
- SembCorp Undergraduate Scholarship (for Citizens of Indonesia or Singapore Permanent Residents of original Indonesian nationality)
- SIA-NOL Undergraduate Scholarship (for Citizens of India or Singapore Permanent Residents of original Indian nationality)

Recipients of other scholarships are eligible to apply for the CN Yang Scholars Programme, i.e. PRC Undergraduate Scholarship and other scholarships by approval.

All successful applicants are required to fulfil the terms and conditions of the scholarships.

For more information, please visit www.ntu.edu.sg/cnyang-scholars

Renaissance Engineering Programme
(http://www.ntu.edu.sg/REP/Pages/Contactus.aspx)

The latest that has sounded in the first decade of this new century is global integration with its realities and challenges. We are engaging a world that is connected multi-dimensionally - a global system of systems. The world's business and public sector leaders of today and tomorrow need to be equipped to cope with a rapid escalation of systems-level diversity and complexity that confront them, an unprecedented level of such complexity expected indeed to accelerate in the coming years within the global environment.

This is Renaissance Engineering. This is holistic engineering in the wake of self-awareness of organised diversity. We are making a new wave of engineers with the potential to develop into outstanding Chief Executive Officers (CEOs) or Chief Technology Officers (CTOs) in a complex world.

The Renaissance Engineering Programme (REP) is an integrated co-terminal engineering programme which will admit 50 elite engineering students to NTU in this flagship programme. The REP awards a dual-degree comprising Bachelor of Engineering Science degree (with specialization in a specific engineering discipline) and Master of Science in Technology Management in 4.5 years.

The REP is an integrated, rigorous and fully residential programme with a curriculum that covers a broad spectrum of multi-disciplinary subjects bridging Engineering, Business and the Liberal Arts which includes Sciences, Mathematics, Engineering Technology Management, and interdisciplinary studies. At the end of REP, students would have mastered all in order that REP graduates will possess the necessary knowledge, skills and attributes within the broader context of engineering science.

The REP adopts a new pedagogy which exposes students to different learning paradigms including supervised, unsupervised and reinforcement learning during the course of study. To inculcate a holistic view of real-life issues, an integrated broad-based approach will be embedded in the curriculum drawing connections across disciplines.

The REP undergraduate will spend one year at the University of California Berkeley, USA, our first collaborating university partner for this flagship programme. REP students will be able to subscribe to the two highly popular courses in offering unique to UC Berkeley, in addition to an Industrial Orientation programme in Silicon Valley with Berkeley’s assistance. This one-year overseas experience will enhance students’ learning experience and equip them with a global outlook in preparation for work life.

The REP will be a major inter-college collaboration on an education programme of national prominence. We are onto making creative, dextrous and outstanding Engineering Leaders of Tomorrow.
For more information, please visit http://www.ntu.edu.sg/REP/Pages/default.aspx

**Streaming**

(http://www.ntu.edu.sg/Students/Undergraduate/AcademicServices/AcademicProgrammes/Pages/Streaming.aspx)

Students of the following programmes will be streamed to one of the disciplines indicated at the end of Year 1 Semester 1:

<table>
<thead>
<tr>
<th>Programme</th>
<th>Discipline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Engineering</td>
<td>Civil Engineering</td>
</tr>
<tr>
<td></td>
<td>Electrical &amp; Electronic Engineering</td>
</tr>
<tr>
<td></td>
<td>Environmental Engineering</td>
</tr>
<tr>
<td></td>
<td>Mechanical Engineering</td>
</tr>
</tbody>
</table>

Students of the following programmes will be streamed to one of the disciplines indicated at the end of Year 1:

<table>
<thead>
<tr>
<th>Programme</th>
<th>Discipline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics and Applied Physics</td>
<td>Applied Physics</td>
</tr>
<tr>
<td>Art, Design and Media</td>
<td>Digital Animation</td>
</tr>
<tr>
<td></td>
<td>Digital Filmmaking</td>
</tr>
<tr>
<td></td>
<td>Photography and Digital Imaging</td>
</tr>
<tr>
<td></td>
<td>Interactive Media</td>
</tr>
<tr>
<td></td>
<td>Product Design</td>
</tr>
<tr>
<td></td>
<td>Visual Communication</td>
</tr>
</tbody>
</table>

**Specialisation**

Students of the following programmes will be streamed to one of the specialisations indicated at the end of Year 1:

<table>
<thead>
<tr>
<th>Programme</th>
<th>Specialisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business (For Single Degree Business and Double Degree Accountancy and Business students only)</td>
<td>Actuarial Science Banking &amp; Finance Human Resource Consulting Information Technology Marketing Tourism &amp; Hospitality Management</td>
</tr>
<tr>
<td>Mathematical Sciences</td>
<td>Applied Mathematics Business Analytics Pure Mathematics Statistics</td>
</tr>
</tbody>
</table>

Eligible Mechanical Engineering students may be invited to pursue a specialisation in one of the following areas from Year 2
- Design
- Mechatronics

The award of a first specialisation will be reflected in a graduate’s transcript but not his degree certificate.

**Second Specialisation** - For Single Degree Accountancy and Single Degree Business students only

Eligible Single Degree Accountancy and Business students may be invited to pursue a second specialisation in one of the following areas at the end of Year 1:
- Banking and Finance
- Business Law
- Economics (for students admitted before AY 2011-12)
- Human Resource Consulting
- Information Technology
- Marketing

The award of a second specialisation will be reflected in a graduate’s transcript but not his degree certificate. No additional certificate will be issued.

**Second Major**

(http://www.ntu.edu.sg/Students/Undergraduate/AcademicServices/AcademicProgrammes/Pages/SecondMajor.aspx)

Eligible students of the following programmes may be offered to pursue a second major:

<table>
<thead>
<tr>
<th>Programme</th>
<th>Second Major Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accountancy (Single Degree)*</td>
<td>Economics</td>
</tr>
<tr>
<td>Business (Single Degree)*</td>
<td></td>
</tr>
<tr>
<td>Art, Design and Media</td>
<td>Art History (not applicable to Art, Design and Media students)</td>
</tr>
<tr>
<td>Chinese</td>
<td>Chinese</td>
</tr>
<tr>
<td>Communication Studies</td>
<td>Communication Studies</td>
</tr>
<tr>
<td>Economics</td>
<td>Economics</td>
</tr>
<tr>
<td>English</td>
<td>English</td>
</tr>
<tr>
<td>Linguistics and Multilingual Studies</td>
<td>History</td>
</tr>
<tr>
<td>Psychology</td>
<td>Linguistics and Multilingual Studies</td>
</tr>
<tr>
<td>Sociology</td>
<td>Studies</td>
</tr>
<tr>
<td>History</td>
<td>Psychology</td>
</tr>
<tr>
<td>History</td>
<td>Sociology</td>
</tr>
<tr>
<td>Economics</td>
<td>Business</td>
</tr>
<tr>
<td>Maritime Studies</td>
<td></td>
</tr>
<tr>
<td>Physics</td>
<td>Mathematical Sciences</td>
</tr>
</tbody>
</table>

* for students admitted from AY 2011-12

The award of a second major will be reflected in a graduate’s transcript but not his degree certificate. No additional certificate will be issued.
Minor Programmes

Minor programmes equip students with multiple skills and broader knowledge, beyond what their major disciplines may provide. Students read minor courses as Unrestricted Electives and the academic units earned will count towards the students’ academic unit requirements for Unrestricted Electives.

To be awarded a minor, students must not opt for these courses to be graded Satisfactory (S)/Un-Satisfactory (U). The award of minor will be reflected in a graduate’s transcript but not his degree certificate. No additional certificate will be issued.

More than 30 minors are available. Students will not be offered a minor in the same field as his major (single degree, double degree, integrated or double major programme). Students intending to pursue a minor are to indicate their intention and when they have fulfilled the minor requirements, they are to file for the award of the minor.

The full details of each minor, the School that offers it and the programme it is offered to are at: http://www.ntu.edu.sg/Students/Undergraduate/AcademicServices/AcademicProgrammes/Pages/Minor_Programme.aspx

The brief descriptions are as follows:

1. **Art History**
The Minor in Art History offers a basic introduction to methodologies of art history to students across NTU. Through a study of artworks and monuments from diverse cultural and historical spheres, students acquire a foundational knowledge of artistic cultures and an understanding of their distinctiveness. Students will develop a preliminary facility for looking at artworks and interpreting them in ways that are methodical, purposeful and informed.

2. **Applied Physics**
The programme emphasises the teaching of basic physical concepts and principles, focusing on topics such as optics, lasers, semiconductors and materials. It also provides training in the development of quantitative reasoning and problem-solving skills.

   This minor is not available to students in the Physics programme.

3. **Business**
The Business minor equips students with the relevant knowledge and skills to be an effective business manager or owner. It is structured to expose students to the analytical, computational and business skills required to understand how business decisions are made in the business world and in the industry.

   This minor is not available to students in the Accountancy and Business programmes.

4. **Chemistry and Biological Chemistry**
The programme prepares non-Chemistry and Biological Chemistry major students for a variety of career opportunities related to Chemistry and Biological Chemistry.

   The programme emphasises the crucial connections of Chemistry and Biological Chemistry with other sciences.

5. **Chinese**
The minor in Chinese equips students with the knowledge and language skill to deal with communication and work in relevant areas. It exposes students to additional career choices, such as teaching, journalism etc.

6. **Communication Studies**
This minor instills in students an understanding of the workings and socio-cultural implications of a knowledge-driven society in the rapidly evolving world of info-comm and media technology.

7. **Computing**
This minor is designed for students who do not wish to become computer engineers but recognise the value of basic computing knowledge and skills in complementing their selected programme.

   The minor is not available to students in the Computer Engineering, Computer Science, Information Engineering & Media and Business (with specialisation in Information Technology) programmes.

8. **Creative Writing**
The Minor in Creative Writing at NTU is the only programme of sustained creative writing study available in Singapore’s higher education landscape. It was designed to provide a training ground for creative thinking and practice, and to contribute to the further development of local literature. The Minor is open to all students interested in exploring their creative talents.

   As a discipline, creative writing encourages conceptual speculation and active engagement both with the world as it is and as it might become. Each piece of writing is essentially a “take” on the world, allowing students to explore, test and reinvent sociological, economic, historical, linguistic, and psychological verities.

   Accordingly, creative writing contributes to the intellectual and aesthetic development of students. Students who write poems and stories of their own are generally more aware of and sensitive to the finer points of how language operates. Creative writing students become skilled in the expression of emotions, reactions, opinions and intuitive judgments, as well as in the arts of project completion and creative collaboration.

   In our courses, students will learn the techniques and practices necessary for the development of original poetry, fiction, drama, screenplays and multimedia works. They will be encouraged to nurture their inventive and critical abilities towards the production of unique and soundly crafted new writing. The courses will comprise workshops that are devoted to literary form and technique, and to the exploration of contemporary trends. They will provide a forum for students to share their work and have it critiqued by other authors in a supportive environment.

9. **Drama and Performance**
This minor offers practical skills (presentational, co-operative and technical) which can be transferred to diverse careers. It offers an alternative paradigm of academic study which can stand in dialogic relationship with core areas of study and give students a broader vision.

   The minor is available only to students in the Art, Design & Media, Chinese, Communication Studies, Economics, English, History, Linguistics & Multilingual Studies, Psychology and Sociology programmes.
10. Economics
The minor in Economics will help students think logically, rationally and rigorously. It gives students the opportunity to learn more about banking, finance, globalisation, employment, economic growth, and broader issues such as the environment, poverty and the Third World.

11. Education Studies
This minor provides students with exposure to key developments in education and training as future professionals in the knowledge-based economy.

12. Energy
The Energy minor provides an understanding of the various aspects of energy and its effects and challenges on society, as well as alternative and potential energy sources for sustainable development. It aims to increase the energy awareness amongst students just as Singapore gears up to explore other energy alternatives. The minor programme offers nine courses in various energy topics.

13. English Language
The provision of an English Language minor to students from the School of Communication and Information is aimed at providing an in-depth understanding of the nature, structure and use of the English Language, so that they can better appreciate how language is applied in the field of communication and information studies. With this aim in mind, a selection of foundational courses that introduce students to the nature and structure of the English Language as well as elective courses which delve into specific areas of applied linguistics are offered to students.

This minor is available only to students in the Communication Studies programme.

14. English Literature
The Minor in English Literature introduces students to a wide range of courses and provides them with a firm foundation in the methods and practices of literary-critical analysis and study. Students are exposed to a variety of literatures, periods and genres, and are acquainted not only with the literary texts, but also with their authors, the literary movements, and the contemporary cultural and historical cross-currents which influenced both author and text. Apart from foundational and progressively advanced study of the major literary genres or forms such as fiction, poetry and drama, special topics courses will also be offered such as Southeast Asian literatures in English, children's literature and science fiction as electives. The minor is an excellent concentration for students planning careers in fields as diverse as academic research, education, publishing, journalism, advertising, library science, public relations, business, and the civil service.

15. Entrepreneurship
This minor is purposefully and uniquely designed to equip and empower students with basic entrepreneurship skills, business acumen, and stamina to grow businesses. Students will develop an open mindset and realise that ideas that may appear like impossible dreams can be shaped into small and realiseable phases. Students will learn to appreciate that entrepreneurship is not just about starting a new business; it is a mindset. It is about taking advantage of opportunities that change brings along. Working with classmates from different schools, disciplines and stages of study, students are able to benefit from the exchange of ideas and opinions.

16. Environmental Management
The Environmental Management minor equips students with essential knowledge and skills in various aspects of protecting and improving precious land, air and water resources.

The minor is not available to students in the Civil Engineering and Environmental Engineering programmes.

17. Environmental and Urban Studies
This Minor enables students to understand the challenges posed by contemporary environmental and urban issues, taking into account multidisciplinary and interdisciplinary approaches. By drawing upon courses offered by divisions in the School of Humanities and Social Sciences and the School of Civil and Environmental Engineering, students will engage with the social, economic, cultural, and technological aspects of new changes in the global environment and in urban settings. The issues covered include energy, food supply, pollution, cultural diversity, social equity, economic development, and the quality of life. Taken together, the course offerings focus on understanding the multiple causes, consequences, and costs of environmental and urban problems -- with a view towards developing useful perspectives and possible solutions.

18. Film Studies
The Minor in Film Studies at NTU is an interdisciplinary program drawing on courses from the College of Humanities, Arts, and Social Sciences (HASS), comprising School of Art, Design and Media (ADM), School of Humanities and Social Sciences (HSS), and Wee Kim Wee School of Communication and Information (WKWSCI). Thus, Film Studies at NTU draws on the expertise and talents of faculty from across the College curriculum, offers a varied conceptual and academic focus, and a wide range of courses, ensuring students are able to work towards a coherent academic programme while simultaneously pursuing their primary degree subject. Film is an important discipline within the College, and of growing importance within Singapore and the South East Asian Region.

19. Finance
The Minor in Finance programme allows Mathematical Sciences students from the School of Physical and Mathematical Sciences (SPMS) to augment their major with knowledge in financial markets, issues and trends. It complements the Mathematics Sciences programme and will provide the students with added set of skills and knowledge to enhance their career opportunities and job search options upon graduation.

The Minor is open only to Mathematical Sciences students from the School of Physical and Mathematical Sciences.

20. History
Studying History helps students understand human experience and thought at different times and places. As a discipline, history encompasses every dimension of human interaction, including social life, economy, culture, thought and politics. By examining continuities and changes through time, students can make sense of the present in terms of the past, and the past in terms of the present.
21. Information & New Media
The Minor in Information and New Media is offered to both Communication Studies and Non-Communication Studies students. The intent of such a programme is to enrich the undergraduate experience by exposing new media from an information perspective and to align the teaching capabilities of the Division of Information Studies with the university's strategic interest in new media. The continuing evolution of the economy to be higher value-added and services-led provides an opportunity for competencies in information management and new media to complement a host of functions- healthcare, R & D, financial services, education, marketing, digital media, etc.

22. Information-Communication Technology
The minor provides non-infocom students with the essential knowledge in e-business technology and the competency skills for the infocom sector.

The minor is not available to students in the Electrical & Electronic Engineering, Computer Engineering, Computer Science, Business (with specialisation in Information Technology) and Information Engineering & Media programmes.

23. Life Sciences
The Minor in Life Sciences is offered to all NTU students except students who are registered in the School of Biological Sciences degree programmes. The purpose of this minor programme is to prepare non-Biology major students for a variety of career opportunities in, and related to, the Life Sciences industry. The minor programme is extremely useful for students majoring in Chemistry & Biological Chemistry, Physics & Applied Physics, Mathematical Sciences, Materials Engineering, Bioengineering, Chemical & Biomolecular Engineering, Sports Science and Business who are interested in complementing their major study with knowledge of today's Life Sciences.

24. Linguistics and Multilingual Studies
Linguistics is the scientific study of language. At the most fundamental level, linguistics is concerned with the description of sound structures and meaning systems and how languages work both at the psychological and sociological levels.

25. Mathematics
The minor in Mathematics serves as a valuable and useful complement to students who seek to develop a deeper appreciation of other courses through a better understanding of the associated quantitative tools.

26. Music
The minor in Music provides foundational skills in music creation, performance, response and research. It provides exposure to major ideas and developments of and about music in both the local and international scene, enhances collaborative work across a range of topics, and offers opportunities for synergy between practical and academic work in music.

27. Philosophy
Literally, philosophy means love of wisdom. When considered as an academic discipline, philosophy is concerned with the study of fundamental problems such as those connected to the nature of knowledge, reality, existence, mind, language, science, and morality. It involves a broad and systematic critical examination of questions that underlie the foundations of the other disciplines.

As such, philosophy shapes the way we think and act. It also heightens our sensitivity towards the nuances of life and at the same time enhances our ability to engage with them. A Philosophy Minor will give students in various disciplines an opportunity to engage in the study of philosophy. This will help them develop critical thinking, reflective consciousness, and other transferable skills, which can strengthen their disciplinary studies and enable them to better adapt to changing circumstances of the world.

28. Physics
This minor emphasises the teaching of basic physical concepts and principles, focusing on topics such as quantum physics, electromagnetic theory, thermodynamics and classical mechanics. It provides strong training in the development of quantitative reasoning and problem-solving skills.

The minor is not available to students in the Applied Physics programme.

29. Psychology
The Minor programme provides students with a broad understanding of the major principles in Psychology, as well as knowledge and skills related to research methods commonly used in Psychology. The Minor in Psychology can be combined with a major in a related field and will provide valuable skills for engaging with others and for understanding and analyzing complex individual, group, and social processes.

30. Public Administration
Public Administration is the interdisciplinary study of policy-making and the organisation and control of government operations. This minor provides students with a general understanding of and exposure to the field of Public Administration and Public Policy.

31. Risk Management and Insurance
The Minor in Risk Management and Insurance (RMI) prepares students to apply modern risk management knowledge and skills in various financial and insurance areas. This is essential under today's rapidly changing and more integrated business world, where organisations, financial institutions, and governments encounter different kinds of risks such as market, operational, technological and catastrophic risks. Students who equip themselves with knowledge in RMI will find their career opportunities enhanced via an understanding of the science of risk management, attainment of practical risk management skills and knowing how to adapt those skills to practical circumstances.

32. Sociology
Sociology is dedicated to understanding the social nature of human beings and the social transformation of human life in the modern world. It is also a practical discipline, involving critical judgement and creative reasoning concerning personal choices, organisational decisions, and public policies without resorting to a convenient acceptance of conventional wisdom.
33. Sport Science
Singapore has played host to a number of major sporting events including the Formula 1 Grand Prix and the inaugural Youth Olympic Games in recent years. The prominence of these events along with the success of Singapore's athletes at the XIX Commonwealth Games in Delhi and the XVI Asian Games in Guangzhou is a demonstration of the investment and commitment of the country to sport which will culminate with the opening of the new Singapore Sports Hub in 2014.

With this expanding interest in sport comes a need to provide sport science support services to athletes, teams, coaches and managers to improve success rates. Along with the investment in elite sport is the national need to maintain fitness of a conscript army, prevent obesity in our children and improve the health and activity of an aging population subject to chronic diseases associated with physical inactivity.

The minor in Sport Science will offer students an insight into the role sports science can play in achieving these aims.

34. Systems Management
Systems Management encompasses the journey of bringing a product, be it big or small, to realisation. Learning outcomes include understanding aspects essential to leaders in industry from the micro aspects of product realisation to the macro aspects of systems engineering and management.

This minor is not available to students in the Aerospace Engineering and Mechanical Engineering programmes.

35. Translation
This minor bridges linguistic and cultural gaps and seeks to accurately convey and retain meaning across languages. Students who equip themselves with translation skills can play important roles in cultural understanding and socio-economic development.

Special Programmes
Singapore Universities Students Exchange Programme
The Singapore Universities Students Exchange Programme (SUSEP) offers NTU students the opportunity to study for a few courses or even one semester in NUS and SMU, made possible through a tripartite agreement with NUS and SMU.

Through this programme, students at the 3 institutions are able to study and experience student's life at a host institution while pursuing their degrees in their university.

In NTU, SUSEP is administered by the Office of Academic Services, and supported by the Schools.

Global Education and Mobility (GEM) Programmes
In this global age, the ability to traverse different sociocultural terrains with ease is an asset for any graduate. NTU is focused on expanding opportunities for its students to become global citizens. We work hand-in-hand with some of the best international partner universities and international organisations to offer student mobility opportunities to learn, work and do research. These help our students develop global perspectives besides broadening their learning experience.

Currently, one in two students has at least one overseas learning opportunity during their undergraduate studies at NTU and the university is planning to raise this to 70% of each cohort.

At NTU, we offer various outbound mobility opportunities that include the GEM Discoverer, GEM Explorer and the Overseas Attachment Programme. One of the strengths of these global programmes is the flexibility it allows – from deciding on the length of the term of study, to the type of programme chosen. There is also the Singapore Universities Students Exchange Programme (SUSEP) that allows NTU students to study a semester in other universities in Singapore.

GEM Discoverer
GEM Discoverer offers enriching, customised short-term overseas programmes (ranging from 2 to 22 weeks) that aim to enhance your cross-cultural intelligence and global exposure. You can choose to embark on the popular summer studies arrangement or participate in specially designed thematic programmes during your vacation.

GEM Discoverer also offers challenging internship/research opportunities for attachment with companies and institutions in emerging to advanced economies.

Work & Study
Spend 12 weeks to a semester long on an internship cum study arrangement in China, India or ASEAN countries.

Research
Attach yourself to renowned scientists and researchers in one of the leading universities in Europe.

Summer Studies
Embark on an interesting summer programme during your school vacation to immerse in the academic culture and heritage of other universities worldwide.

Prelude
Discover the essence of the culture, economy and society in key Asian cities and other emerging countries, through a 2-week intensive customised programme conducted by our partner universities.

To learn more about these programmes, please visit http://www.ntu.edu.sg/GEM-Discoverer.

GEM Explorer
GEM Explorer gives undergraduate students an opportunity to take courses in an overseas partner institution for one full-semester while exploring a new country and culture. You can earn academic units while broadening your global network and perspective.

This programme consists of over 150 prestigious partner universities spanning across more than 25 countries thus allowing you to broaden your horizons. Not forgetting, a world of adventure that awaits.

For more details, please refer to http://www.ntu.edu.sg/GEM-Explorer.
Attachment Programmes

In line with NTU’s mission to educate leaders and advance knowledge for Singapore and beyond, NTU provides students with diverse opportunities to enhance their employability by gaining real-life working experience in local or overseas organisations through various attachment programmes as part of their undergraduate studies in Year 2 or Year 3.

The various attachment programmes are:

<table>
<thead>
<tr>
<th>Programmes</th>
<th>Duration</th>
<th>Brief Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial Orientation (IO)</td>
<td>10 weeks</td>
<td>For third year students from the engineering Schools, i.e. School of Chemical and Biomedical Engineering School of Civil and Environmental Engineering School of Computer Engineering School of Electrical and Electronics Engineering School of Materials Science and Engineering School of Mechanical and Aerospace Engineering</td>
</tr>
<tr>
<td>Industrial Attachment (IA)</td>
<td>22 weeks</td>
<td></td>
</tr>
<tr>
<td>Enhanced Industrial Attachment (EIA)</td>
<td>30 weeks</td>
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</tr>
<tr>
<td>International Research Attachment (IRA)</td>
<td>30 weeks</td>
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</tr>
<tr>
<td>Industrial Immersion (II)</td>
<td>10 weeks</td>
<td>For third year Maritime Studies students from the School of Civil and Environmental Engineering</td>
</tr>
<tr>
<td>Professional Attachment (PA)</td>
<td>10 weeks</td>
<td>For third year Double Degree in Business and Computer Science For second year Double Degree in Accountancy and Business For second year Accountancy and Business students from the Nanyang Business School For third year students from the School of Humanities and Social Sciences</td>
</tr>
<tr>
<td>Professional Internship (PI)</td>
<td>22 weeks</td>
<td>For third year students from the Wee Kim Wee School of Communication and Information.</td>
</tr>
<tr>
<td>Industrial Internship Programme (IIP)</td>
<td>10 weeks</td>
<td>For third-year and fourth-year students from the School of Physical &amp; Mathematical Sciences</td>
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<tr>
<td>(for Physics students)</td>
<td>12 weeks</td>
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<tr>
<td>(for Maths students)</td>
<td>22 weeks</td>
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<tr>
<td>(for Chemistry &amp; Physics students)</td>
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<tr>
<td>Industrial Internship Programme (IIP)</td>
<td>22 weeks</td>
<td>For fourth-year students from the School of Biological Sciences</td>
</tr>
<tr>
<td>ADM Internship</td>
<td>10 weeks</td>
<td>For third-year students from the School of Art, Design &amp; Media.</td>
</tr>
<tr>
<td>SSM Internship</td>
<td>22 weeks</td>
<td>For fourth-year Sport Science &amp; Management students from the Physical Education and Sports Science programme in NIE</td>
</tr>
</tbody>
</table>

Time Schedule:

- 10/12-week attachment - May to July (Inter-Semester)
- 22-week attachment - January to June (Semester 2) or July to December (Semester 1)
- 30-week attachment - January to July (Semester 2)

The attachment programmes which are a hallmark of NTU’s undergraduate education are a unique learning process for the students. They are built on the partnership between the University and the industry in the professional training of students for the knowledge-based economy.

The students can choose from a pool of industry partners in Singapore, Australia, China, France, Germany, Ghana, Hong Kong, India, Indonesia, Japan, Malaysia, Nepal, Pakistan, Sri Lanka, Switzerland, Taiwan, Thailand, UK, USA. To promote a broader and more engaging education and prepare our graduates for new challenges and lifelong learning, the students will get to set their own learning objectives based on the attachment programmes provided by the organisations.

For more details, please visit the Career and Attachment Office's website: http://www.ntu.edu.sg/cao/
Undergraduate Research Experience on CAmpus (URECA)

The Undergraduate Research Experience on CAmpus (URECA) programme is now in its eighth year. URECA is an elite research programme for undergraduate students who have obtained excellent academic standing. The programme enables these students to immerse themselves in a research environment in their second or third year of undergraduate studies, while earning benefits such as stipend or academic credits. These NTU President Research Scholar (PRS) will receive a certificate of participation upon completion of the programme.

URECA creates a platform for aspiring researchers by guiding them through a chosen research project over a period of 11 months (August to June) under the guidance of professors.

URECA students enjoy the flexibility of working on any research project in any discipline at NTU laboratories, external research institutes or national laboratories. In the last academic year, URECA students were given choices of over 1000 research projects proposed by College of Engineering, College of Science, College of Business, Humanities, Arts and Social Sciences.

By undertaking these research projects, the students will:
• Develop a deeper understanding of what they are studying
• Challenge their knowledge beyond textbook and classroom, and learn to look at an issue from more than one perspective.
• Enhance their prospects of job opportunities with our partner organizations.

URECA students spend approximately 10 hours a week for 11 months on their research and some have opted to commit themselves full-time during breaks and vacations. This substantial research immersion gives them a deeper understanding of their research problem and facilitates more significant research findings.

As a testimony to its effectiveness, URECA has since evolved to encompass collaboration with external research organisations; DSO-URECA was launched in collaboration with the DSO National Laboratories, ATREC-URECA was launched in collaboration with Advanced Technology Research Centre, SIMTech-URECA was launched in collaboration with Singapore Institute of Manufacturing Technology (SIMTech-A*STAR), IME-URECA was launched in collaboration with Institute of Microelectronics (IME-A*STAR), NMC-URECA was launched in collaboration with National Metrology Centre (NMC-A*STAR). NTU professors and senior research staff at these organisations collaborate to provide ideas and supervision for these URECA research projects.

URECA students may also pursue research-based final year projects under the FYP-URECA scheme.

A growing number of URECA students have published research papers in archived journals and international conferences. Some of the research activities undertaken were impressively outstanding that they clinched prizes when presented at prestige international conferences. The students’ participation in these conferences were funded by URECA. Several other excellent research activities were also featured in the local media and international journals.

With an exposure in research, URECA students are able to utilise this advantage to pursue postgraduate studies or embark on a career in research.

Admissions

Admission Criteria

Singapore-Cambridge GCE ‘A’ Level

Applicants, regardless of nationality, presenting the Singapore-Cambridge GCE ‘A’ Level certificate.

Admission Requirements

You are offering the Singapore-Cambridge GCE ‘A’ Level Examination in the English medium and must have obtained all of the following:
• At least two passes in subjects at H2 Level and attempted General Paper (GP) or Knowledge & Inquiry (KI) in the same sitting;
• Meet one of the following Mother Tongue Language (MTL) requirements:
  – A minimum of ‘S’ grade in H1 MTL or General Studies in Chinese or H2 Mother Tongue Language & Literature (MTLL) taken at ‘A’ Level
  – Pass in MTL ‘B’ syllabus taken at ‘A’ Level
  – A minimum of D7 in Higher MTL taken at ‘O’ Level

A Mother Tongue subject (Chinese/Malay/Tamil) taken at a separate sitting of the GCE ‘A’ Level examination is acceptable for purpose of admission. H1 non-Tamil Indian Language (Bengali, Gujarati, Hindi, Punjabi and Urdu) or H1 Foreign Language (French, German, Japanese) may be taken in lieu of MTL.

Candidates who do not satisfy the MTL requirement may still submit an application for admission. If selected, he/she will be admitted on a provisional basis. During their course of study, they will be required to meet the minimum MTL requirement before they are allowed to graduate.

In addition to fulfilling the above admission requirements, candidates are required to fulfil the minimum subject requirements of the degree programmes as stated in the following page.
<table>
<thead>
<tr>
<th>Programme</th>
<th>Minimum Subject Requirements</th>
<th>Selection Test/Interview</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RENAISSANCE ENGINEERING PROGRAMME</strong></td>
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<tr>
<td>Renaissance Engineering Programme</td>
<td>1. Pass in H2 Level Mathematics, and&lt;br&gt;2. Pass in H2 Level Biology or Chemistry or Computing or Physics, and&lt;br&gt;3. Pass in H1 Level or ‘O’ Level Physics+ or equivalent</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>COLLEGE OF ENGINEERING</strong></td>
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<tr>
<td>Aerospace Engineering *^</td>
<td>1. Pass in H2 Level Mathematics, and&lt;br&gt;2. Pass in H2 Level Biology or Chemistry or Computing or Physics, and&lt;br&gt;3. Pass in H1 Level or ‘O’ Level Physics+ or equivalent</td>
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<tr>
<td>Bioengineering *^</td>
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<tr>
<td>Business &amp; Computing (Double Degree)</td>
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<tr>
<td>Business &amp; Computer Engineering (Double Degree)</td>
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<tr>
<td>Civil Engineering *^</td>
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<tr>
<td>Computer Engineering *^</td>
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<tr>
<td>Electrical &amp; Electronic Engineering *^</td>
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<tr>
<td>Engineering ^</td>
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<tr>
<td>Environmental Engineering *^</td>
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<tr>
<td>Information Engineering &amp; Media *^</td>
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<tr>
<td>Mechanical Engineering *^</td>
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<tr>
<td>Integrated Programmes #</td>
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<tr>
<td>• BEng [CS] &amp; MSc [CS]</td>
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<td>• BEng [CE] &amp; MSc [CS]</td>
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<tr>
<td>• BEng [EEE] &amp; MSc [ECE]</td>
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<tr>
<td>Materials Engineering *^</td>
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<tr>
<td>Chemical &amp; Biomolecular Engineering *^</td>
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<tr>
<td>Maritime Studies **</td>
<td>1. Pass in H1 Level Mathematics or ‘O’ Level or equivalent pass in Additional Mathematics, and&lt;br&gt;2. Pass in H1 Level or ‘O’ Level Science subject</td>
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<tr>
<td>Maritime Studies with Business Major **</td>
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<tr>
<td><strong>COLLEGE OF SCIENCE</strong></td>
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<tr>
<td>Biological Sciences ^</td>
<td>1. Pass in H1 Level Mathematics, and&lt;br&gt;2. Pass in H2 Level Biology or Chemistry or Physics</td>
<td>On a selective basis</td>
</tr>
<tr>
<td>Biomedical Sciences &amp; Chinese Medicine (Double Degree)</td>
<td>1. Pass in H1 Level Mathematics, and&lt;br&gt;2. Pass in H2 Level Biology or Chemistry or Physics, and&lt;br&gt;3. Pass in ‘O’ Level Chinese</td>
<td>On a selective basis</td>
</tr>
<tr>
<td>Chemistry &amp; Biological Chemistry</td>
<td>1. Pass in H2 Level Chemistry, and&lt;br&gt;2. Pass in H2 Level Mathematics or Physics</td>
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<tr>
<td>Mathematical Sciences ^^</td>
<td>Pass in H2 Level Mathematics</td>
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<tr>
<td>Mathematics &amp; Economics</td>
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<tr>
<td>Physics/Applied Physics</td>
<td>1. Pass in H2 Level Physics, and&lt;br&gt;2. Pass in H2 Level Mathematics</td>
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<tr>
<td>Physics with Mathematical Sciences Major</td>
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<tr>
<td>Programme</td>
<td>Minimum Subject Requirements</td>
<td>Selection Test/Interview</td>
</tr>
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<td>-----------------------------------------------------</td>
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<tr>
<td><strong>NANYANG BUSINESS SCHOOL</strong></td>
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<tr>
<td>Accountancy</td>
<td>Pass in H1 Level Mathematics or ‘O’ Level or equivalent pass in Additional Mathematics</td>
<td>On a selective basis</td>
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<tr>
<td>Business</td>
<td></td>
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<tr>
<td>Accountancy &amp; Business (Double Degree)</td>
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<tr>
<td><strong>COLLEGE OF HUMANITIES, ARTS, &amp; SOCIAL SCIENCES</strong></td>
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<tr>
<td>Art, Design &amp; Media</td>
<td>‘O’ Level or equivalent pass in Mathematics</td>
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<td></td>
<td>In addition, candidates are required to produce and submit the following materials for admission assessment:</td>
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<td>1. A Portfolio</td>
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<td>2. A Personal Statement</td>
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<td></td>
<td>3. A Creative Writing/Film</td>
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<td></td>
<td>4. Three Drawings</td>
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<tr>
<td></td>
<td>For specific submission instructions and details, please refer to: <a href="http://www.adm.ntu.edu.sg/">http://www.adm.ntu.edu.sg/</a></td>
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<tr>
<td></td>
<td>ProspectiveADM/UndergraduateProgrammes/ApplicationProcedures/Pages/ApplicationProcedures.aspx</td>
<td></td>
</tr>
<tr>
<td>Communication Studies</td>
<td>A good grade in General Paper or Knowledge &amp; Inquiry, at least B in order to be considered</td>
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</tr>
<tr>
<td>Chinese</td>
<td>Pass in H2 Level Chinese or good pass in H1 Level Chinese or China Studies in Chinese or ‘O’ Level Chinese or distinction in ‘O’ Level Chinese</td>
<td>On a selective basis</td>
</tr>
<tr>
<td>Economics</td>
<td>1. A good grade in H1 Level Mathematics, and</td>
<td>On a selective basis</td>
</tr>
<tr>
<td></td>
<td>2. A good grade in General Paper or Knowledge &amp; Inquiry</td>
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<tr>
<td>Psychology</td>
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<tr>
<td>English Literature</td>
<td>A good grade in H1 Level English Language or General Paper or Knowledge &amp; Inquiry or H2 Level History</td>
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</tr>
<tr>
<td>History</td>
<td>A good grade in General Paper or Knowledge &amp; Inquiry or H1 Level History or English Literature or Geography</td>
<td>On a selective basis</td>
</tr>
<tr>
<td>Linguistics &amp; Multilingual Studies</td>
<td>A good grade in H1 Level English Language, Geography or History; or a good grade in General Paper, Knowledge &amp; Inquiry or H2 Level Mother Tongue Language</td>
<td>Yes</td>
</tr>
<tr>
<td>Sociology</td>
<td>A good pass in General Paper or Knowledge &amp; Inquiry</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>NATIONAL INSTITUTE OF EDUCATION</strong></td>
<td></td>
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</tr>
<tr>
<td>Arts (Education) ▲</td>
<td>1. 2 subjects taken at H1 Level, including a pass in General Paper or Knowledge and Inquiry at H2 Level, taken at one and the same sitting, and</td>
<td>Yes</td>
</tr>
<tr>
<td>Science (Education) ▲</td>
<td>2. Pass in at least 5 subjects including English as a First Language taken at ‘O’ Level, and</td>
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<tr>
<td></td>
<td>3. Pass in Mathematics at either ‘O’ Level or at least H1 Level in the ‘A’ Level examinations</td>
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<tr>
<td><strong>SPORT SCIENCE &amp; MANAGEMENT</strong></td>
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</tr>
<tr>
<td>Sport Science &amp; Management **</td>
<td>Pass in H1 Level Mathematics or ‘O’ Level or equivalent pass in Additional Mathematics</td>
<td>On a selective basis</td>
</tr>
</tbody>
</table>

- Programme leading to Bachelor of Engineering Science & Master of Science in Technology Management.
- The programme is also offered as a double degree programme with Economics.
- The programme is also offered as a single degree programme with Business Minor.
- ‘O’ Level pass in Physics is only applicable to applicants who have not read Physics at H2 or H1 Level.
- [CE]: Computer Engineering; [CS]: Computer Science; [ECE]: Electrical and Computer Engineering; [EEE]: Electrical and Electronic Engineering. These integrated programmes are with National Infocomm Scholarship and are only open to Singapore Citizens and Singapore Permanent Residents.
- ** Programmes leading to Bachelor of Science degree.
- ^ The programme is also offered as a single degree with Minor in Finance.
- ▲ These degree programmes offer many courses which may require further subject prerequisites. Please refer to the National Institute of Education (NIE) website at www.nie.edu.sg for details.
Local Polytechnic Diploma

Admission Requirements
Applicants, regardless of nationality, presenting a relevant Diploma or a current Final Year student from one of the following institutions:
- One of the five local polytechnics in Singapore
- Nanyang Academy of Fine Arts (NAFA)
- LASALLE College of the Arts
- Building & Construction Academy (BCA)
- Singapore Sports School – Auckland University of Technology (Diploma in Sports Management & Exercise Science only)

In addition to the above requirements, applicants for programmes offered by the Nanyang Business School (NBS) need to fulfil the following subject requirements:
- A good grade in GCE ‘O’ Level Additional Mathematics or its equivalent
- Applicants who do not meet this Mathematics requirement and who are deemed to have not performed well for the subject – may be invited for interviews and undergo a Mathematics Test conducted by NBS

NBS will not consider any elective/module taken by the applicants at the Polytechnics as a replacement of the GCE ‘O’ Level Additional Mathematics to satisfy the Mathematics requirement.

For more information on the admission requirements, please visit http://admissions.ntu.edu.sg/UndergraduateAdmissions/Pages/PolyDiploma.aspx

List of Acceptable Diplomas
Please visit https://wis.ntu.edu.sg/webexe/owa/adm_appl.relevant_diploma?student_type=F to find out more information on the programmes that you can apply based on your diploma.

Programmes open to all Local Polytechnic Diploma Holders
Applications for the following NTU programmes are open to all local Polytechnic Diploma holders regardless of the diploma obtained from Ngee Ann Polytechnic (NP), Nanyang Polytechnic (NYP), Republic Polytechnic (RP), Singapore Polytechnic (SP) and Temasek Polytechnic (TP):

<table>
<thead>
<tr>
<th>School</th>
<th>Programme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nanyang Business School</td>
<td>Accountancy</td>
</tr>
<tr>
<td></td>
<td>Business</td>
</tr>
<tr>
<td></td>
<td>Accountancy &amp; Business (Double Degree)</td>
</tr>
<tr>
<td>School of Art, Design &amp; Media</td>
<td>Art, Design &amp; Media</td>
</tr>
<tr>
<td>School of Humanities &amp; Social Sciences</td>
<td>Chinese</td>
</tr>
<tr>
<td></td>
<td>Economics *</td>
</tr>
<tr>
<td></td>
<td>English Literature</td>
</tr>
<tr>
<td></td>
<td>History</td>
</tr>
<tr>
<td></td>
<td>Linguistics &amp; Multilingual Studies</td>
</tr>
<tr>
<td></td>
<td>Psychology *</td>
</tr>
<tr>
<td></td>
<td>Sociology</td>
</tr>
<tr>
<td></td>
<td>* Polytechnic graduates with ‘O’ Level Additional Mathematics or its equivalent are preferred. Those who do not meet the Maths requirement but can show potential may be called up for interviews and considered on a case-by-case basis.</td>
</tr>
<tr>
<td>School of Physical &amp; Mathematical Sciences</td>
<td>Mathematical Sciences</td>
</tr>
<tr>
<td></td>
<td>Mathematics &amp; Economics</td>
</tr>
<tr>
<td></td>
<td>Mathematical Sciences with Minor in Finance</td>
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<tr>
<td></td>
<td>Physics/Applied Physics</td>
</tr>
<tr>
<td></td>
<td>Physics with Mathematical Sciences Major</td>
</tr>
<tr>
<td>School of Civil &amp; Environmental Engineering</td>
<td>Maritime Studies</td>
</tr>
<tr>
<td></td>
<td>Maritime Studies with Business Major</td>
</tr>
<tr>
<td>National Institute of Education</td>
<td>Arts (Education)</td>
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<tr>
<td></td>
<td>Science (Education)</td>
</tr>
<tr>
<td></td>
<td>Sport Science &amp; Management</td>
</tr>
</tbody>
</table>

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International Baccalaureate Diploma
Applicants, regardless of nationality, presenting the International Baccalaureate (IB) Diploma.

Admission Requirements
You are offering the International Baccalaureate (IB) Diploma, and will have completed at least 12 years of general education in the year of admission.

In addition to fulfilling the above admission requirements, below are the minimum subject requirements of the degree programmes that you also need to fulfil.

<table>
<thead>
<tr>
<th>Programme</th>
<th>Minimum Subject Requirements</th>
<th>Selection Test/Interview</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RENAISSANCE ENGINEERING PROGRAMME</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Renaissance Engineering Programme</td>
<td>1. Mathematics at Higher Level, and</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>2. Physics or Chemistry or Biology or Computer Science at Higher Level, and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Physics at Standard Level or equivalent+</td>
<td></td>
</tr>
<tr>
<td><strong>COLLEGE OF ENGINEERING</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aerospace Engineering *^</td>
<td>1. Mathematics at Higher Level, and</td>
<td></td>
</tr>
<tr>
<td>Bioengineering *^</td>
<td>2. Physics or Chemistry or Biology or Computer Science at Higher Level, and</td>
<td></td>
</tr>
<tr>
<td>Business &amp; Computing (Double Degree)</td>
<td>3. Physics at Standard Level or equivalent+</td>
<td></td>
</tr>
<tr>
<td>Business &amp; Computer Engineering (Double Degree)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Civil Engineering *^</td>
<td>1. Mathematics at Higher Level, and</td>
<td></td>
</tr>
<tr>
<td>Computer Engineering *^</td>
<td>2. Physics or Chemistry or Biology or Computer Science at Higher Level, and</td>
<td></td>
</tr>
<tr>
<td>Computer Science *^</td>
<td>3. Physics at Standard Level or equivalent+</td>
<td></td>
</tr>
<tr>
<td>Electrical &amp; Electronic Engineering *^</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental Engineering *^</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information Engineering &amp; Media *^</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Integrated Programmes #</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• BEng [CS] &amp; MSc [CS]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• BEng [CE] &amp; MSc [CS]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• BEng [EEE] &amp; MSc [ECE]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical Engineering *^</td>
<td>1. Mathematics at Higher Level, and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Physics at Standard Level or equivalent+</td>
<td></td>
</tr>
<tr>
<td>Chemical &amp; Biomolecular Engineering *^</td>
<td>1. Mathematics at Higher Level, and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Chemistry at Higher Level, and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Physics at Standard Level or equivalent+</td>
<td></td>
</tr>
<tr>
<td>Materials Engineering *^</td>
<td>1. Mathematics at Higher Level, and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Physics or Chemistry or Biology at Higher Level, and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Physics at Standard Level or equivalent+</td>
<td></td>
</tr>
<tr>
<td>Maritime Studies **</td>
<td>1. Mathematics at Standard Level, and</td>
<td></td>
</tr>
<tr>
<td>Maritime Studies with Business Major **</td>
<td>2. Physics or Chemistry or Biology at Standard Level</td>
<td></td>
</tr>
<tr>
<td><strong>COLLEGE OF SCIENCE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biological Sciences ^</td>
<td>1. Mathematics at Standard Level, and</td>
<td>On a selective basis</td>
</tr>
<tr>
<td>Biomedical Sciences &amp; Chinese Medicine (Double Degree)</td>
<td>2. Physics or Chemistry or Biology at Higher Level, and</td>
<td>On a selective basis</td>
</tr>
<tr>
<td></td>
<td>3. Chinese at Standard Level</td>
<td></td>
</tr>
<tr>
<td>Chemistry &amp; Biological Chemistry</td>
<td>1. Chemistry at Higher Level, and</td>
<td></td>
</tr>
<tr>
<td>Mathematical Sciences ^^</td>
<td>2. Mathematics or Physics at Higher Level</td>
<td></td>
</tr>
<tr>
<td>Mathematics &amp; Economics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physics/Applied Physics</td>
<td>1. Physics at Higher Level, and</td>
<td></td>
</tr>
<tr>
<td>Physics with Mathematical Sciences Major</td>
<td>2. Mathematics at Higher Level</td>
<td></td>
</tr>
<tr>
<td>Programme</td>
<td>Minimum Subject Requirements</td>
<td>Selection Test/Interview</td>
</tr>
<tr>
<td>-----------</td>
<td>-----------------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td><strong>NANYANG BUSINESS SCHOOL</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accountancy</td>
<td>Mathematics at Standard Level</td>
<td>On a selective basis</td>
</tr>
<tr>
<td>Business</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accountancy &amp; Business (Double Degree)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>COLLEGE OF HUMANITIES, ARTS, &amp; SOCIAL SCIENCES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Art, Design &amp; Media</td>
<td>Mathematics at Standard Level</td>
<td></td>
</tr>
<tr>
<td>In addition, candidates are required to produce and submit the following materials for admission assessment:</td>
<td></td>
<td></td>
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<tr>
<td>1. A Portfolio</td>
<td></td>
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<tr>
<td>2. A Personal Statement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. A Creative Writing/Film</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Three Drawings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>For specific submission instructions and details, please refer to <a href="http://www.adm.ntu.edu.sg/ProspectiveADM/UndergraduateProgrammes/ApplicationProcedures/Pages/ApplicationProcedures.aspx">http://www.adm.ntu.edu.sg/ProspectiveADM/UndergraduateProgrammes/ApplicationProcedures/Pages/ApplicationProcedures.aspx</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication Studies</td>
<td>A good grade in English at Standard Level</td>
<td>Yes</td>
</tr>
<tr>
<td>Chinese</td>
<td>A good grade in Chinese at Standard Level</td>
<td>On a selective basis</td>
</tr>
<tr>
<td>Economics</td>
<td>1. A good grade in Mathematics at Standard Level, and</td>
<td>On a selective basis</td>
</tr>
<tr>
<td>Psychology</td>
<td>2. A good grade in English at Standard Level</td>
<td></td>
</tr>
<tr>
<td>English Literature</td>
<td>A good grade in English at Standard Level</td>
<td>Yes</td>
</tr>
<tr>
<td>Linguistics &amp; Multilingual Studies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sociology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>History</td>
<td>A good grade in English at Standard Level</td>
<td>On a selective basis</td>
</tr>
<tr>
<td><strong>NATIONAL INSTITUTE OF EDUCATION</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arts (Education) ▲</td>
<td>1. Mathematics at Standard Level, and</td>
<td></td>
</tr>
<tr>
<td>Science (Education) ▲</td>
<td>2. English A1 at Standard Level, and</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>3. Pass in at least 5 subjects including English as a First Language at ‘O’ Level or Junior High School Level, where applicable</td>
<td></td>
</tr>
<tr>
<td><strong>SPORT SCIENCE &amp; MANAGEMENT</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sport Science &amp; Management **</td>
<td>Mathematics at Standard Level</td>
<td>On a selective basis</td>
</tr>
</tbody>
</table>

- Programme leading to a Bachelor of Engineering Science & Master of Science in Technology Management.
- The programme is also offered as a double degree programme with Economics.
- ^ The programme is also offered as a single degree programme with Business Minor.
- + Pass in Physics at Standard Level is only applicable to applicants who have not read Physics at Higher Level.
- # [CE]: Computer Engineering; [CS]: Computer Science; [ECE]: Electrical and Computer Engineering; [EEE]: Electrical and Electronic Engineering. These integrated programmes are with National Infocomm Scholarship and are only open to Singapore Citizens and Singapore Permanent Residents.
- ** Programmes leading to Bachelor of Science degree.
- ^^ The programme is also offered as a single degree with Minor in Finance.
- ▲ These degree programmes offer many courses which may require further subject prerequisites. Please refer to the National Institute of Education (NIE) website at www.nie.edu.sg for details.

### NUS High School Diploma

Applicants, regardless of nationality, presenting the NUS High School Diploma awarded by NUS High School of Mathematics & Science.

#### Admission Requirements

You are offering the NUS High School Diploma and must fulfil one of the following Mother Tongue Language (MTL) requirements:

- A pass in MTL ‘B’ or a grade ‘S’ for General Studies in Chinese or H1 MTL or H2 MTL at ‘A’ Level
- A minimum of D7 in Higher MTL taken at ‘O’ Level
- An MOE-approved MTL-in-lieu or MTL-exemption
In addition to fulfilling the above admission requirements, below are the minimum subject requirements of the degree programme that you also need to fulfil.

<table>
<thead>
<tr>
<th>Programme</th>
<th>Minimum Subject Requirements</th>
<th>Selection Test/Interview</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RENAISSANCE ENGINEERING PROGRAMME</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Renaissance Engineering Programme ✓</td>
<td>1. Major CAP of 2.0 in Mathematics, and&lt;br&gt;2. Major CAP of 2.0 in Physics or Chemistry or Biology+</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>COLLEGE OF ENGINEERING</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aerospace Engineering ^*^</td>
<td>1. Major CAP of 2.0 in Mathematics, and&lt;br&gt;2. Major CAP of 2.0 in Physics or Chemistry or Biology+</td>
<td></td>
</tr>
<tr>
<td>Bioengineering ^*^</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business &amp; Computing (Double Degree)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business &amp; Computer Engineering (Double Degree)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Civil Engineering ^*^</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer Engineering ^*^</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer Science ^*^</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical &amp; Electronic Engineering ^*^</td>
<td></td>
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<tr>
<td>Engineering ^*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental Engineering ^*^</td>
<td></td>
<td></td>
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<tr>
<td>Information Engineering &amp; Media ^*</td>
<td></td>
<td></td>
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<tr>
<td>Integrated Programmes #</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• BEng [CS] &amp; MSc [CS]</td>
<td></td>
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<tr>
<td>• BEng [CE] &amp; MSc [CS]</td>
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</tr>
<tr>
<td>• BEng [EEE] &amp; MSc [ECE]</td>
<td></td>
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</tr>
<tr>
<td>Materials Engineering ^*^</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical Engineering ^*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemical &amp; Biomolecular Engineering ^*^</td>
<td>1. Major CAP of 2.0 in Mathematics, and&lt;br&gt;2. Major CAP of 2.0 in Chemistry, and&lt;br&gt;3. Overall CAP of 2.0 in Physics</td>
<td></td>
</tr>
<tr>
<td>Maritime Studies **</td>
<td>1. Major CAP of 2.0 in Mathematics, and&lt;br&gt;2. Overall CAP of 2.0 in Physics or Chemistry or Biology</td>
<td></td>
</tr>
<tr>
<td>Maritime Studies with Business Major **</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>COLLEGE OF SCIENCE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biological Sciences ^*</td>
<td>1. Major CAP of 2.0 in Mathematics, and&lt;br&gt;2. Major CAP of 2.0 in Physics or Chemistry or Biology</td>
<td>On a selective basis</td>
</tr>
<tr>
<td>Biomedical Sciences &amp; Chinese Medicine (Double Degree)</td>
<td>1. Major CAP of 2.0 in Mathematics, and&lt;br&gt;2. Major CAP of 2.0 in Physics or Chemistry or Biology, and&lt;br&gt;3. Good Overall CAP in Chinese Language</td>
<td>On a selective basis</td>
</tr>
<tr>
<td>Chemistry &amp; Biological Chemistry</td>
<td>1. Major CAP of 2.0 in Chemistry, and&lt;br&gt;2. Major CAP of 2.0 in Mathematics or Physics</td>
<td></td>
</tr>
<tr>
<td>Mathematical Sciences ^^</td>
<td>Major CAP of 2.0 in Mathematics</td>
<td></td>
</tr>
<tr>
<td>Mathematics &amp; Economics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physics/Applied Physics</td>
<td>1. Major CAP of 2.0 in Physics, and&lt;br&gt;2. Major CAP of 2.0 in Mathematics</td>
<td></td>
</tr>
<tr>
<td><strong>NANYANG BUSINESS SCHOOL</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accountancy</td>
<td>Major CAP of 2.0 in Mathematics</td>
<td>On a selective basis</td>
</tr>
<tr>
<td>Business</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accountancy &amp; Business (Double Degree)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Programme | Minimum Subject Requirements | Selection Test/Interview
---|---|---
**COLLEGE OF HUMANITIES, ARTS, & SOCIAL SCIENCES**
Art, Design & Media | Major CAP of 2.0 in Mathematics  
In addition, candidates are required to produce and submit the following materials for admission assessment:  
1. A Portfolio  
2. A Personal Statement  
3. A Creative Writing/Film  
4. Three Drawings  
For specific submission instructions and details, please refer to: [http://www.adm.ntu.edu.sg/ProspectiveADM/UndergraduateProgrammes/ApplicationProcedures/Pages/ApplicationProcedures.aspx](http://www.adm.ntu.edu.sg/ProspectiveADM/UndergraduateProgrammes/ApplicationProcedures/Pages/ApplicationProcedures.aspx) |  
Communication Studies | Good Overall CAP in English Language | Yes  
Chinese | Good Overall CAP in Chinese Language | On a selective basis  
Economics | 1. Major CAP of 2.0 in Mathematics, and  
2. Good Overall CAP in English Language | On a selective basis  
English Literature |  
Linguistics & Multilingual Studies | Good Overall CAP in English Language | Yes  
Sociology |  
History | Good Overall CAP in English Language | On a selective basis  
Psychology | 1. Major CAP of 2.0 in Mathematics, and  
2. Good Overall CAP in English Language | On a selective basis

**NATIONAL INSTITUTE OF EDUCATION**
Arts (Education) ▲ | 1. Major CAP of 2.0 in Mathematics, and  
2. Good Overall CAP in English Language | Yes  
Science (Education) ▲ |  
**SPORT SCIENCE & MANAGEMENT**
Sport Science & Management ** | Major CAP of 2.0 in Mathematics | On a selective basis

- Programme leading to a Bachelor of Engineering Science & Master of Science in Technology Management.
- The programme is also offered as a double degree programme with Economics.
- The programme is also offered as a single degree programme with Business Minor.
+ An Overall CAP of 2.0 in Physics is applicable to applicants who have not majored in Physics.
# [CE]: Computer Engineering; [CS]: Computer Science; [ECE]: Electrical and Computer Engineering; [EEE]: Electrical and Electronic Engineering. These integrated programmes are with National Infocomm Scholarship and are only open to Singapore Citizens and Singapore Permanent Residents.
** Programmes leading to Bachelor of Science degree.
^^ The programme is also offered as a single degree with Minor in Finance.
▲ These degree programmes offer many courses which may require further subject prerequisites. Please refer to the National Institute of Education (NIE) website at [www.nie.edu.sg](http://www.nie.edu.sg) for details.

**International & Other Qualifications**
Applicants, regardless of nationality, presenting an International qualification (e.g. Malaysia STPM/UEC, India Standard 12, Indonesia SMA UAN, PRC Gao Kao, Vietnam High School Graduation Certificate, etc.) or other qualifications not specified in the preceding groups above.

**Application Procedures**
**Singapore-Cambridge GCE ‘A’ Level, Local Polytechnic Diploma, International Baccalaureate (IB) Diploma and NUS High School Diploma**

Application is done online by submitting an electronic application form during application period. Application will only be processed if the application fee and required supporting documents are received within the stipulated deadlines.

Full-time National Servicemen (NSF) with places already reserved in NTU and who wish to submit new applications may apply under the respective application groups that correspond to his qualifications.
Submission of Supporting Documents
Softcopies of documents can be submitted via uploading online at the Document Submission Page via the Application Status Menu or hardcopies by post or hand.

Online uploading is not applicable for submission of materials required for consideration into the Art, Design & Media programme.

International & Other Qualifications
Applicants must have completed at least 12 years of general education or will be taking Year 12 national examinations in the year of application in order to be considered for admission.

Application is done online by submitting an electronic application form during application period. The website http://admissions.ntu.edu.sg/UndergraduateIntnlAdmissions/Pages/InternationalOthers.aspx provides more information.

Inaccurate or false information or omission of material information will render the application invalid and those admitted on the basis of such false or incomplete information will be asked to withdraw.

Submission of Supporting Documents
Please submit the documents via one, not both, of the following methods no later than 1 week after the closing date:
• Upload online or
• Send by post.

NTU Entrance Examination
International students with Malaysia STPM, Malaysia UEC, ‘A’ Level (AQA, Brunei, Cambridge, Edexcel, Hong Kong, London, Maldives or Sri Lanka), India Standard 12, Mauritius HSC, PRC Gao Kao, American High School Diploma, German Abitur, French Baccalaureate, International Baccalaureate and Hong Kong Diploma of Secondary Education Examination (HKDSE) are not required to take the entrance exams.

In addition, applicants who have won gold, silver or bronze medals in International Science Olympiad Competitions* will be exempted from taking the entrance examination.

Applicants with other qualifications may be required to take an entrance examination before a final decision on admission is made. Details on the examination will be made known to shortlisted applicants.

* We accept the medals from the following competitions:
• International Mathematical Olympiad (IMO)
• International Physics Olympiad (IPhO)
• International Chemistry Olympiad (IChO)
• International Biology Olympiad (IBO)
• International Olympiad in Informatics (IOI)
• International Olympiad on Astronomy and Astrophysics (IOAA)

Admission to undergraduate programmes not closely related to your field of achievement (as above) will normally be on a case-by-case basis.

IELTS/TOEFL/SAT1
Submission of IELTS, TOEFL and SAT1 scores are optional except for students with PRC Gao Kao qualification (i.e. students who will be taking Gao Kao in June 2012 and those who have already taken Gao Kao). Only scores obtained in the 3 years leading up to the application deadline will be considered.
Academic Year 2012/13 Application Period and Application Fee

<table>
<thead>
<tr>
<th>Application Group</th>
<th>Application Period</th>
<th>Application Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singapore-Cambridge GCE ‘A’ Level</td>
<td>Start : A-Level results release day</td>
<td>VISA or Mastercard or DBS/POSB ATM – $10</td>
</tr>
<tr>
<td></td>
<td>End : 1 April 2012</td>
<td></td>
</tr>
<tr>
<td>Local Polytechnic Diplomas</td>
<td>Start : 1 February 2012</td>
<td></td>
</tr>
<tr>
<td></td>
<td>End : 21 February 2012</td>
<td></td>
</tr>
<tr>
<td>NUS High School Diploma</td>
<td>Start : 1 December 2011</td>
<td></td>
</tr>
<tr>
<td></td>
<td>End : 15 January 2012</td>
<td></td>
</tr>
<tr>
<td>International Baccalaureate Diploma</td>
<td>Start : 13 October 2011</td>
<td>• Singaporean or Singapore Permanent Resident Applicants – VISA or Mastercard or DBS/POSB ATM – $10</td>
</tr>
<tr>
<td></td>
<td>End : 1 April 2012</td>
<td>• International Applicants – Bank Draft – S$30 or US$30 / VISA or Mastercard – S$20</td>
</tr>
<tr>
<td>International &amp; Other Qualifications</td>
<td>Start : 3 October 2011</td>
<td>Cash or Cheque* - S$70</td>
</tr>
<tr>
<td></td>
<td>End : Refer to <a href="http://admissions.ntu.edu.sg/UndergraduateIntnlAdmissions/Pages/InternationalOthers.aspx">http://admissions.ntu.edu.sg/UndergraduateIntnlAdmissions/Pages/InternationalOthers.aspx</a> for the application period of the respective qualifications</td>
<td></td>
</tr>
<tr>
<td>Part-Time B.Eng</td>
<td>Start : 1 December 2011</td>
<td>VISA or Mastercard or DBS/POSB ATM – S$65</td>
</tr>
<tr>
<td></td>
<td>End : 23 January 2012</td>
<td></td>
</tr>
</tbody>
</table>

*We only accept cheques drawn on banks in Singapore

The dates indicated above are correct as of 31 March 2012. Please refer to http://admissions.ntu.edu.sg/UndergraduateAdmissions/Pages/default.aspx for updated information.

Tuition Fees
For students offered admission in Academic Year (AY) 2012/13, the annual tuition fee is fixed at the rate for the duration of their degree programme.

<table>
<thead>
<tr>
<th>Programme of Study</th>
<th>Subsidised Tuition Fee</th>
<th>Non-Subsidised Tuition Fee (not receiving tuition grant)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SINGAPORE CITIZENS</td>
<td>SINGAPORE PERMANENT RESIDENTS (SPR)</td>
</tr>
<tr>
<td>SPR and international students who are eligible and applied for Tuition Grant are required to sign the MOE Tuition Grant Agreement and will be bonded to work in any Singapore-registered companies based overseas or in Singapore for 3 years upon graduation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• All Programmes (except for those listed below)</td>
<td>S$7,460</td>
<td>S$9,850</td>
</tr>
<tr>
<td>• Accountancy</td>
<td>S$8,420</td>
<td></td>
</tr>
<tr>
<td>• Business</td>
<td>S$11,120</td>
<td></td>
</tr>
<tr>
<td>• Accountancy &amp; Business (Double Degree)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Business &amp; Computing (Double Degree)</td>
<td>S$15,500</td>
<td>S$30,860</td>
</tr>
<tr>
<td>• Business &amp; Computer Engineering (Double Degree)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Renaissance Engineering Programme</td>
<td>S$16,640</td>
<td>S$21,970</td>
</tr>
</tbody>
</table>

For more information on Tuition Fees, please visit http://admissions.ntu.edu.sg/UndergraduateAdmissions/Pages/FeesTuitionGrant.aspx
Notes on payment of fees

- Students who do not sign the tuition grant agreement or who are not eligible for the tuition grant will have to pay non-subsidised tuition fee.
- Fees (tuition fee and compulsory miscellaneous fees) are payable by students on a semester basis regardless of whether they are on Industrial Attachment, Overseas Exchange Programme etc., or otherwise during the semester.
- Students who are completing one last subject in order to graduate, are also required to pay fees (tuition fee and compulsory miscellaneous fees) on a semester basis.
- Students who withdraw or apply for leave of absence from the University two or more weeks after the commencement of a semester are liable for the payment of fees (tuition fee and other compulsory fees) for the entire semester.
- National Servicemen whose enrolment in the University is delayed by one or two years because of their National Service commitment, are allowed to enjoy a one-year or two-year lag in the payment of their subsidised tuition fee. The fee payable will depend on the year that they had first accepted a place in the University. For example, if they were offered admission in AY2010 and had accepted the offer, they pay the subsidised tuition fee applicable for AY2010 when they join the University in AY2012. If they had reapplied for a new programme in AY2011, they will still pay the subsidised tuition fee applicable for AY2010 regardless of the 2nd application outcome. Students paying the non-subsidised tuition fee will pay the rate based on the year they join the University.
- Office of Finance sends the electronic bill (e-bill) to undergraduates via their NTU student email account at the beginning of each semester. Upon notification, students are required to log on using their StudentLINK account to view and print their e-bill for record/payment.

Tuition Grant

The Ministry of Education, Singapore (MOE) provides tuition grant (TG) which covers a substantial portion of the full tuition fees to eligible students. Students who accept the tuition grant are required to pay only the subsidised tuition fee. Unless informed otherwise, students are eligible for tuition grant up to the normal duration of their degree programmes. Please visit our website at http://admissions.ntu.edu.sg/UndergraduateAdmissions/Pages/TuitionGrant.aspx for more information.

Miscellaneous Fees

In addition to the tuition fee, there is also the compulsory annual miscellaneous fees payable by students.

<table>
<thead>
<tr>
<th>Annual Miscellaneous Fees</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registration Fee</td>
<td>$16.05*</td>
</tr>
<tr>
<td>Students’ Union Entrance Fee</td>
<td>$10.70*</td>
</tr>
<tr>
<td>Students’ Union Subscription Fee</td>
<td>$25.60</td>
</tr>
<tr>
<td>Computer Fee</td>
<td>$13.90</td>
</tr>
<tr>
<td>Laboratory Fee (for laboratory-based degree programmes)</td>
<td>$16.05</td>
</tr>
<tr>
<td>University Copyright Licence Fee</td>
<td>$10.00</td>
</tr>
<tr>
<td>Student Health Service Fees</td>
<td>$64.20</td>
</tr>
<tr>
<td>Sports Fee</td>
<td>$25.60</td>
</tr>
<tr>
<td>Group Personal Accident Insurance Scheme</td>
<td>$5.35 #</td>
</tr>
<tr>
<td>Amenities Fee</td>
<td>$12.80</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$200.25</strong></td>
</tr>
</tbody>
</table>

For Singapore Permanent Residents & International Students Only

Group Hospitalisation and Surgical Insurance (GHSI)               | $83.00  |

This is the compulsory fee payable by students staying in hall.

<table>
<thead>
<tr>
<th>Monthly Hall Rental Fees</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Only required if one chooses to stay in NTU Halls of Residence)</td>
<td>$195.00 – $230.00**</td>
</tr>
<tr>
<td>Double Occupancy</td>
<td></td>
</tr>
</tbody>
</table>

The above fees are inclusive of prevailing GST except for the Copyright Licence Fee and Hall Rental Fees which does not attract GST.

* One-time fee, payable in semester of admission only.
# This is an indicative figure. The confirmed rate will be posted in due course at http://www.ntu.edu.sg/STUDENTS/UNDERGRADUATE/STUDENTSERVICES/HEALTHANDCOUNSELLING/MEDICALINSURANCESCHEMES/Pages/GPAI.aspx
** This figure is effective from 31 May 2012 and subject to revision in subsequent years. More information can be found at http://www.ntu.edu.sg/hso/Undergraduate/HallsofResidence/Pages/UG_SummaryOfRates.aspx
Scholarships and Financial Assistance Schemes

Scholarships
In recognition of academic excellence and leadership potential, NTU offers a variety of scholarships to new as well as current students pursuing their full-time undergraduate studies in NTU. Scholarships are generally awarded to students based on academic merit, leadership qualities, unique talents and outstanding Co-Curricular Activities records.

Scholarships for Freshmen

NTU Administered Scholarships

<table>
<thead>
<tr>
<th>Scholarship</th>
<th>Eligibility</th>
<th>Applicats must</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nanyang Scholarship</td>
<td>• All nationalities.</td>
<td>• Possess outstanding Singapore-Cambridge GCE 'A' Level, Local Polytechnic Diploma, NUS High School Diploma, IB Diploma or Year 12 equivalent qualifications.</td>
</tr>
<tr>
<td></td>
<td>• Successful awardees should read a full-time undergraduate degree programme. The scholarship will cover the years of study at NTU.*</td>
<td>• Have excellent Co-Curricular Activities records.</td>
</tr>
<tr>
<td></td>
<td>• For the Biomedical Sciences &amp; Chinese Medicine and the NTU-Georgia Tech Integrated Programmes, the scholarship will cover only the first three years of study in NTU. For the Renaissance Engineering Programme (REP), the scholarship is also applicable for the one year the scholarship holder is at the University of California Berkeley.</td>
<td>• Have strong leadership qualities and potential.</td>
</tr>
</tbody>
</table>

College Scholarship

<table>
<thead>
<tr>
<th>Eligibility</th>
<th>Applicats must</th>
</tr>
</thead>
<tbody>
<tr>
<td>• All nationalities.</td>
<td>• Possess outstanding Singapore-Cambridge GCE 'A' Level, Local Polytechnic Diploma, NUS High School Diploma, IB Diploma or Year 12 equivalent qualifications.</td>
</tr>
<tr>
<td>• Successful awardees should read a full-time undergraduate degree programme. The scholarship will cover the years of study at NTU. *</td>
<td>• Have good Co-Curricular Activities records.</td>
</tr>
<tr>
<td>• For the Biomedical Sciences &amp; Chinese Medicine and the NTU-Georgia Tech Integrated Programmes, the scholarship will cover only the first three years of study in NTU. For the Renaissance Engineering Programme (REP), the scholarship is also applicable for the one year the scholarship holder is at the University of California Berkeley.</td>
<td>• Have good leadership qualities and potential.</td>
</tr>
</tbody>
</table>

ASEAN Undergraduate Scholarship

<table>
<thead>
<tr>
<th>Eligibility</th>
<th>Applicats must</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Citizens or Singapore Permanent Residents from the ASEAN countries except Singapore.</td>
<td>• Possess outstanding Singapore-Cambridge GCE 'A' Level, Local Polytechnic Diploma, NUS High School Diploma, IB Diploma or Year 12 equivalent qualifications.</td>
</tr>
<tr>
<td>• Successful awardees should read a full-time undergraduate degree programme leading to a first degree, with the exception of Biomedical Sciences &amp; Chinese Medicine and the NTU-Georgia Tech Integrated Programmes where it will cover only the first three years of study in NTU.</td>
<td>• Have excellent Co-Curricular Activities records.</td>
</tr>
<tr>
<td>• Have strong leadership qualities and potential.</td>
<td></td>
</tr>
</tbody>
</table>

E. W. Barker Scholarship

<table>
<thead>
<tr>
<th>Eligibility</th>
<th>Applicats must</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Singapore Citizens or Singapore Permanent Residents.</td>
<td>• Possess outstanding Singapore-Cambridge GCE ‘A’ Level results, Local Polytechnic Diploma, Singapore Sports School AUT Diploma, NUS High School Diploma or IB Diploma.</td>
</tr>
<tr>
<td>• Successful awardees should read the BSc (Hons) in Sport Science &amp; Management Programme on a full-time basis.</td>
<td>• Have excellent Co-Curricular Activities records.</td>
</tr>
<tr>
<td>• Have strong leadership qualities and potential.</td>
<td></td>
</tr>
</tbody>
</table>
# LKY-STEP Award

**Eligibility**
- Singapore Citizens or Singapore Permanent Residents.
- Successful awardees should read a full-time undergraduate degree programme leading to a first degree, with the exception of Biomedical Sciences & Chinese Medicine and the NTU-Georgia Tech Integrated Programmes where the scholarship will cover only the first three years of study in NTU.

**Applicants must:**
- Possess outstanding Local Polytechnic Diploma (preferably Diploma with Merit).
- Have excellent Co-Curricular Activities records.
- Have strong leadership qualities and potential.

# Ng Bok Eng Renaissance Engineering Scholarship

**Eligibility**
- Open to Singapore Citizens.
- Successful awardees offered the Renaissance Engineering Programme (REP) in NTU.

**Applicants must:**
- Possess outstanding Singapore-Cambridge GCE ‘A’ Level, Local Polytechnic Diploma, NUS High School Diploma or IB Diploma.
- Have excellent Co-Curricular Activities records.
- Have strong leadership qualities and potential.
- Have a gross monthly household per capita income (PCI) of S$1,000 and below.

# NTU Science and Engineering Undergraduate Scholarship

**Eligibility**
- Citizens or Singapore Permanent Residents from the Asian countries, except Singapore.
- Successful awardees should read a full-time Engineering or Science undergraduate degree programme leading to a first degree, with the exception of Biomedical Sciences & Chinese Medicine, NTU-Georgia Tech Integrated Programmes and Renaissance Engineering Programme.

**Applicants must:**
- Have excellent Co-Curricular Activities records.
- Have strong leadership qualities and potential.

# The Khoo Teck Puat Scholarship

**Eligibility**
- Singapore Citizens, Citizens of PRC or Singapore Permanent Residents of original PRC.
- Successful awardees should read a full-time undergraduate degree programme leading to a first degree, with the exception of Biomedical Sciences & Chinese Medicine and the NTU-Georgia Tech Integrated Programmes where it will cover only the first three years of study in NTU.

**Applicants must:**
- Possess outstanding Singapore-Cambridge GCE ‘A’ Level, Local Polytechnic Diploma, NUS High School Diploma, IB Diploma or Year 12 equivalent qualifications (National College Entrance Exam (NCEE) or Gao Kao).
- Have excellent Co-Curricular Activities records.
- Have strong leadership qualities and potential.
- Have a gross monthly household per capita income (PCI) of S$750 and below.

# University Engineering Scholarship

**Eligibility**
- Singapore Citizens or Singapore Permanent Residents.
- Successful awardees should read a full-time Engineering or Technology related undergraduate degree programme.

**Applicants must:**
- Possess outstanding Local Polytechnic Diploma (preferably Diploma with Merit) in Engineering or Technology-related courses.
- Have excellent Co-Curricular Activities records.
- Have strong leadership qualities and potential.
Wee Kim Wee Legacy Fund Undergraduate Scholarship

Eligibility
- Singapore Citizens or Singapore Permanent Residents.
- Successful awardees should read the Bachelor of Communication Studies on a full-time basis.

Applicants must:
- Possess outstanding Singapore-Cambridge GCE ‘A’ Level, Local Polytechnic Diploma, NUS High School Diploma or IB Diploma.
- Have excellent Co-Curricular Activities records.
- Have strong leadership qualities and potential.

Scholarships for Current Undergraduate students
Please visit our website at http://admissions.ntu.edu.sg/UndergraduateAdmissions/Pages/ExistingNTUScholarship.aspx for more information.

Financial Assistance Schemes
NTU believes that no student should be denied the opportunity of a university education because of financial difficulties. In order to enable such students to take up a university education, NTU offers several financial assistance schemes.

Tuition Fee Loan
All applicants pursuing their full-time undergraduate degree programmes are eligible for the loan regardless of family income.

Note:
- Students taking Biomedical Sciences & Chinese Medicine programme will only be covered under the scheme for the first three years of the programme.
- International students paying non-subsidised tuition fees are not eligible to apply for financial aid schemes.

The Tuition Fee Loan covers up to 90% of subsidised tuition fee payable by Singaporeans. It does not cover compulsory miscellaneous fees and hostel fee.

Study Loan
The NTU Study Loan is meant for both local and international NTU full-time undergraduates who require assistance to finance their tuition fees and/or living expenses.

Note:
- Students taking Biomedical Sciences & Chinese Medicine programme will only be covered under the scheme for the first three years of study in NTU.
- International students paying non-subsidised tuition fees are not eligible to apply for financial aid schemes.

The application must be held concurrently with one or combination of the following 3 schemes: Tuition Fee Loan/CPF Education Scheme/Mendaki Tertiary Tuition Fee Subsidy. The per capita monthly household income must be less than $2,400 for SG and SPR students, and less than $1,200 for international students.

CPF Education Scheme
The Central Provident Fund (CPF) Education Scheme is for the payment of tuition fee for full-time undergraduate degree programmes. It does not cover compulsory miscellaneous fees and hostel fee.

Students can use their own, their spouse’s or their parents’ CPF savings to pay for their tuition fees. The CPF Board will consider the use of sibling’s or relative’s CPF savings only on a case-by-case basis.

Note:
- Students taking Biomedical Sciences & Chinese Medicine programme will only be covered under the scheme for the first three years of study in NTU.

Post Secondary Education Account (PSEA)
The PSEA scheme is administered by the Ministry of Education (MOE) which allows full-time undergraduates to utilize the funds in their own and/or their siblings’ PSEA accounts for the payment of tuition fee and compulsory miscellaneous fees (exclude hostel fees and late fees) as well as course fees for enrichment programmes approved by the University.

Mendaki Tertiary Tuition Fee Subsidy
The Mendaki Tertiary Tuition Fee Subsidy offered by Yayasan Mendaki is meant for Singaporean and Singapore Permanent Resident Malay full-time undergraduates who are receiving MOE Tuition Grant and are pursuing their first full-time degree. The per capita monthly household income must not exceed $1,500.

Bursaries
The NTU-administered bursaries are for NTU full-time undergraduates who need financial assistance to cover fees or defray their living costs.

Personal Computer Loan (PC Loan)
The PC Loan is an interest free loan given to financial needy full-time undergraduates to fund their laptop/desktop purchases from the current vendors of the NTU student notebook/PC tender that is in force.

Overseas Student Programme Loan/Travel Awards
This scheme is for full-time undergraduates who need financial assistance to fund their overseas study/exchange programmes or overseas industrial/professional attachments.

Work Study Scheme
The Work Study Scheme is designed to encourage students who need financial assistance to be self-reliant. Through this scheme, students will also gain valuable experience before they enter the workforce. The scheme consolidates jobs available on campus for easy viewing and application by full-time undergraduates.
Matriculation
To officially register as a student of NTU, students need to complete their matriculation after they have obtained their matriculation number.

Once matriculated, students will be able to print their course timetable for the semester of the Academic Year. The timetable will show the courses and the lecture/tutorial/laboratory groupings that they are assigned to.

Collection of Matriculation Packages
All new students will each be issued a matriculation package comprising a matriculation card and clicker device. This package must be collected in person. For the collection schedule and venue, please go to http://www.ntu.edu.sg/Students/Undergraduate/AcademicServices/Matriculation/Pages/MatriculationForNewStudents.aspx for details.

Please note that the clicker device is on loan to you for the duration of your programme in NTU. You are required to return the device to your respective school’s IT support or the CELT Helpdesk, upon the completion of your programme or leaving NTU, whichever is earlier. For further queries on your clicker device, please email to clickers@ntu.edu.sg.

Freshmen Welcome Ceremony
The Freshmen Welcome Ceremony is an annual event specially organised by the University at the Nanyang Auditorium to officially welcome all freshmen. This is an important rite of passage for freshmen to be inducted into the University.

There will be exciting programmes lined up and attractive welcome gifts to commemorate your induction as part of NTU’s fraternity. Freshmen are strongly encouraged to attend the ceremony assigned for them as it will be an excellent opportunity to meet fellow freshmen, seniors and members of the University Management and Faculty.

Change of Programme
An existing student is allowed to change the programme of study within NTU, subject to the approval of the School(s) of both the current and new programme. Students may apply for change of programme during the following two application periods:

<table>
<thead>
<tr>
<th>Period</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>21 May – 20 July 2012</td>
<td>for change of programme with effect from Semester 1</td>
</tr>
<tr>
<td>10 Dec 2012 – 4 Jan 2013*</td>
<td>for change of programme with effect from Semester 2</td>
</tr>
</tbody>
</table>

The School of Art, Design and Media (ADM) and Sport Science and Management (SSM) programme consider students for change of programme only once a year, together with all new applicants to the University. Hence, applicants for these two programmes are to apply for change of programme online during the May-July application period for the change to be effected from Semester 1. The School of ADM also requires applicants to submit their portfolio, write-up and assignment to the School of Art, Design and Media for evaluation by 31 March.

Please refer to http://www.adm.ntu.edu.sg/ProspectiveADM/UndergraduateProgrammes/ApplicationProcedures/Pages/ApplicationProcedures.aspx for the application procedures and requirements for the School of ADM.

Note:
- Freshmen (who have studied in the University for less than one semester) who wish to change programme must make their request by the third week of their first semester to the Office of Admissions and Financial Aid (OAFA) via email at adm_local@ntu.edu.sg or adm_intl@ntu.edu.sg. Thereafter, any application for change of programme can be made via StudentLINK during the application periods as given above.
- Students who are receiving scholarships are to check with the Scholarship Section of OAFA via email at ug_scholarships@ntu.edu.sg on how the change of programme is going to affect their scholarship status, before applying for change of programme.
- Existing part-time students must complete at least 4 semesters of study before they are eligible to apply for change to a full-time programme.
- Students who have changed their programme of study are not allowed to repeat a course which they have passed in the previous programme.
- Transfer of Credits
  - Students are to apply for transfer of credits by the 3rd week of the first semester in the new programme. The relevant School shall decide on the final list of courses which may be used to satisfy the graduation requirements of the new programme.
  - For programmes involving common Year 1 (e.g. change of programme from Accountancy to Business) or equivalent courses, such courses taken previously, whether passed or failed, will be transferred.
  - For transfer of course credits within the University, both the academic units and grades (including P, F, S or U grade) of these courses will be counted towards the fulfilment of the degree requirements and used in the computation of the GPA.

Please refer to http://www.ntu.edu.sg/Students/Undergraduate/AcademicServices/Pages/ChangeofProgramme.aspx for more details.

Candidature
Semester Leave of Absence
Semester leave of absence granted by the university is categorized as follows:

- **Medical Leave**
  Leave of absence must be supported by a medical practitioner or medical report.
- **Personal Leave**
  All other leave of absence for reasons such as to participate in competitions and sports, to work or start up a company, or to attend to personal matters.

Students may be granted up to one year of semester leave each time. Students need to submit another application at the end of the leave period if an extension of leave is required. This extension is subject to support by the School. The cumulative maximum period of leave of absence that can be granted for the entire duration of study is three years.
For students who are graded under the GPA system, the semester leave taken will not be counted towards the student’s period of candidature.

Students who apply for leave **after the first two weeks of the semester** are required to pay the fees for that entire semester.

For more details, please refer to: http://www.ntu.edu.sg/Students/Undergraduate/AdminServices/Pages/ApplyforSemesterLeave.aspx

**Short Leave**

Students must apply for short leave of absence or medical leave with their respective Schools if they cannot attend classes.

- **Short Leave of Absence**
  Applications for short leave of absence must be submitted to the respective Schools' General Offices **not later than 7 working days in advance** of such leave. Students should not go on leave until approval has been obtained.

- **Medical Leave**
  All medical certificates must be submitted not later than 7 working days after the medical leave to the relevant Schools' General Offices. If students submit the medical certificate after the deadline, they will be given zero marks for any test or quiz that they were absent from.

- **Compassionate Leave**
  Compassionate leave will be granted in the event of the demise of an immediate family member (defined as parents, siblings and grandparents).

Please note that these categories of leave will not be approved:
1. Returning to home country during festive periods e.g. Chinese New Year, Hari Raya, etc.
2. Participating in activities (in and outside campus) organised by student bodies during the various occasions mentioned in point (1) above.

For more details, please refer to: http://www.ntu.edu.sg/Students/Undergraduate/AdminServices/Pages/ApplyforShortleave.aspx

**Withdrawal**

Students who wish to withdraw from University are to complete and submit the Application for Withdrawal from University (For Undergraduates) form together with the matriculation card and clicker device to their School of study.

Student who applies for withdrawal from the University **after the first two weeks of the semester** will be liable to pay fees for that entire semester.

For more details, please refer to: http://www.ntu.edu.sg/Students/Undergraduate/AdminServices/Pages/Withdrawfromcourse.aspx

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**The Academic Unit System**

(http://www.ntu.edu.sg/Students/Undergraduate/AcademicServices/Pages/AcademicUnitSystem(AUS).aspx)

The University's academic structure for its undergraduate programmes is based on the Academic Unit System. The system provides opportunities for students to broaden their learning experience and progress at a pace most suited to their individual needs while maintaining high academic standards.

The main features of the Academic Unit System are the semester arrangement of the academic year and the use of academic units (AU) for measuring academic workload.

**Academic Calendar**

The academic year starts off with an orientation week. It is divided into two semesters, Semester 1 of 18 weeks and Semester 2 of 17 weeks. Examinations are held at the end of each semester. There are two special terms during the Semester 2 vacation.

**Academic Units**

Under the Academic Unit System, each course is assigned a certain number of AU. The AU is a measure of the student's workload associated with both class attendance and preparation. For a typical one-semester course, the number of AU is calculated as follows:

(a) one hour of lecture/tutorial per week : 1 AU
(b) 3 hours laboratory/fieldwork per week : 1 AU

**Curricular Requirements**

(1) **Curriculum Structure**

The curriculum structure comprises 2 categories of requirements:

a. **Major Requirement**

The courses of study are classified under 2 groups:

(i) Core Courses
- these are compulsory courses required to satisfy programme requirements.

(ii) Major Prescribed Electives
- these are courses for specialisation in a particular degree programme.

b. **General Education Requirement (GER)**

This is a curriculum requirement for broadening study and is divided into 3 areas of studies as follows:

(i) Core Courses (GER-Core):
- these are courses relating to:
  → Communication Skills
  → Singapore Studies
  → Human Resource Management*/ Environmental Sustainability*

(ii) Prescribed Electives (GER-PE):
- the courses are categorised into 4 sub-areas of studies relating to:
  → Art, Humanities & Social Sciences (AHSS)
  → Business & Management (BM)
  → Liberal Studies (LS)*
  → Science, Technology & Society (STS)
(iii) Unrestricted Electives (GER-UE)
- these are courses chosen by students to broaden their learning experience.

Unrestricted electives may be taken from the list of courses offered by the School or, with the approval of the Chair concerned, from courses offered by other Schools in the University. Although unrestricted electives may be taken in any year of study, students are advised to plan carefully when to take the unrestricted electives in order not to delay their graduation.

For the purpose of fulfilling the requirements of the programme and for classification of the degree, once a course is confirmed by the student as being registered as a prescribed elective, it cannot be re-classified as an unrestricted elective, and vice-versa.

* applies to students admitted before AY 2011-12 (except students in the Sport Science & Management programme), full-time students admitted directly to Year 2 in AY 2011-12 and part-time students admitted in AY 2011-12

* applies to all students in the Sport Science & Management programme and full-time students admitted to Year 1 with effect from AY 2011-12

(2) Prerequisites
Some courses may only be offered to students who have obtained at least the specified grade in related courses offered at a lower level. These lower-level courses are called the “prerequisites” for the higher-level courses.

(3) Academic Structure
The number of academic units that students must obtain in order to graduate is at:
http://www.ntu.edu.sg/Students/Undergraduate/Academic Services/Pages/AcademicUnitSystem(AUS).aspx

(4) Period of Candidature (for students admitted to NTU with effect from AY 2009-10)
(a) The period of candidacy for each programme is as follows:

### Single Degree Programmes (Full-Time)

<table>
<thead>
<tr>
<th>Programme</th>
<th>Period of Candidature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Normal</td>
</tr>
<tr>
<td>Accountancy</td>
<td>3 years</td>
</tr>
<tr>
<td>Business</td>
<td></td>
</tr>
<tr>
<td>Aerospace Engineering</td>
<td></td>
</tr>
<tr>
<td>Art, Design &amp; Media</td>
<td></td>
</tr>
<tr>
<td>Bioengineering</td>
<td></td>
</tr>
<tr>
<td>Biological Sciences</td>
<td></td>
</tr>
<tr>
<td>Chemical &amp; Biomolecular Engineering</td>
<td></td>
</tr>
<tr>
<td>Chemistry &amp; Biological Chemistry</td>
<td></td>
</tr>
<tr>
<td>Chinese</td>
<td></td>
</tr>
<tr>
<td>Civil Engineering</td>
<td></td>
</tr>
<tr>
<td>Communication Studies</td>
<td></td>
</tr>
<tr>
<td>Computer Engineering</td>
<td></td>
</tr>
<tr>
<td>Computer Science</td>
<td></td>
</tr>
<tr>
<td>Economics</td>
<td></td>
</tr>
<tr>
<td>Electrical &amp; Electronic Engineering</td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>4 years</td>
</tr>
<tr>
<td>Environmental Engineering</td>
<td></td>
</tr>
<tr>
<td>History</td>
<td></td>
</tr>
<tr>
<td>Information Engineering &amp; Media</td>
<td></td>
</tr>
<tr>
<td>Linguistics &amp; Multilingual Studies</td>
<td></td>
</tr>
<tr>
<td>Maritime Studies</td>
<td></td>
</tr>
<tr>
<td>Materials Engineering</td>
<td></td>
</tr>
<tr>
<td>Mathematical Sciences</td>
<td></td>
</tr>
<tr>
<td>Mathematics &amp; Economics</td>
<td></td>
</tr>
<tr>
<td>Mechanical Engineering</td>
<td></td>
</tr>
<tr>
<td>Physics &amp; Applied Physics</td>
<td></td>
</tr>
<tr>
<td>Psychology</td>
<td></td>
</tr>
<tr>
<td>Sociology</td>
<td></td>
</tr>
<tr>
<td>Sport Science and Management</td>
<td></td>
</tr>
</tbody>
</table>

For students admitted directly to the second year of a 4-year programme, the normal, minimum and the maximum periods shall be 3 years, 2.5 years and 5 years respectively.

### Single Degree Programmes (Part-Time)

<table>
<thead>
<tr>
<th>Programme</th>
<th>Period of Candidature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Normal</td>
</tr>
<tr>
<td>Electrical &amp; Electronic Engineering</td>
<td>5 years</td>
</tr>
<tr>
<td>Mechanical Engineering</td>
<td></td>
</tr>
</tbody>
</table>

For the period of candidacy of part-time programmes offered by NIE, please refer to http://www.nie.edu.sg (Click on Programme Offices / Office of Teacher Education / Programmes & Courses / UndergraduateProgrammes/ProgrammeInformation&Handbook)
### Double Degree Programmes (Full-Time)

<table>
<thead>
<tr>
<th>Programme</th>
<th>Period of Candidature</th>
<th>Normal</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accountancy and Business</td>
<td></td>
<td>4 years</td>
<td>3½ years</td>
<td>5 years</td>
</tr>
<tr>
<td>Biomedical Sciences and Chinese Medicine*</td>
<td></td>
<td>5 years</td>
<td>4 years</td>
<td>6 years</td>
</tr>
<tr>
<td>Business and Computing</td>
<td></td>
<td>4 years</td>
<td>5 years</td>
<td>7 years</td>
</tr>
<tr>
<td>Business and Computer Engineering</td>
<td></td>
<td>4 years</td>
<td>6 years</td>
<td>7 years</td>
</tr>
<tr>
<td>Engineering and Economics</td>
<td></td>
<td>5 years</td>
<td>4½ years</td>
<td>7 years</td>
</tr>
</tbody>
</table>

* Inclusive of 2 years at Beijing University of Chinese Medicine
* With acceleration

### Integrated Programme (Full-Time)

<table>
<thead>
<tr>
<th>Programme</th>
<th>Period of Candidature</th>
<th>Normal</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renaissance Engineering Programme^</td>
<td></td>
<td>4½ years</td>
<td>4 years</td>
<td>6 years</td>
</tr>
</tbody>
</table>

^ awards two degrees - a Bachelor's degree and a Master's degree

* Computer Engineering, Computer Science, and Electrical and Electronic Engineering students who are pursuing the integrated programme offered by NTU in collaboration with the Georgia Institute of Technology are to seek advice from their Schools on the period of candidature

### Classification of Students

Students are classified as Year 1 to Year 5 students according to the number of AU earned. While re-classification is normally done at the end of an academic year, where appropriate, this may be done at the end of the first semester. Students placed on Academic Warning and Academic Probation will not be re-classified until they have been restored to good academic standing.

The number of AU that students must earn to be classified to the next year of study is at: [http://www.ntu.edu.sg/Students/Undergraduate/AcademicServices/Pages/AcademicUnitSystem(AUS).aspx](http://www.ntu.edu.sg/Students/Undergraduate/AcademicServices/Pages/AcademicUnitSystem(AUS).aspx)

### Graduation and Residential Requirements

To be eligible for the award of a Bachelor's degree from NTU, a student must fulfill the following conditions:

(a) For all students in the Sport Science & Management programme and full-time students admitted to Year 1 with effect from AY 2011-12

### Programme Details

<table>
<thead>
<tr>
<th>Programme</th>
<th>Min. Years of Study at NTU</th>
<th>Min. AU of Graded Courses* Obtained from NTU</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-year programmes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- For students admitted to Yr 1</td>
<td>2 academic years</td>
<td>52 AU</td>
</tr>
<tr>
<td>- For students admitted directly to Yr 2</td>
<td>2 ½ academic years</td>
<td>69 AU</td>
</tr>
</tbody>
</table>

* cover all courses i.e. Core, Major Prescribed Electives and GER courses

In addition to the above, students of the Bachelor of Engineering programmes must additionally meet a minimum AU of graded Core and Major Prescribed Elective courses (i.e. excluding the GER courses) for the award of their degrees. Please refer to [http://www.ntu.edu.sg/students/undergraduate/AcademicServices/Pages/AcademicUnitSystem(AUS).aspx](http://www.ntu.edu.sg/students/undergraduate/AcademicServices/Pages/AcademicUnitSystem(AUS).aspx) for the details.

For students admitted before AY 2011-12 (except students in the Sport Science & Management programme), full-time students admitted directly to Year 2 in AY 2011-12 and part-time students admitted in AY 2011-12

### Programme Details

<table>
<thead>
<tr>
<th>Programme</th>
<th>Min. Years of Study at NTU</th>
<th>Min. AU of Graded Courses* Obtained from NTU</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-year programmes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- For students admitted to Yr 1</td>
<td>2 academic years</td>
<td>66 AU</td>
</tr>
<tr>
<td>- For students admitted directly to Yr 2</td>
<td>2 ½ academic years</td>
<td>69 AU</td>
</tr>
</tbody>
</table>

* cover all courses i.e. Core, Major Prescribed Electives and GER courses

The balance AU may consist of AU earned from courses with Pass (P), Exempted (EX) and Satisfactory (S) notations.

(b) Pass all or been exempted from some of the examinations prescribed for the degree.

(c) Satisfy all other requirements prescribed for the degree.

### Transfer of Academic Units

With the prior approval of the Chair concerned, students are allowed to take some courses from another university and transfer the number of AU earned from that university towards fulfilling the degree requirements of NTU. This could include participation in exchange and/or other similar programme.
Subjects who have taken some courses from another university prior to their admission to NTU may also apply for transfer of credits earned. They must submit their application for transfer of credits within the first semester of their enrollment in NTU.

Grades obtained for credits earned in other institutions are not counted in the classification of the degree awarded.

Students who transfer credits from another university must comply with the requirements in Section (6) on Graduation and Residential Requirements.

Course Registration
(http://www.ntu.edu.sg/Students/Undergraduate/AcademicServices/CourseRegistration/Pages/default.aspx)

1) Student Automated Registration System
All students must register their courses through the Student Automated Registration System (STARS) according to the schedule announced by the Office of Academic Services.

Students who join any courses without registration will not be allowed to take the examination(s) for the course(s) involved.

2) Outstanding Tuition and Hostel Rental Fees
Students with outstanding tuition and hostel rental fees will be denied access to STARS and barred from course registration. Students must pay their outstanding fees before registering courses.

3) Add/Drop Courses
Students may add or drop any course provided this is done within the add/drop period as announced by the Office of Academic Services.

A course that is dropped during the add/drop period will not appear in the official transcript. A student who is still registered for a course after the add/drop period but did not subsequently sit for the examination will be deemed to have read and failed the course. An 'F' will appear on his official transcript.

4) Academic Load
In order to complete the degree requirements within the normal specified period of candidature, full-time students at NTU are expected to carry an academic load of 16 to 18 AU*/21 AU* per semester.

Subject to approval by the Chair concerned, students may be allowed to take up to 3 AU*/8 AU* more or less than the normal semester academic load to enable them to pursue their studies at a pace commensurate with their needs and/or capabilities.

* applies to students admitted beforeAY. 2011-12 (except students in the Sport Science & Management programme), full-time students admitted directly to Year 2 inAY. 2011-12 and part-time students admitted inAY. 2011-12

* applies to all students in the Sport Science & Management programme and full-time students admitted to Year 1 with effect fromAY. 2011-12

5) Restricted Repeat
Final Year students who have failed any core course which is not offered in the semester following the failure may be permitted to take the failed course(s) as restricted repeat(s). This arrangement is available only for Final Year core courses which students cannot replace with any other courses offered in the following semester. Additionally, only Final Year students deemed to have sufficient AU to meet graduation requirements will be eligible for restricted repeat(s).

Special Terms
(http://www.ntu.edu.sg/Students/Undergraduate/AcademicServices/Pages/SpecialTerms.aspx)

The University offers two Special Terms during the Semester 2 vacation. Special Term I is held from May to June and Special Term II from June to July.

Participation in the Special Terms is optional. It is open only to full-time matriculated students of NTU except for students who will be graduating at the end of Semester 2 prior to the Special Terms.

Additionally, only students who are not away during the Special Term classes or examinations for activities such as In-Camp Training, attachment programme, sports, holiday, part-time employment, etc can apply. Students who are reading courses in the Special Terms to complete their degree requirements in that academic year may not be able to join the year's Convocation.

Information on Special Term fees is available at: http://www.ntu.edu.sg/Students/Undergraduate/AcademicServices/Pages/fees.aspx

Examinations
(http://www.ntu.edu.sg/Services/Academic/undergraduates/Examination/Pages/default.aspx)

The examination timetables are available at http://www.ntu.edu.sg/Services/Academic/undergraduates/Examination/Pages/ExaminationTimetable.aspx

Examination Rules and Regulations
1. A candidate who breaches any of the Examination Regulations will be dealt with by the Board of Discipline.
2. A candidate who is caught cheating during the examination is liable to be expelled from the university.
3. All materials and/or devices which are found to violate any examination rules and regulations will be confiscated.
4. Examinations will be conducted during the allocated times shown in the examination time-table.
5. Candidates are allowed into the examination hall ten minutes before the time scheduled for the commencement of the examination. They are, however, not permitted to turn over the question paper placed on their desks until the time for the commencement of the examination.
6. Candidates are not allowed to present themselves for examination later than one hour after the commencement of the examination.
7. The identity of every candidate will be checked during the examination. Candidates are required to bring their matriculation card, identity card, passport, driving licence or EZ Link card and place them at the upper right-hand corner of their desk at the commencement of each examination.

8. Candidates may bring into the examination hall only those calculators that have been approved by the School. Graphic calculators which are approved for use must be re-set i.e. memory cleared, prior to any examination. Unauthorised calculators are not permitted in the examination hall.

9. No candidate is allowed to bring into the examination hall any unauthorised material such as book, paper, document or picture. Bags, waist pouches, ear or headphones are not to be brought into the examination hall.

10. Candidates are allowed to bring their mobile phones into the examination hall. However, the mobile phones must be switched off at all times. Disciplinary action will be taken against a candidate who breaks this regulation.

11. For open-book examinations, candidates must also leave their bags outside the examination hall.

12. The University will not be responsible for the loss of candidates’ belongings in or outside the examination hall.

13. No candidate who has entered the examination hall will be allowed to leave the hall, temporarily or otherwise for any reason whatsoever, until the examination has started.

14. Candidates are not allowed to leave their seats without the permission of an invigilator.

15. Candidates who wish to communicate with an invigilator must raise their hands.

16. No communication by word of mouth or otherwise between candidates is allowed in the examination hall.

17. Candidates who have been given permission to leave their seats temporarily must be accompanied by an invigilator throughout their absence from the examination hall. Candidates’ mobile phone must be left on their desk in the examination hall when they leave the examination hall temporarily, e.g. to visit the washroom.

18. Candidates must carefully read the instructions printed on each answer book and examination question paper. The blank pages in the answer book are to be used only for candidates’ rough work. Solutions or any other materials written on these blank pages will not be marked.

19. Candidates must not write their names on the answer books. They should write only their matriculation numbers in the space provided on the cover of each answer book.

20. Candidates are not allowed to write, mark, highlight or deface any reference materials provided for the examination. Any candidate found doing so is liable to have his reference materials removed from his use for the rest of the examination and be made to pay for the cost of the materials that have to be replaced.

21. Candidates who have presented themselves for an examination will not be allowed to hand in their answer books until one hour has elapsed after the commencement of the examination.

22. Candidates are not allowed to leave their seats during the last 15 minutes before the conclusion of the examination.

23. At the conclusion of the examination, candidates must remain seated and must not communicate with one another while their answer books are being collected and tallied.

24. Candidates may not take with them, used or unused papers, from the examination hall, except their own question paper, unless otherwise instructed.

25. Candidates must comply with the dress code of the University. A candidate who is not properly attired will not be admitted into the examination hall.

26. A student who does not register or who, having registered, fails to take any examination for which he is eligible to sit, shall be deemed to have failed the course unless the Chair concerned is satisfied that there is good and sufficient reason for such failure to register or take the examination.

27. Where a candidate, on account of illness, is absent from an examination for a degree, he may be permitted to appear for the examination at the next period of the examination provided the candidate has been examined by a registered medical practitioner and a medical certificate and a medical report submitted to the Office of Academic Services within 2 working days of the absence. Any fee payable for the medical examination shall be paid by the candidate.

28. No candidate shall be entitled to be admitted to a University examination unless the Chief Financial Officer certifies that he is not in debt to the University (otherwise than as a result of a loan made by the University) or to any University hall of residence. Candidates are reminded to settle all outstanding fees with the Office of Finance, Student Services Centre Level 3, before they sit for any examination.

Note:
In the event of a major train service disruption lasting more than an hour and if stranded in such a situation on their journey for the examination, candidates are advised to approach the SMRT or SBS Transit staff at the station’s information counter for assistance. SMRT and SBS Transit have assured the University that alternative means of transport will be provided for examination candidates to reach the examination venue as quickly as possible. If necessary, the University may delay the start of the examinations by up to 30 minutes. In this instance, a notification will be sent to all affected students via sms and to their NTU email account.

Candidates are advised to plan their schedule and allow for extra travelling time to attend their examinations.

Candidates are advised to tune in to the radio for traffic news before leaving home for the examination. No extra time will be given for students who are delayed due to traffic jams, bad weather, etc.
Academic Standing and Grading Systems

(1) Grading Systems
The Grade Point Average (GPA) system applies to students admitted to the School of Humanities and Social Sciences in AY 2004-2005 and all students admitted to Year 1 with effect from AY 2005-2006 and direct-entry students admitted to Year 2 with effect from AY 2006-2007.

(a) Grades and grade points are assigned as follows:

<table>
<thead>
<tr>
<th>Letter-grade</th>
<th>Grade point</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>5.00</td>
</tr>
<tr>
<td>A</td>
<td>5.00</td>
</tr>
<tr>
<td>A-</td>
<td>4.50</td>
</tr>
<tr>
<td>B+</td>
<td>4.00</td>
</tr>
<tr>
<td>B</td>
<td>3.50</td>
</tr>
<tr>
<td>B-</td>
<td>3.00</td>
</tr>
<tr>
<td>C+</td>
<td>2.50</td>
</tr>
<tr>
<td>C</td>
<td>2.00</td>
</tr>
<tr>
<td>D+</td>
<td>1.50</td>
</tr>
<tr>
<td>D</td>
<td>1.00</td>
</tr>
<tr>
<td>F</td>
<td>0.00</td>
</tr>
</tbody>
</table>

The above grades also apply to all current students with effect from the AY2005–2006.

(b) The following non-letter grades and notations are also used:
* - Course with Pass/Fail grading only
# - Repeated attempt
IP – In Progress
LOA - Absent (with valid reasons)
EX - Exempted from course
TC - Transfer credits
S – Satisfactory
U - Unsatisfactory

(c) The Cumulative Grade Point Average (CGPA) represents the grade average of all courses (including failed courses) attempted by a student. The computation of CGPA is as follows:

\[
\text{CGPA} = \frac{\text{Grade Point x AU for Course 1} + \text{Grade Point x AU for Course X} + \ldots}{\text{Total AU attempted in all semesters so far}}
\]

Only letter-graded courses i.e. courses with grades A+, A, A-, B- ... are included in the computation of CGPA. Courses where only Pass/Fail grades are given, where the Satisfactory/Unsatisfactory option was invoked, where the students were absent with valid reasons, and courses that the students are exempted from or are incomplete (i.e. awarded an "IP" grade) are not included in the computation of CGPA. A few examples of how CGPA is computed are given below for illustration.

Example 1

<table>
<thead>
<tr>
<th>Course</th>
<th>AU</th>
<th>Grade</th>
<th>Grade Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA101</td>
<td>3</td>
<td>B</td>
<td>3.50</td>
</tr>
<tr>
<td>AB102</td>
<td>3</td>
<td>B-</td>
<td>3.00</td>
</tr>
<tr>
<td>AC103</td>
<td>3</td>
<td>C</td>
<td>2.00</td>
</tr>
<tr>
<td>AD104</td>
<td>4</td>
<td>A</td>
<td>5.00</td>
</tr>
<tr>
<td>AE105</td>
<td>3</td>
<td>D</td>
<td>1.00</td>
</tr>
</tbody>
</table>

\[\text{CGPA} = \frac{\text{3.50 x 3} + \text{3.00 x 3} + \text{2.00 x 3} + \text{5.00 x 4} + \text{1.00 x 3}}{\text{3 + 3 + 3 + 4 + 3}} = 3.03\]

Example 2

<table>
<thead>
<tr>
<th>Course</th>
<th>AU</th>
<th>Grade</th>
<th>Grade Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA101</td>
<td>3</td>
<td>B</td>
<td>3.50</td>
</tr>
<tr>
<td>AB102</td>
<td>3</td>
<td>B-</td>
<td>3.00</td>
</tr>
<tr>
<td>AC103</td>
<td>3</td>
<td>C</td>
<td>2.00</td>
</tr>
<tr>
<td>AD104</td>
<td>4</td>
<td>A</td>
<td>5.00</td>
</tr>
<tr>
<td>AE105</td>
<td>3</td>
<td>F</td>
<td>0.00</td>
</tr>
</tbody>
</table>

\[\text{CGPA} = \frac{\text{3.50 x 3} + \text{3.00 x 3} + \text{2.00 x 3} + \text{5.00 x 4} + \text{0.00 x 3}}{\text{3 + 3 + 3 + 4 + 3}} = 2.84\]

Example 3

(The S/U option was invoked for AD104 and AE105. Grade S denotes a Satisfactory grade while grade U denotes an Unsatisfactory grade. These two courses, AD104 and AE105, are excluded from the computation of the CGPA.)

<table>
<thead>
<tr>
<th>Course</th>
<th>AU</th>
<th>Grade</th>
<th>Grade Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA101</td>
<td>3</td>
<td>B</td>
<td>3.00</td>
</tr>
<tr>
<td>AB102</td>
<td>3</td>
<td>B-</td>
<td>3.00</td>
</tr>
<tr>
<td>AC103</td>
<td>3</td>
<td>C</td>
<td>2.00</td>
</tr>
<tr>
<td>AD104</td>
<td>4</td>
<td>U</td>
<td>N.A</td>
</tr>
<tr>
<td>AE105</td>
<td>3</td>
<td>S</td>
<td>N.A</td>
</tr>
</tbody>
</table>

\[\text{CGPA} = \frac{\text{3.50 x 3} + \text{3.00 x 3}}{\text{3 + 3}} = 2.83\]

Example 4

(AE105 is a Pass/Fail course i.e. only P or F grades are awarded. This course is excluded from the computation of the CGPA.)

<table>
<thead>
<tr>
<th>Course</th>
<th>AU</th>
<th>Grade</th>
<th>Grade Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA101</td>
<td>3</td>
<td>B</td>
<td>3.50</td>
</tr>
<tr>
<td>AB102</td>
<td>3</td>
<td>B-</td>
<td>3.00</td>
</tr>
<tr>
<td>AC103</td>
<td>3</td>
<td>C</td>
<td>2.00</td>
</tr>
<tr>
<td>AD104</td>
<td>4</td>
<td>A</td>
<td>5.00</td>
</tr>
<tr>
<td>AE105</td>
<td>3</td>
<td>P</td>
<td>N.A</td>
</tr>
</tbody>
</table>

\[\text{CGPA} = \frac{\text{3.50 x 3} + \text{3.00 x 3} + \text{2.00 x 3} + \text{5.00 x 4}}{\text{3 + 3 + 3 + 4}} = 3.50\]

Example 5

(If a student is exempted from AE105, the grade ‘EX’ will be shown for this course. This course is excluded from the computation of the CGPA.)

<table>
<thead>
<tr>
<th>Course</th>
<th>AU</th>
<th>Grade</th>
<th>Grade Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA101</td>
<td>3</td>
<td>B</td>
<td>3.50</td>
</tr>
<tr>
<td>AB102</td>
<td>3</td>
<td>B-</td>
<td>3.00</td>
</tr>
<tr>
<td>AC103</td>
<td>3</td>
<td>C</td>
<td>2.00</td>
</tr>
<tr>
<td>AD104</td>
<td>4</td>
<td>A</td>
<td>5.00</td>
</tr>
<tr>
<td>AE105</td>
<td>3</td>
<td>EX</td>
<td>N.A</td>
</tr>
</tbody>
</table>

\[\text{CGPA} = \frac{\text{3.50 x 3} + \text{3.00 x 3} + \text{2.00 x 3} + \text{5.00 x 4} + \text{0.00 x 3}}{\text{3 + 3 + 3 + 4 + 3}} = 3.03\]

The method of computing the YGPA is similar to that for computing the CGPA. Please refer to the examples for computing
CGPA for illustration. Courses attempted in the Special Terms are not included in the computation of the YGPA.

(e) The CGPA will be reflected in students’ transcripts.

(f) An ‘F’ grade obtained in a course and a new grade attained for the subsequent attempt will both be reflected in the transcript. Both grades will also be counted in the computation of YGPA (if they are taken within the same academic year) and CGPA.

(g) Students are not allowed to repeat any courses taken except those graded ‘F’.

(2) Satisfactory/Unsatisfactory (S/U) Option

(a) The S/U option allows a student to take a course on an ‘ungraded’ basis i.e. no letter grade such as A, B, etc will be awarded. A course will be indicated as ‘S’ (Satisfactory) if the final letter grade obtained is a ‘C’ or better (i.e. grade point of 2.0 and above). Conversely, it will be indicated as ‘U’ (Unsatisfactory) if the grade obtained is lower than a ‘C’ grade. The descriptor ‘Satisfactory’ or ‘Unsatisfactory’ will appear in the result slip and the transcript issued by the University.

(b) A student will receive AU towards his degree only if he attains a ‘Satisfactory’ (S) grade. He earns no AU for courses with a ‘U’ grade.

(c) The ‘S’ or ‘U’ notations carry no grade point and hence have no effect on the CGPA and the classification of degrees.

(d) A student is to select the courses that he would like to be graded S/U online, before the examinations. Students will be informed each semester on the period to declare S/U for the courses that they have registered in that semester. Schools will advise their students on the courses that are available on S/U option. More information on S/U option is at: http://www.ntu.edu.sg/Students/Undergraduate/AcademicServices/CourseRegistration/Pages/satisfactoryUnsatisfactory.aspx

(e) The S/U option does not apply to:
- Pass/Fail courses
- courses that count towards the requirements for second major or minor programme
- graduate courses
- incoming exchange and non-graduating students

(f) Unless otherwise advised by his School, the maximum number of AU that a student can choose for S/U grading during his candidature is as follows:

<table>
<thead>
<tr>
<th>Programme</th>
<th>S/U quota</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-year</td>
<td>12 AU</td>
</tr>
<tr>
<td>4-year (except for Biomedical Sciences programme)</td>
<td>12 AU</td>
</tr>
<tr>
<td>- For students admitted to Year 1</td>
<td>12 AU</td>
</tr>
<tr>
<td>- For students admitted directly to Year 2</td>
<td>9 AU</td>
</tr>
<tr>
<td>Biomedical Sciences programme</td>
<td>9 AU</td>
</tr>
</tbody>
</table>

(g) Once opted for S/U grading, the course AU will count towards the S/U quota regardless of the final results i.e. S, U or absent with valid reasons (LOA).

(h) The S/U option that students have exercised for a course is irrevocable. Hence, students cannot appeal for the course(s) that they have opted to take on S/U basis to be changed to graded basis after the exercise for S/U option is over. The S/U option cannot be applied retrospectively after the declaration period or to courses that students had already completed for letter grades.

(i) A student who obtains a ‘U’ can repeat the course. However, the ‘U’ grade that he gets for his first attempt will remain in his academic record and will be printed in the transcript issued by the University.

(j) The repeat attempt(s) of a course will retain the grading option chosen for the first attempt i.e. S/U or letter graded. The repeat course includes replacement courses. The AU of a course that has been opted for S/U grading will be counted against the S/U quota only once. Its repeat will not be counted against the quota again.

(k) Students who exercise the S/U option must comply with the ‘Graduation and Residential Requirements’.

(3) Classification of Degree

The cut-off for each degree classification is as follows:

<table>
<thead>
<tr>
<th>CGPA range</th>
<th>Class of Honours</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.50 - 5.00</td>
<td>First Class *</td>
</tr>
<tr>
<td>4.00 - 4.49</td>
<td>Second Class Upper</td>
</tr>
<tr>
<td>3.50 - 3.99</td>
<td>Second Class Lower</td>
</tr>
<tr>
<td>3.00 - 3.49</td>
<td>Third Class</td>
</tr>
<tr>
<td>2.00 - 2.99</td>
<td>Pass with Merit</td>
</tr>
</tbody>
</table>

* For programmes under the College of Engineering (except for the Maritime Studies programme) and College of Science, a minimum CGPA of 4.50 plus at least an ‘A-’ grade for the Final Year Project are required for the award of a First Class Honours degree. For programmes under the School of Humanities and Social Sciences, students who opt out of the Final Year Project will not be eligible for a First Class or Second Upper Honours degree.

(4) Academic Standing

(a) The requirements for graduation are as follows:
- Successful completion of the prescribed academic unit requirement as set out by the programme curriculum
- A minimum CGPA of 2.00 is required at the end of the final semester of study

(b) The criteria for satisfactory academic standing in any given semester are:
- maintaining a minimum CGPA of 2.00
- completing at least 75% of the normal AU workload
(c) Students with poor results will be accorded the following academic standing and subjected to performance review:

- **Academic Warning** - if the CGPA falls below 2.00 for any given semester
- **Academic Probation** - if the CGPA falls below 2.00 for the following semester
- **Academic Termination** - if the CGPA falls below 2.00 for the third consecutive semester, or at the end of the final semester of study. A letter of termination will be issued. Appeal against termination on the grounds of extenuating circumstances may be made, subject to the following rules:

  - The appeal must be submitted to the relevant School within 2 weeks after release of semester examination results or before the start of next semester, whichever is earlier.
  - Normally only one appeal is allowed per candidature.

(d) A minimum CGPA of 2.0 must be maintained at the end of each semester to qualify for the overloading of courses.

(e) The Dean’s list is compiled on a yearly basis. The top 5% of the cohort, subject to attaining a minimum YGPA of 4.50 and the specified AU of graded courses by curriculum type taken in NTU in the academic year, is eligible for the Dean’s list. Full-time single degree students have to complete at least 16 AU (non-BRC curriculum) or 15 AU (BRC curriculum) of graded courses, while part-time single degree students have to complete at least 9 AU of graded courses. Effective from AY11-12, double-degree students have to complete a total of 16 or 15 AU (for non-BRC and BRC respectively) of discrete graded courses from both degrees, and 9 AU of graded courses from each degree, to be eligible for Dean’s list.

Courses that are graded as Satisfactory/Unsatisfactory (S/U) and Pass/Fail or those with grades ‘EX’ (Exempted), ‘IP’ (In Progress) and ‘LOA’ (Leave of Absence) are not counted in the AU of graded courses for the purpose of determining the Dean’s List. Besides this, final year students must attain at least a Second Upper Honours degree in order to be considered for the Dean’s List.

(f) Students enrolled in the Accelerated Bachelor’s Programme must maintain a minimum CGPA of 4.00 in order to remain in the Programme. However, some Schools may set a higher minimum CGPA. For these Schools, the students will be informed.

(g) Credits for courses taken from approved student exchange programmes are excluded from the CGPA computation, but they will be counted towards the academic unit requirement for graduation, and reflected in the transcript.

### Medals and Prizes

**Medals and prizes** are awarded to NTU undergraduates to reward outstanding academic and extra-curricular achievements. The most prestigious awards are the Lee Kuan Yew Gold Medal and Koh Boon Hwee Scholars Award.

**Lee Kuan Yew Gold Medal**

The Lee Kuan Yew Gold Medals are awarded to the most outstanding students who are first in general proficiency throughout their programme of studies and who have obtained a First Class Honours in their degree programmes.

**Koh Boon Hwee Scholars Award**

The Koh Boon Hwee Scholars Award is awarded to students who have achieved excellent academic performance, displayed strong leadership ability and demonstrated potential for contributing to society. This award recognizes the achievement of graduating students, while honouring teachers and faculty members who have been an inspiration to them. A cash grant is set up in the name of each teacher honoured, who in turn nominates a prospective student to receive the grant upon admission to NTU. The University aims to perpetuate the virtuous cycle of recognizing student’s achievements and honouring the hard work of teachers in producing well-rounded student achievers.

### Convocation

Convocation is a watershed event that commemorates a significant milestone in a student’s life. It is a joyous and meaningful occasion for the student, their family and friends as they mark the completion of the journey as a student at NTU and go on to make contributions to society.

Convocation also marks the transition from a student to a proud alumnus of the University. This is an opportunity to celebrate achievements acquired in NTU and look back on the friendships and bonds forged, lessons learnt and challenges overcome.

To help students and guests prepare for the graduation and to help make this occasion memorable for years to come, a webpage will be uploaded nearer the convocation. It is recommended that students check this page every few weeks, and immediately prior to leaving for any convocation activities, to ensure that they have the most updated information.

### Honorary Doctorate

An honorary doctorate is one of higher education’s most significant accolades. The University awards honorary doctorates to distinguished individuals who have achieved pre-eminence in their field or profession, or who have made significant contributions to their country, the society or in international relations. They are conferred on individuals who have made important contributions to the University and with whom the University has a relationship.
Academic Programmes

Overview
As a comprehensive university with a proven R&D track record and a robust research infrastructure, NTU is well-positioned to provide Singapore and the region with quality manpower training through graduate education. We offer graduate students the opportunity to develop themselves as leaders and scholars as they work alongside and learn from distinguished academics and researchers.

The University offers a comprehensive range of graduate programmes leading to the award of the degrees of Master’s and Doctor of Philosophy as well as Graduate Diplomas. Graduate degree programmes are either by research or coursework and dissertation.

For details of programmes and courses, please visit: http://admissions.ntu.edu.sg/graduate

Higher Degree Programmes by Research
Candidates will pursue independent but supervised research on an approved topic which a thesis must be submitted for examination. Candidates are also required to do at least three to six courses. Selection of courses is made after consultation with the research supervisor.

Research candidates work closely and keep in regular contact with their supervisor on their research project. Supervisors will submit regular reports on the progress of each candidate under their supervision. In addition to being examined on the thesis, a candidate for the degree of Doctor of Philosophy must pass an oral examination on the subject matter of his thesis and related matters. For non-PhD candidates, the oral examination may be prescribed at the discretion of the Board of Examiners.

Higher Degree Programmes by Coursework
Candidates will follow a prescribed programme of study comprising several courses and undertake a project on which a dissertation will be written. For most programmes, the dissertation can also be replaced by a few equivalent courses. The course of study involves formal classes, lectures, tutorials, seminars, laboratory work and written examinations.

Programmes Offered by National Institute of Education
The National Institute of Education offers the following programmes by research: Doctor of Philosophy, Master of Arts and Master of Science. It also offers Master of Arts, Master of Science and Master of Education programmes by coursework and dissertation.

Partnership Programmes with Other Universities
The University prides itself on continued, worldwide collaborations with the best in the industry and academia. Partnerships have been developed with more than 200 universities in over 30 different countries, and strong ties have been established with industry through research collaborations.

The following graduate programmes are offered in collaboration with partner universities:

Singapore-MIT Alliance
(http://web.mit.edu/sma/)
The Singapore-MIT Alliance is an innovative engineering education and life science educational and research collaboration among three of the top engineering research universities in the world: Nanyang Technological University, National University of Singapore and Massachusetts Institute of Technology.

Partnership with Shanghai Jiaotong University
NTU-SJTU Programme
(http://www.embा.ntu.edu.sg/Pages/Home.aspx)
The Shanghai Jiaotong University (SJTU) Graduate School and NTU offer the SJTU-MBA programme and NTU-SJTU Joint Executive MBA programme.

Joint Degree in Master of Management in Hospitality at Cornell - Nanyang Institute of Hospitality Management
(http://www.cni.ntu.edu.sg/)
This premier Master of Management in Hospitality programme is offered and awarded by Cornell University’s renowned School of Hotel Administration and NTU’s Nanyang Business School, an elite business school in Asia. The year-long programme is designed for the global industry yet focused on developing a wealth of expertise in Asian hospitality. Participants can expect a truly international experience spending six months in Singapore and the remaining six months in New York in the United States.

NTU-ESSEC Double MBA
(http://www.nanyangmba.ntu.edu.sg/DoubleMasters/NTUESSEC.asp)
Nanyang MBA participants offered the general MBA or the specialized MBA in Marketing may register for the NTU-ESSEC double MBA and earn two degrees simultaneously - an MBA each from NTU and the ESSEC Business School in Paris, France. They will spend two trimesters at NTU (beginning in July) before going to ESSEC in April for a year of full-time study.
to design methodology, automation, product manufacturing
and testing. Integrated circuit design is also placed in a broader
context, for example, by teaching fundamental concepts of signal
processing, which are at the core of today’s communications
circuits. Non-technical but essential topics such as product
marketing, international management, patent law and aspects
of culture and globalisation are also covered.

**Joint M.Sc.(Aerospace Engineering Programme) with
Technical University of Munich**

(http://www.mae.ntu.edu.sg/ProspectiveStudents/
GraduateProgrammes/Coursework/AE/Pages/Home.aspx)

NTU-TUM Master of Science (M.Sc.) in Aerospace Engineering
degree is, jointly awarded by Nanyang Technological University
(NTU), Singapore and Technische Universitat Munchen (TUM),
Germany. This highly specialised programme is jointly taught by
international faculty members from both universities, who have
extensive experience in aerospace education and research.

**Joint M.Sc.(Microelectronics Programme) with Technical
University of Munich**

(http://www.eee.ntu.edu.sg/ProspectiveStudents/MSc/Pages/
NTU-TUM_ME.aspx)

This M.Sc.(Microelectronics) programme is a highly specialized
programme jointly offered by Nanyang Technological University
and Technische Universitat Munchen (Germany) on a full-time
basis for training engineers to work in silicon wafer fabrication
industries, engage with the related research institutions and
pursue further studies.

**Joint Master’s Programme in Infrastructure Engineering
and Management (MIEM)**

(http://www.cee.ntu.edu.sg/ProspectiveStudents/Graduate/
MIEM/Pages/Home.aspx)

The Master’s Programme in Infrastructure Engineering and
Management (MIEM) provides holistic training in infrastructure
engineering and management covering conceptual and physical
planning, design, and operational aspects of infrastructure
systems. Such systems are in great demand in rapidly developing
regions such as in China, India, ASEAN and the Middle East and
include air, sea and land transport networks, water supply and
drainage systems, and power distribution networks. We invite
students from Asia’s best universities to apply particularly those
from Singapore, India, China, ASEAN and Middle East.

**NTU-Warwick Double Master’s Programme**

(http://www.rsis.edu.sg/grad/NTU-Warwick.htm)

The NTU-Warwick Double Master’s Programme represents an
innovative programme of study offering students the opportunity
to live and study in two culturally diverse countries/regions,
experiencing the ‘best of both worlds’ in conceptual training,
empirical relevance and policy application.

**Joint M.Sc.(Integrated Circuit Design) programme with
Technical University of Munich**

(http://www.eee.ntu.edu.sg/ProspectiveStudents/MSc/Pages/
NTU-TUM_ICD.aspx)

The international Master of Science programme in Integrated
Circuit Design jointly offered by NTU and Technische Universitaet
Muenchen will educate the next generation of engineers
and leaders for the semiconductor industry. Contents of the
programme range from analog, digital and mixed-circuit design
to design methodology, automation, product manufacturing
and testing. Integrated circuit design is also placed in a broader
context, for example, by teaching fundamental concepts of signal
processing, which are at the core of today’s communications
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**Dual Master’s Programme in M.Sc.(Systems and Project
Management) and M.E.(Systems Engineering) with
Stevens Institute of Technology**

(http://www.mae.ntu.edu.sg/ProspectiveStudents/
GraduateProgrammes/Coursework/Documents/DMP_Brochure. pdf)

The Dual Master’s Programme provides an opportunity for NTU’s
M.Sc.(Systems and Project Management) students to broaden and
enrich their educational experience by spending one semester at
Stevens Institute of Technology (SIT), Hoboken, New Jersey/NY,
to take core courses in Systems Engineering in lieu of the core
course requirements in NTU.

**Joint Master’s Programme in Infrastructure Engineering
and Management (MIEM)**

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course requirements in NTU.
Admissions

Admission Requirements for Research Programmes

(a) Minimum Entry Qualifications for Admission
Master’s Programme
A bachelor's degree with minimum 2nd Class Upper Honours, master's degree (research-based) and the ability to pursue research in the candidate's proposed field of advanced study.

Doctor of Philosophy Programme
A bachelor's degree with minimum 2nd Class Upper Honours, master's degree (research-based) and the ability to pursue research in the candidate's proposed field of advanced study.

(b) Required Test Scores
A valid GRE/GMAT score is required for applicants who are not graduates of the Autonomous Universities in Singapore, unless there is specific requirement stated in the School's website for the respective programme.

A photocopy of the GRE/GMAT test scores should be attached to the application. Official ETS test scores are not required when you are sending in the application.

A valid TOEFL score is required for those who graduated from a university where English was not the medium of instruction. An equivalent IELTS score is acceptable in lieu of TOEFL.

Application Procedures

Programmes by Research
There are two intakes a year, in January and August. Applications for a higher degree by research are to be submitted at least six months before the desired intake date. The University reserves the right to consider applications for other semesters.

Applications for admission (excluding applications to the National Institute of Education) must be submitted online at http://admissions.ntu.edu.sg/graduate/R-Programs/Pages/default.aspx

Programmes by Coursework and Dissertation
Applications for admission are normally invited through the press in January for admission in July/August (NIE's invitation for applications for its early January intake is advertised in July).

Please apply online at:
http://admissions.ntu.edu.sg/graduate/coursework

For the following coursework programmes, please visit the website indicated.

MBA Programme
The Nanyang MBA
Nanyang Business School
Nanyang Technological University
Nanyang Avenue, S3-B3A-01
Singapore 639798
Tel: (65) 6790 4835/6183, Fax: (65) 6791 3561
Email: nbsmba@ntu.edu.sg
http://www.nbs.ntu.edu.sg/GRADUATE/NANYANG_MBA

MBA (Nanyang Fellows) Programme
The Nanyang Fellows Programme
Nanyang Business School
Nanyang Technological University
Nanyang Avenue, S3-B2A-39
Singapore 639798
Tel: (65) 6790 4779/4803/6413, Fax: (65) 6791 8522
Email: fellows@ntu.edu.sg
http://www.nfp.ntu.edu.sg

MBA (Nanyang Executive MBA
Nanyang Business School
Nanyang Technological University
Nanyang Avenue, S3-B3A-03
Singapore 639798
Tel: (65) 6790 5798/4901, Fax: (65) 6792 4535
Email: emba@ntu.edu.sg
http://www.emba.ntu.edu.sg

Master of Management in Hospitality
Cornell-Nanyang Institute of Hospitality Management
Nanyang Business School
Nanyang Technological University
Nanyang Avenue, S3-B1A-35
Singapore 639798
Tel: (65) 6316 8865, Fax: (65) 6794 9796
Email: cni-hospitality@ntu.edu.sg
http://cornellmmh.asia/
Programmes at the National Institute of Education
There are two intakes a year, in January and August. Please visit NIE's website for application details and the application form.

<table>
<thead>
<tr>
<th></th>
<th>Deadline for online submission</th>
<th>Results (by post)</th>
</tr>
</thead>
<tbody>
<tr>
<td>January Intake</td>
<td>17 July</td>
<td>Latest by 15 December</td>
</tr>
<tr>
<td>August Intake</td>
<td>17 January</td>
<td>Latest by 15 June</td>
</tr>
</tbody>
</table>

* Applicants will be notified of their application results by post. For enquiries, please contact the Administrative Manager of NIE's Graduate Programmes and Research Office. Tel: (65) 6790 3871 Email: nieadmpp@nie.edu.sg http://www.nie.edu.sg/nieweb/index.do

Academic Year
The academic year which commences in August each year is normally divided into two semesters. A few of the coursework programmes run on a three-trimester academic year. For updates, please refer to:
http://www.ntu.edu.sg/collegesandprogrammes/acadcalendar/Pages/gradcalendar.aspx
Candidature Periods

a) Research Programmes
The maximum and minimum periods of candidature are as follows:

<table>
<thead>
<tr>
<th>Programme</th>
<th>Full-Time</th>
<th>Part-Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctor of Philosophy Degree</td>
<td>2 years</td>
<td>5 years</td>
</tr>
<tr>
<td>Master’s Degree</td>
<td>1 year</td>
<td>3 years</td>
</tr>
</tbody>
</table>

b) Coursework Programmes

<table>
<thead>
<tr>
<th>List of Programmes</th>
<th>Programme Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>School of Chemical and Biomedical Engineering</td>
<td></td>
</tr>
<tr>
<td>M.Sc.(Biomedical Engineering)</td>
<td>1 – 2 years 2 – 4 years</td>
</tr>
<tr>
<td>School of Civil and Environmental Engineering</td>
<td></td>
</tr>
<tr>
<td>M.Sc.(Civil Engineering)</td>
<td>1 – 3 years 2 – 4 years</td>
</tr>
<tr>
<td>M.Sc.(Environmental Engineering)</td>
<td>1 – 3 years 2 – 4 years</td>
</tr>
<tr>
<td>M.Sc.(International Construction Management)</td>
<td>1 – 3 years 2 – 4 years</td>
</tr>
<tr>
<td>M.Sc.(Maritime Studies)</td>
<td>1 – 3 years 2 – 4 years</td>
</tr>
<tr>
<td>Graduate Diploma in Construction Management</td>
<td>– 1 – 3 years</td>
</tr>
<tr>
<td>School of Electrical &amp; Electronic Engineering</td>
<td></td>
</tr>
<tr>
<td>M.Sc.(Communications Engineering)</td>
<td>1 – 3 years 2 – 4 years</td>
</tr>
<tr>
<td>M.Sc.(Computer Control &amp; Automation)</td>
<td>1 – 3 years 2 – 4 years</td>
</tr>
<tr>
<td>M.Sc.(Electronics)</td>
<td>1 – 3 years 2 – 4 years</td>
</tr>
<tr>
<td>M.Sc.(Integrated Circuit Design) – Joint degree with Technical University of Munich (TUM)</td>
<td>1.5 – 3 years –</td>
</tr>
<tr>
<td>M.Sc.(Microelectronics) – Joint degree with Technical University of Munich (TUM)</td>
<td>1.5 – 3 years –</td>
</tr>
<tr>
<td>M.Sc.(Power Engineering)</td>
<td>1 – 3 years 2 – 4 years</td>
</tr>
<tr>
<td>M.Sc.(Signal Processing)</td>
<td>1 – 3 years 2 – 4 years</td>
</tr>
<tr>
<td>Graduate Diploma in Information-Communication Technology</td>
<td>– 1 – 3 years</td>
</tr>
<tr>
<td>School of Mechanical &amp; Aerospace Engineering</td>
<td></td>
</tr>
<tr>
<td>M.Sc.(Project Management) – Joint degree with University of Manchester (UOM)</td>
<td>1 – 3 years 3 – 6 years</td>
</tr>
<tr>
<td>M.Sc.(Aerospace Engineering) - Joint degree with Technical University of Munich (TUM)</td>
<td>2 – 4 years –</td>
</tr>
<tr>
<td>M.Sc.(Computer Integrated Manufacturing)</td>
<td>1 – 2 years 2 – 4 years</td>
</tr>
<tr>
<td>M.Sc.(Logistics)</td>
<td>1 – 2 years 2 – 4 years</td>
</tr>
<tr>
<td>M.Sc.(Mechanical Engineering)</td>
<td>1 – 2 years 2 – 4 years</td>
</tr>
<tr>
<td>M.Sc.(Precision Engineering)</td>
<td>1 – 2 years 2 – 4 years</td>
</tr>
<tr>
<td>M.Sc.(Smart Product Design)</td>
<td>1 – 2 years 2 – 4 years</td>
</tr>
<tr>
<td>M.Sc.(Systems and Project Management)</td>
<td>1 – 2 years 2 – 4 years</td>
</tr>
<tr>
<td>Nanyang Business School</td>
<td></td>
</tr>
<tr>
<td>MBA (Nanyang Fellows)</td>
<td>3 – 6 trimesters –</td>
</tr>
</tbody>
</table>

Tuition Fees
Please refer to these webpages for information about fees, service obligation and other details:

Programmes by Research
http://admissions.ntu.edu.sg/graduate/R-Programs/BeforeApplying-Research/Pages/Fees.aspx

Programmes by Coursework
http://admissions.ntu.edu.sg/graduate/coursework/BeforeApplying/Pages/Fees.aspx

Service Obligation
http://admissions.ntu.edu.sg/graduate/Pages/ServiceObligation.aspx
Scholarships and Financial Assistance Schemes

Research Programmes

The University provides Research Scholarships to candidates with outstanding academic results to pursue higher degree studies by research on a full-time basis. The scholarship covers research and other university-related fees and includes a monthly stipend. Details are at http://admissions.ntu.edu.sg/graduate/scholarships

In addition, scholarship awards are also offered by government agencies and industry partners.

<table>
<thead>
<tr>
<th>Scholarship</th>
<th>Eligibility</th>
<th>Award Details &amp; Quantum</th>
</tr>
</thead>
</table>
| Nanyang President's Graduate Scholarship | • Applicants must have a 1st Class Honours degree or equivalent at Bachelor's level and should also demonstrate excellent research abilities.  
• No restriction as to the nationality of candidates but, all things being equal, preference will be given to Singapore Citizens and Singapore Permanent Residents  
* DSO Augmentation: There is a top-up provided by DSO to successful applicants of NPGS. Recipients must be Singapore Citizens who will work on DSO projects and will be co-supervised by a DSO researcher and a faculty member from the University.  
• There is no bond attached to the scholarship. | • Full tuition fees.  
• Monthly stipend of $3,200.  
• Conference allowance for two major overseas conferences in the 4-year period.  
• One-time IT allowance of $1,500.  
• Annual grant of $500 for journal subscription or book purchase.  
• Thesis preparation allowance.  
• Priority for subsidised campus accommodation. |
| NTU Research Scholarship             | • Open to local or international students seeking admission as a full-time candidates pursuing a Doctor of Philosophy (Ph.D) programme by research at NTU.  
• Candidates with 1st Class Honours or 2nd Class Upper Honours or its equivalent will be considered for the scholarship regardless of their citizenship.  
• Students should not be on paid employment or accept paid employment or concurrently hold any other scholarship, fellowship, bursary or top-up allowance during the prescribed period of the award.  
• There is no bond attached to the scholarship. | • It is tenable for one year in the first instance and renewable every 12 months, subject to the scholar's good progress and availability of funds.  
• The monthly stipends for Ph.D students are as follows:  
  - Singapore Citizens: $2,500  
  - Singapore Permanent Residents: $2,200  
  - International Students: $2,000  
For students who pass the Ph.D Qualifying Examination/ Confirmation, the stipend may be increased to $3,000 for Singapore Citizens, $2,700 for Singapore PRs and $2,500 for international students, subject to good performance in research and the attainment of required standards for courses taken (the university reserves the right to vary the amount of the stipend at any time by written notice).  
• It also covers the annual research and computer fees.  
• The maximum period of the award is 4 years for Ph.D candidates, subject to good performance and progress, as well as availability of research funding.  
* For student intake prior to AY2010, the monthly stipend for Singapore Citizens is $2,300 and for those after the Ph.D Qualifying Exam/Confirmation, the amount will be increased by $500. |
| Scholarship                                      | Eligibility                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Award Details & Quantum                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Singapore - MIT Alliance (SMA) Graduate Fellowship at SMART | • The Ministry of Education has recently launched a prestigious SMA Graduate Fellowship. These 4-year SMA Graduate Fellowships are available for highly talented doctoral graduate education and research for students from Nanyang Technological University (NTU) and National University of Singapore (NUS).  
• Selection of candidates will take place twice a year, in time for the start of the August & January semesters.  
• Available for full-time Ph.D students who wish to conduct their research at Singapore-MIT Alliance for Research and Technology (SMART) Centre.  
• There is no bond attached to the scholarship. | • The award is tenable for 1 year in the first instance; it may be renewed annually subject to the Fellow's satisfactory progress. The maximum period of the award is 4 years.  
• Full tuition fees and other compulsory fees.  
• Stipend of $3,200 per month.  
• A travel grant of $12,000 to help cover the expenses with a six-month research residency at MIT.  
• Conduct research in one of the existing SMART Interdisciplinary Research Groups (IRGs):  
  - Infectious Diseases (ID)  
  - Center for Environmental Sensing and Modeling (CENSAM)  
  - BioSystems and Micromechanics (BioSYM)  
  - Future Mobility (FM)  
  - Low Energy Electronic Systems (LEES)  
• Co-supervision with at least one advisor each from MIT and NTU. |
| Singapore International Graduate Award (SINGA) | • Open to local or international student seeking admission as a full-time candidate pursuing a Doctor of Philosophy (Ph.D) programme by research at NTU.  
• Applicant must have excellent academic results, and be in the top 20% of the cohort.  
• Good skills in written and spoken English.  
• Good reports from two academic referees.  
• There is no bond attached to the scholarship. | • Full tuition fees.  
• Monthly stipend of $2,000 (increase to $2,500 upon confirmation).  
• One-time $1,000 settling-in allowance.  
• One-time airfare grant of $1,500. |
| DSO PhD Research Award | • Singaporeans.  
• Open to fields of study relevant to engineering and science.  
• Must have obtained a 1st class or 2nd Class Upper Honours Bachelor's degree.  
• Must apply to NTU for PhD programme.  
• There is no bond attached to the scholarship. | • Successful candidates will receive a monthly stipend, full tuition fees, and other compulsory fees and allowances for attending both local and international conferences.  
• Monthly stipend of $3,100 - $3,300.  
• Conference support of up to $4,000 per year.  
• The sponsorship period is up to 4 years. |
<table>
<thead>
<tr>
<th>Scholarship</th>
<th>Eligibility</th>
<th>Award Details &amp; Quantum</th>
</tr>
</thead>
</table>
| A*STAR Graduate Scholarship | • Singaporeans, Singapore Permanent Residents, citizens of ASEAN countries and other international students seeking admission as full-time Ph.D research candidates in NTU.  
• Successful applicants have to take up Singapore Citizenship.  
• Graduates with (1) 1st Class Honours or (2) 2nd Class Upper Honours and good ‘A’ Level results or polytechnic diploma with merit.  
• Applicants are encouraged to apply with their GRE scores. Applications without GRE test scores will still be considered but successful applicants will have to satisfy the GRE requirement before embarking on their Ph.D studies.  
• The average scores of successful awardees for the combined Verbal and Quantitative components for past batches were 1370 with a standard deviation of 100 with at least 4.5 for the Analytical Writing Components. | • Support for up to 4 years of academic pursuit, leading to a Ph.D.  
• Opportunities for overseas attachment of up to 12 months during the Ph.D studies.  
• Successful candidates will receive a monthly stipend, full tuition fees, and other compulsory fees and allowances for attending both local and international conferences.  
• Monthly stipend of $3,100 - $3,300.  
• Conference support of up to $4,000 per year. |
### Coursework Programmes

<table>
<thead>
<tr>
<th>Scholarship</th>
<th>Eligibility</th>
<th>Award Details &amp; Quantum</th>
<th>Applications</th>
</tr>
</thead>
</table>
| **APEC**                            | • Open to nationals of the following APEC member economies to pursue a full-time Master of Business Administration (MBA) programme at NTU: Australia, Brunei Darussalam, Canada, Chile, People's Republic of China, Hong Kong, Indonesia, Japan, Republic of Korea, Malaysia, Mexico, New Zealand, Papua New Guinea, Peru, Philippines, Russia, Chinese Taipei, Thailand, United States, Vietnam.  
• Singaporeans and Singapore Permanent Residents are not eligible to apply.  
• A good bachelor's degree.  
• At least two years of management or professional experience.  
• Proficiency in the English Language.  
• An acceptable score in the Graduate Management Admission Test (GMAT). | • The scholarship is tenable for 4 trimesters (≈16 months).  
• It covers:  
  - Monthly stipend of $1,400  
  - Book allowance of $500  
  - Tuition fee, health insurance, examination fee and other approved fees, allowances and expenses.  
• Cost of one overseas Business Study Mission (for MBA candidates only) undertaken within the tenable period of the scholarship.  
• Cost of travel from home country to Singapore on award of the scholarship.  
• Cost of travel from Singapore to home country on successful completion of the Master's degree within the tenable period of the scholarship. | • Open in November and close in December each year. |
| **ASEAN Graduate Scholarship**      | • Open to nationals of member countries of ASEAN (except Singapore) to pursue a designated full-time Master’s degree by coursework and dissertation at NTU.  
• Singaporeans and Singapore Permanent Residents are not eligible to apply.  
• Excellent academic record.  
• A very good command of the English language.  
• At least 2 years of working experience.  
• An acceptable score in the Graduate Management Admission Test (GMAT) – for applicants of the MBA programme.  
• Applications open in November and close in December each year. | • Each scholarship is tenable for a period of 1 year only for M.Sc and M.Mass Communication programmes and 4 trimesters (≈16 months) only for the MBA programme.  
• It covers:  
  - Monthly stipend of $1,350.  
  - Book allowance of $500.  
  - Tuition fee, health insurance, examination fee and other approved fees, allowances and expenses.  
• Cost of one overseas Business Study Mission (for MBA candidates only) undertaken within the tenable period of the scholarship.  
• Cost of travel from home country to Singapore on award of the scholarship. | • Open in November and close in December each year. |
<table>
<thead>
<tr>
<th>Scholarship</th>
<th>Eligibility</th>
<th>Award Details &amp; Quantum</th>
<th>Applications</th>
</tr>
</thead>
</table>
| Nanyang Fellows Scholarship         | • Open to nationals of member countries of ASEAN (except Singapore) to pursue a designated full-time Master’s degree by coursework and dissertation at NTU.  
• Singaporeans and Singapore Permanent Residents are not eligible to apply.  
• Excellent academic record.  
• A very good command of the English language  
• At least 2 years of working experience  
• An acceptable score in the Graduate Management Admission Test (GMAT) – for applicants of the MBA programme.  
• Applicants open in November and close in December each year. | • Each scholarship is tenable for a period of 1 year only.  
• It covers the following:  
− Full or partial tuition fees in NTU and MIT and the overseas business study mission.  
− A monthly stipend of $1200 and lodging with return airfare to MIT may also be awarded to outstanding candidates from the civil service. | • Application is submitted online at: www.nfp.ntu.edu.sg  
For enquiries, please contact fellows@ntu.edu.sg |
| NTU-MBA Scholarship                 | • Open to international students seeking admission to pursue a full-time MBA programme at NTU.  
• Singaporeans and Singapore Permanent Residents are not eligible to apply.  
• Selection is based on scholastic achievements as well as financial circumstances and other relevant factors.  
Note: Recipients of this scholarship may be called upon to assist in some administrative or research work of not more than 5 hours per week.  
• There is no bond attached to the scholarship. | • Coverage of tuition fees for up to 4 trimesters. | • Application forms may be obtained from the MBA Office when applications for the MBA programme open in October each year.  
• Application for the scholarship should be submitted to the MBA Office together with the application for admission to the MBA programme.  
• For enquiries, contact the MBA office at: nbsmba@ntu.edu.sg |
Tuition Fee Loan
Candidates enrolled in research programmes or selected full-time coursework programmes are eligible to apply for a Tuition Fee Loan of up to 90% of the research/tuition fee payable by Singapore citizens. The University has appointed selected banks as agents to administer the Tuition Fee Loan Scheme.

Course Registration

Registration Period
All graduate students are to register for the course(s) they wish to study through the Graduate Course Registration System.

Students who fail to register a course and yet proceed to attend classes in that course, will not be allowed to take the examination in that course. No grade will be awarded if the course has no formal examination.

It is the responsibility of students to register course(s) themselves and ensure that the courses are correctly registered.

Students must register for and finalised their courses during their allocated registration period, after which adding and dropping of courses is disallowed. Please refer to the class time-table when selecting courses to avoid clashes in schedules.

Important
A course dropped within the registration period will not appear in the student’s result slip and official transcript. However, for a course that has not been dropped within the registration period, the student will be deemed to have sat and failed the course and a fail grade will be reflected in the result slip and official transcript.

Coursework Students
Academic Unit (AU) requirement
Students should refer to the AU system to check for the AU required for the coursework component of study.

Selection of Electives
Selection of an elective is on a first-come, first-served basis. A student who has chosen an elective from another programme will be placed on a waiting list. Electives will be allocated after the stipulated registration period on a first-come, first-served basis.

Research Students
School may have additional or other requirements on courses to be taken by research students. Therefore, research students are strongly advised to check with their own School on the courses requirements.

Maximum Number of Courses Per Term
Master’s students are allowed to register up to three courses per term, while Ph.D students are allowed to register up to five per term.

Examinations
Instructions to Candidates
Students are responsible for understanding and complying with the University policies and procedures pertaining to examination matters.

All candidates must follow these instructions conscientiously. You will be dealt with by the Board of Discipline for any breach of regulations.

Cheating
A candidate who is caught cheating in examinations is liable to be expelled from the University.

The University takes a serious view of cheating in examination. All students are to take note of the written examination instructions issued to them as well as the announcement made by the Chief Invigilators during examination.

Examination Rules and Regulations
1. Please read the instructions carefully as a candidate who breaches any of the Examinations Regulations will be dealt with by the Board of Discipline.
2. Examinations will be conducted during the allocated times shown in the examination timetable.
3. Candidates are allowed into the examination hall ten minutes before the time scheduled for the commencement of the examination. They are, however, not permitted to turn over and read the question papers placed on their desks until the commencement of the examination.
4. No candidate is allowed to present himself for examination later than one hour after the commencement of the examination.
5. The identity of every candidate will be checked during the examination. Candidates are required to bring their matriculation cards or identity cards and place them at the top right-hand corner of their desks at the commencement of each examination.
6. Candidates may bring into the examination hall only those calculators that have been approved by the School. Unauthorised calculators are not permitted in the examination hall. Candidates in the M.B.A., M.Sc.(MBA Specialisation), M.Mass Comm., M.Sc.(Info.Studies), M.Sc.(Info.Systems), M.Sc.(Knowledge Management) and Grad.Dip.Mass Comm. programmes are NOT required to have their calculators approved by the Schools concerned and are allowed to use any calculators.
7. No candidate is allowed to bring into the examination hall any unauthorised material such as book, paper, document or picture. Bags, waist pouches, ear or headphones are also not permitted to be brought into the examination hall. A candidate who is found to be in possession of any unauthorised material or caught cheating during the examination is liable to be expelled from the University.
8. Candidates are allowed to bring their handphones into the examination hall. However, the handphones must be switched off at all times. Disciplinary actions will be taken against a candidate who breaches this regulation.

9. For open book examination, candidates must also leave their bags outside the examination hall.

10. The University will not be responsible for the loss of any belongings which candidates bring with them and which they are required by this regulation to leave outside the examination hall.

11. No candidate who has entered the examination hall will be allowed to leave the hall, temporarily or otherwise for any reason whatsoever until the examination has commenced.

12. No candidate is allowed to leave his seat without the permission of an invigilator.

13. A candidate who wishes to communicate with an invigilator must raise his hand.

14. A candidate who has been given permission to leave his seat temporarily must be accompanied by an invigilator.

15. No communication by word of mouth or otherwise between candidates is allowed in the examination hall.

16. Candidates must carefully read the instructions printed on each answer book and examination question paper. The blank pages in the answer book are to be used only for candidates’ rough work. Solutions or any other materials written on these blank pages will not be marked.

17. Candidates must not write their names on the answer books. They should write only their matriculation numbers in the space provided on the cover of each answer book.

18. Candidates are not allowed to write, mark, highlight or deface any reference materials provided for the examination. Any candidate found doing so is liable to have his reference materials removed from his use for the rest of the examination and be made to pay for the cost of the materials that have to be replaced.

19. No candidate who has presented himself for an examination will be allowed to hand in his answer script until one hour has lapsed after the commencement of the examination.

20. No candidate is allowed to leave his seat during the last 15 minutes before the conclusion of the examination.

21. At the conclusion of the examination, candidates must remain seated and must not communicate with one another while their answer scripts are being collected and tallied.

22. No papers, used or unused, may be removed from the examination hall except that a candidate may take with him his own question paper unless instructed otherwise.

23. Candidates must comply with the dress code of the University. A candidate who is not properly attired will not be admitted into the examination hall.

24. Attention is drawn to the following regulation relating to absence from any examination due to illness:

“A candidate who is absent from an examination for a degree, on account of illness, may be permitted to appear for the examination at the next period of the examination on the condition that the candidate has been examined by a registered medical practitioner and a medical report attached with the original medical certificate be submitted to the Graduate Studies Office within forty-eight (48) hours of the absence.”

The medical report form is available at GSLink-Academic-Examination-Request for Medical Report Form. Candidates are responsible to provide the form to their attending doctor.

Any fee payable for the medical examination under the above regulation shall be paid by the candidate.

25. Attention is drawn to the following regulation relating to absence from any examination:

“A student who does not register or who, having registered, fails to take any examination for which he is eligible to sit, shall be deemed to have sat and failed the examination unless the Chair concerned is satisfied that there is good and sufficient reason for such failure to register or take the examination.”

All appeals must be submitted to the Graduate Studies Office within forty-eight (48) hours of the absence.

26. Attention is drawn to the following regulation relating to outstanding fees:

“No candidate shall be entitled to be admitted to a University examination unless the Chief Financial Officer certifies that he is not in debt to the University (otherwise than as a result of a loan made by the University) or to any University hall of residence.”

Candidates are reminded to settle all outstanding fees with the Office of Finance and/or rental fees with the International Student Centre before they sit for any examination.

Academic Standing and Grading Systems

1. Grades and grade points are assigned as follows:

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Grade Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>5.00</td>
</tr>
<tr>
<td>A</td>
<td>5.00</td>
</tr>
<tr>
<td>A-</td>
<td>4.50</td>
</tr>
<tr>
<td>B+</td>
<td>4.00</td>
</tr>
<tr>
<td>B</td>
<td>3.50</td>
</tr>
<tr>
<td>B-</td>
<td>3.00</td>
</tr>
<tr>
<td>C+</td>
<td>2.50</td>
</tr>
<tr>
<td>C</td>
<td>2.00</td>
</tr>
<tr>
<td>D+</td>
<td>1.50</td>
</tr>
<tr>
<td>D</td>
<td>1.00</td>
</tr>
<tr>
<td>F</td>
<td>0.00</td>
</tr>
</tbody>
</table>
2. The following non-letter grades and notations will be used.
   * - Course with Pass/Fail grading only
   AT - By attendance only
   IP - In Progress
   W - Withdrawal
   X - Absent

3. Definition of Grade Point Average
   3.1. Term Grade Point Average (TGPA)
   TGPA represents the grade point average of all courses attempted by a student in any term of study
   \[
   TGPA = \frac{\text{Sum of (Grade Point x AU* for course attempted in the term)}}{\text{Total AU* attempted in the term of study}}
   \]
   ‘Term’ refers to either semester or trimester as defined periods of study in each programme.

   3.2 Cumulative Grade Point Average (CGPA)
   CGPA represents the grade point average of all courses attempted by a student
   \[
   CGPA = \frac{\text{Sum of (Grade Point x AU* for course attempted to date)}}{\text{Total AU* attempted to date}}
   \]*AU = Academic Unit: Each course is assigned a certain number of AU. It is a measure of the student’s workload associated with both class attendance and preparation.

3.3. The TPGA and CGPA will be reflected in students’ transcript of academic records.

4. Courses that are exempted and courses with approval to transfer credits will not be counted in the calculation of TGPA or CGPA. However, they will be counted towards the AU requirement for graduation, and reflected in the transcript.

5. A Fail (F) grade obtained in a course, and a new grade attained for any subsequent repeat, will be counted in the calculation of TGPA and CGPA. The grades for all attempts will be reflected in the transcript.

Graduation Requirements and Academic Performance

Coursework Programmes

Graduation Requirements
   i. Successful completion of all requirements as prescribed by the programme of study; and
   ii. A minimum CGPA of 2.50 is attained at the completion of the programme of study.

Satisfactory Academic Performance
   A student is considered to be making satisfactory progress in any term of study if he/she attains a minimum TGPA of 2.50.

Poor Academic Performance
   A student with poor academic performance will be subjected to the following actions:
   1. Academic warning if TGPA < 2.50 in any term of study
   2. Candidature termination if TGPA < 2.50 for the second consecutive term of study
   3. Appeal against termination on the grounds of extenuating circumstances may be made, subject to the following rules:
      i. the appeal must be submitted to the relevant School by the end of the first week of a term. Late appeals will not be considered.
      ii. normally, only one appeal is allowed per candidature.

Research Programmes

Graduation Requirements
   i. Successful completion of all requirements as prescribed by the programme of study or School; and
   ii. After completion of all course requirements, a minimum CGPA of 3.00 and 3.50 must be attained for Master’s students and PhD students respectively.

Satisfactory Academic Performance
   In any term of study, a research student is considered to be making satisfactory progress if he/she satisfies the following conditions:
   i. Attain a minimum TGPA of 3.00 for Master’s students and 3.50 for PhD students; and
   ii. Attain at least Grade Point 2.50 (grade C+) in every course; and
   iii. Complete all course requirements within the confirmation period as prescribed under Qualifying Examination.

Poor Academic Performance
   A research student with poor academic performance will be subjected to the following actions:
   
<table>
<thead>
<tr>
<th>Research Programme</th>
<th>Academic Warning</th>
<th>Termination of Financial Aid and/or Candidature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master’s</td>
<td>i. TGPA &lt; 3.00 in any term of study; or</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ii. Any course with Grade Point less than 2.50 (below C+)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>i. Fail to complete all course requirements within the confirmation period; or</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ii. TGPA &lt; 2.50 in two consecutive terms;</td>
<td></td>
</tr>
<tr>
<td>PhD</td>
<td>i. TGPA &lt; 3.50 in any term of study; or</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ii. Any course with Grade Point less than 2.50 (below C+)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>iii. TGPA &lt; 3.00 in three consecutive terms.</td>
<td></td>
</tr>
</tbody>
</table>
# Medals And Prizes For Graduate Programmes

<table>
<thead>
<tr>
<th>Name of Award</th>
<th>Programme</th>
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</thead>
<tbody>
<tr>
<td>Ernst &amp; Young Cash Prize</td>
<td>All MBA Programmes</td>
</tr>
<tr>
<td>Singapore Academy of Law Prize</td>
<td>All MBA Programmes</td>
</tr>
<tr>
<td>Information Systems Audit and Control Association Book Prize</td>
<td>All MBA Programmes</td>
</tr>
<tr>
<td>Singapore Association of the Institute of Chartered Secretaries and Administrators Gold Medal</td>
<td>All MBA Programmes</td>
</tr>
<tr>
<td>Institute of Certified Public Accountants of Singapore Gold Medal Cum Cash Award</td>
<td>M.B.A.(Accountancy)</td>
</tr>
<tr>
<td>The Association of Banks in Singapore Gold Medal Cum Cash Award</td>
<td>M.B.A.(Finance)</td>
</tr>
<tr>
<td>Accenture Gold Medal</td>
<td>M.B.A.(Strategy)</td>
</tr>
<tr>
<td>Raffles Hotel Book Prize</td>
<td>M.B.A.(Marketing)</td>
</tr>
<tr>
<td>Professor Lim Chong Yah Gold Medal</td>
<td>M.B.A.(Nanyang Fellows)</td>
</tr>
<tr>
<td>Monetary Authority of Singapore Gold Medal</td>
<td>M.Sc.(Financial Engineering)</td>
</tr>
<tr>
<td>Reuters Gold Medal</td>
<td>M.Sc.(Financial Engineering)</td>
</tr>
<tr>
<td>Furama Ltd Endowed Book Prize</td>
<td>Master of Business Administration</td>
</tr>
<tr>
<td>Frontken-Willie Wong Endowed Gold Medal</td>
<td>Master of Business Administration</td>
</tr>
<tr>
<td>United Overseas Bank Gold Medal</td>
<td>M.Sc.(Strategic Studies)</td>
</tr>
<tr>
<td>Singapore Technologies Engineering Gold Medal</td>
<td>M.Sc.(International Relations)</td>
</tr>
<tr>
<td>The Lion Group Gold Medal</td>
<td>M.Sc.(International Political Economy)</td>
</tr>
<tr>
<td>The Rajabali Jumabhoy Foundation Gold Medal</td>
<td>M.Sc.(Asian Studies)</td>
</tr>
<tr>
<td>Tay Seow Huah Book Prize</td>
<td>M.Sc.(Strategic Studies) / M.Sc.(International Relations) / M.Sc.(International Political Economy) / M.Sc.(Asian Studies)</td>
</tr>
<tr>
<td>The Association of Nanyang University Graduates Gold Medal</td>
<td>M.Sc.(Managerial Economics)</td>
</tr>
<tr>
<td>Zaobao Gold Medal</td>
<td>Master of Public Administration</td>
</tr>
<tr>
<td>Singapore Chinese Chamber of Commerce &amp; Industry Gold Medal</td>
<td>M.Sc.(Managerial Economics) / Master of Public Administration</td>
</tr>
<tr>
<td>Li Lien Fung Gold Medal</td>
<td>M.Sc.(Managerial Economics) / Master of Public Administration</td>
</tr>
<tr>
<td>Ng Ghit Cheong Cash Award</td>
<td>Master of Public Administration</td>
</tr>
<tr>
<td>Professional Engineers Board Gold Medal</td>
<td>M.Sc. from any of the programmes offered by the School of CEE / School of EEE / School of MAE</td>
</tr>
<tr>
<td>Guthrie Gold Medal</td>
<td>M.Sc.(International Construction Management)</td>
</tr>
<tr>
<td>Maritime &amp; Port Authority Gold Medal cum Cash Award</td>
<td>M.Sc.(Maritime Studies)</td>
</tr>
<tr>
<td>DSTA Gold Medal &amp; Cash Award</td>
<td>CEE Master of Engineering</td>
</tr>
<tr>
<td>Tech Semiconductor Gold Medal</td>
<td>M.Sc.(Electronics)</td>
</tr>
<tr>
<td>Texas Instruments Book Prize</td>
<td>M.Sc. from any of the programmes offered by the School of EEE</td>
</tr>
<tr>
<td>Systems on Silicon Manufacturing Company Book Prize</td>
<td>M.Sc. from any of the programmes, Master of Engineering &amp; Doctor of Philosophy offered by the School of EEE</td>
</tr>
<tr>
<td>Pearson Education Gold Medal</td>
<td>Master of Mass Communication</td>
</tr>
<tr>
<td>LexisNexis Gold Medal</td>
<td>M.Sc. (Information Systems)</td>
</tr>
<tr>
<td>Ministry of Information and The Arts Gold Medal</td>
<td>Graduate Diploma in Mass Communication</td>
</tr>
<tr>
<td>NTU Class of 1985 Cash Prizes Award</td>
<td>M.Sc. (Technopreneurship &amp; Innovation)</td>
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<tr>
<td>Dr and Mrs Alex Tan Pang Kee Gold Medal</td>
<td>SPMS Doctor of Philosophy</td>
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Research and Interdisciplinary Centres

Progress of Research Activities in NTU

NTU is a fast-rising, research-intensive university with a strong science and technological base; up-and-coming humanities, social science, media and arts disciplines, advanced research facilities and infrastructure, as well as a highly rated accountancy and business school. It also has Singapore's newest medical school, the Lee Kong Chian School of Medicine, in partnership with Imperial College London (UK).

NTU has joined the ranks of the world's top elite young universities through the new Quacquarelli Symonds (QS) ranking that put NTU 4th among universities below the age of 50. In 2012 QS World University Rankings (WUR), NTU is ranked 47th in the world and is the fastest-rising university in the QS Top 50, having moved up 27 places in the past 2 years (up from 58th position last year and 74th in 2010).

Focusing on five Thematic Peaks of Excellence - Sustainable Earth, Future Healthcare, New Media, the New Silk Road, and Innovation Asia, NTU promotes inter-disciplinary research while building strength and depth in the established disciplines. NTU has now positioned itself firmly at the forefront in the acquisition of a large proportion of competitive research funding in Singapore, securing $5440.6 million competitive research funding in FY 2011 (including Tier 1 and RSB). Major research funding achievements in FY 2011 include NTU's first MOE AcRF Tier 3 project at $10 million for "Distruptive Photonics Technology", which is thus far, the only award in Singapore for the AcRF Tier 3 Programme Grant Call, the four (4) new CREATE projects funded by NRF, as well as EUR 3 million ($55.17 million) AXA Research Fund to create the Nanyang Chair in Natural Hazards held by Prof Kerry Sieh, the first AXA Chair in Asia. The number of publications co-authored by NTU faculty in international refereed journals with impact factor ≥ 10 in 2011 has increased to 55 and is five (5) fold the number in 2007.

The most significant milestone of NTU's success in external competitive research grants is the award of $150 million Earth Observatory of Singapore (EOS) RCE in FY07 and $120 million Singapore Centre on Environmental Life Sciences Engineering (SCELSE) RCE in FY09. These awards mark a big step forward for NTU in our efforts to become a world-class research-intensive university. The EOS, which received $35 million endowment from the AXA Research Fund in February 2012, is headed by world-renowned seismologist, Professor Kerry Sieh while the SCELSE is led by Professor Staffan Kjelleberg and Professor Yehuda Cohen; both world leaders in the field of environmental life sciences. These two Research Centres of Excellence at NTU are significant pillars of the university's efforts in sustainable research.

AY 2010/AY2011 witnessed NTU's significant progress in research through the launch of the Institute on Asian Consumer Insight led by marketing guru Prof Bernd Schmitt; various new NRF CREATE programmes - TUM Centre for Electromobility in Megacities, Singapore-Berkeley Initiative for Sustainable Energy (SinberRISE) and Singapore-Berkeley Building Efficiency and Sustainability in the Tropics (BEST), Singapore-Peking University Research Centre for a Sustainable Low-Carbon Future (SPURc), with Ben-Gurion University (BGU) of the Negev and Hebrew University of Jerusalem (HUJ) in nanomaterials research, the Cambridge Centre for Carbon Reduction in Chemical Technology, the opening of BeingThere research lab with ETH Zurich and University of North Carolina Chapel Hill; the award of the Institute for Sport Research (ISR) with University of Loughborough (UK); the establishment of NTU's Complexity Programme; and many other exciting developments.

Apart from its fundamental research, NTU is also actively fostering applied research through partnerships with major corporations and industry leaders by proactively engaging multinational companies in collaborative initiatives. In recent years (2010-2012), we inked agreements with Carl Zeiss, University of British Columbia, EADS, Det Norske Veritas, National Instruments, Kemira Oyj, Gamesa, MicoVision, Austrian Institute of Technology, Solid Asia, the University of Warwick, Rice University, Rolls-Royce, IBM, Fraunhofer-Gesellschaft, Centre National de la Recherche, Scientifique International and Thales, global Dye Solar Cells leader Dyesol, Lushang Group, JTC Corporation and Royal Philips Electronics among others. These industrial collaborations form the key component of a world-class technological university, testament of the relevance of NTU's research expertise to real life problems that would result in societal benefits and to the pressing market needs of industry.

Helmed by Professor Bertil Andersson, winner of the 2010 Wilhelm Exner Medal, an honour bestowed on the world's best scientists, NTU is also a melting pot of international award-winning scientists, young talents and eminent global industry partners. NTU has secured the lion's share, on a competitive basis, attracting 24 (50%) of Singapore National Research Foundation (NRF) Fellows.
awardees. Running parallel to the NRF Fellowship Scheme, NTU has also implemented its own Nanyang Assistant Professorship (NAP) scheme to attract outstanding young researchers, from all over the world, to develop and pursue an independent research career in NTU. These two schemes are the latest initiatives set up to woo top researchers from around the world for them to play leading roles in the University's new wave of multi-disciplinary and integrative research.

NTU is implementing high level international best practices to achieve research standards that are comparable to leading universities. Among the measures taken to raise the standards of NTU's research quality and integrity are the establishment of the NTU Research Council chaired by Professor Bengt Nordén from Chalmers University of Technology, Sweden, a comprehensive review of inter-school research centres, the use of research-quality drivers for annual core budget allocations to the schools, benchmark NTU's research productivity and future research priorities through various bibliometric analytical tools, the establishment of a Core Facility (CF) framework by investing in cost-effective state-of-the-art research equipment that can serve the whole university, and implementation of a university-wide network for research administrators to share best practices and international standards for research administration.

NTU is also committed to research integrity. The NTU Research Integrity policy has been revised to incorporate the Singapore Statement on Research Integrity. Network of Research Integrity Points of Contact (NORIPOC) has been established as a formal structure to discuss and deal with issues related to research integrity within the university. NTU had also been part of a development group for a new on-line Research Integrity educational programme from Epigeum to teach the key elements of Research Integrity. NTU's Institutional Review Board chaired by Professor Lee Sing Kong, Director of the National Institute of Education, has also been in operation since August 2010.

Research Centres of Excellence
Earth Observatory of Singapore
Director: Professor Kerry Sieh, AXA-Nanyang Chair in Natural Hazards
Website: www.earthobservatory.sg/

Vision
To understand and assess threats from geohazards for the purpose of risk mitigation

Mission
To conduct fundamental research on earthquakes, volcanic eruptions, tsunami and climate change in and around Southeast Asia, towards safer and more sustainable societies

Research Activities
The Earth Observatory of Singapore (EOS) research focuses on Tectonics, Volcanoes and Climate.

Tectonics:
Asia is home to several of the largest and most seismically active faults in the world: hundreds of millions of people live in their vicinity. EOS investigates faulting mechanisms with a view to forecast earthquakes and tsunamis more reliably. Research efforts in tectonics address the consequences of the convergence between Indian-Australian and Eurasian tectonic plates, from the Sunda megathrust to the Himalayas and Central Asia.

Volcanoes:
Volcanoes in Southeast Asia are among the most active on Earth and in this region hundreds of thousands of people live in their shadow. EOS volcano research increases fundamental knowledge on volcanic processes and histories. Field work ranges from unravelling and interpreting eruptive histories to augmenting monitoring networks, for the purposes of volcanic risk prevention and mitigation. Magmatic systems are investigated thanks to selected lab volcanoes spanning from openly degassing to plugged systems, from Papua-New Guinea and the Philippines to Indonesia.

Climate:
Several major drivers of global climate are active in Southeast Asia, yet scientific knowledge about them is relatively scant. Global climate change will result in a sea-level rise that will especially pose a threat in the tropics. The emerging EOS programme of climate research is focused on sea-level change, regional climate monitoring, paleo-climate studies, and modelling of past and modern tropical climates. Coastal hazards and environmental change are also investigated.

Singapore Centre on Environmental Life Sciences Engineering (SCELSE)
Director: Professor Staffan Kjelleberg
Website: www.scelse.sg

Vision
SCELSE will be synonymous with the advanced understanding and informed control of complex microbial communities and will enable the development of novel biotechnology for clean water, a sustainable environment, and human health
**Research Activities**

SCELSE is divided into four research clusters:

1. Environmental Engineering - SCELSE works in collaboration with industry and organisational bodies on several key environmental engineering systems, such as used water treatment plants that have been selected for improved understanding and harnessing of biochemical transformation processes.

2. Meta-omics and Systems Biology - To understand microbial communities in any natural or engineered systems to the level where informed control can be applied requires the development and application of a range of cutting edge, high resolution, genomics, imaging and analytical technologies. SCELSE analyses the structure, function, dynamics and interactions of the millions of different microorganisms in complex biofilm communities, to identify all members of these communities, what they do, and how the responses of the entire biofilm community reflect the conditions of their environment and the performance of the systems.

3. Biofilm Biology - Unravelling the mechanisms behind biofilm establishment and functioning is key to integrating engineering and life sciences. SCELSE has adopted a novel and powerful experimental bottom-up approach using model systems - designing habitat specific biofilms in the laboratory - to address defined biofilm-environment interactions in micro-scales.

4. Public Health - SCELSE employs a thorough understanding of how biofilms provide a basis for pathogens to develop resistance, and how this explains their presence in drinking water biofilms as well as in biofilm mediated chronic infection and inflammation conditions. To develop the next generation biofilm control systems, SCELSE has embarked on a chemical biology approach to target and control the biofilm specific traits.

Research Institutes in NTU

**Nanyang Environment & Water Research Institute (NEWRI)**

Executive Director: Professor Ng Wun Jern
Website: www.ntu.edu.sg/newri

**Vision**

To be the key environmental science and engineering research and education provider in Singapore and the region

**Mission**

To unify NTU’s education, research, and applications in environmental science and engineering through the NEWRI ecosystem of multi-disciplinary research groups and centres, and so provide a contiguous value chain linking research, education, industry and community

**Overview**

NEWRI is an R&D ‘ecosystem’, with alliances between independent, but closely interacting entities that pursue a common vision of trans-disciplinary environmental research, translation, development and applications to provide solutions for community and industry. The NEWRI ecosystem now comprises 8 multi-disciplinary members:

- 4 Centres of Excellence (CoE), supported by EWI/EDB:
  - DHI-NTU Centre – Urban water modelling and management
  - Singapore Membrane Technology Centre (SMTC) – Fundamental investigations in and applications of membranes
  - Residues and Resource Reclamation Centre (R3C) – Urban and industrial residues management and resource reclamation
  - Advanced Environmental Biotechnology Centre (AEBC) – Fundamental investigations in environmental biotechnology and bioprocess applications

- Environmental Chemistry and Materials Group (ECMG) – Investigations into environmental chemistry and development of treatment materials

- NEWRI Postgraduate Education Unit (N.PhD) – Generating manpower for the industry

- Lien Foundation-NTU Environmental Endeavour (EE2) – NEWRI’s window to society through philanthropic projects

- Institute of Environmental Science and Engineering (iESE) – NEWRI’s associate member and window to the industry through testbedding and technology transfers

More about the Members of the NEWRI Ecosystem:

**CoE DHI-NTU Centre (DHI-NTU)**

Co-Director: Associate Professor Law Wing Keung, Adrian (NTU)
Co-Director: Dr Ole Larsen (DHI)
Website: www.ntu.edu.sg/DHI-NTU

**Vision**

To generate new water knowledge and to strengthen the water & environment industry in Singapore via the development of innovative technologies and training of water & environment professionals

**Mission**

The mission of the DHI-NTU Centre is to conduct research and provide training to uplift Singapore to a higher echelon in the following areas:

(a) Urban Planning and Water Management
(b) Industrial Water Management
(c) Solid Waste Management
(d) Environmental Impact Assessment
(e) Decision Support System Tools and Technologies

**Research and Training Activities**

Through an integrated approach, encompassing both research and education, DHI-NTU Water & Environment Research Centre and Education Hub (DHI-NTU Centre) strives towards a sustainable long-term conservation of environment while improving the quality of life for all. The Centre was jointly established by DHI Singapore (DHI) and NTU in October 2007, with support from the Environment & Water Industry Development Council (EWI). It is an inter-disciplinary research and training centre for the water & environment industry in Singapore. The centre works towards development of environmentally friendly solutions, and tools and technologies to support a sustainable ecology.
Key directions of the centre’s activities are:
- It develops and applies hydrodynamic and water quality models to improve the planning and management of water resources in urban cities.
- It derives environment friendly technologies and solutions to enable effective water management in industrial facilities.
- It creates original knowledge and tools to facilitate the assessment of environmental impact by human activities in the water and environment domains.
- It educates talents in the mission areas through training and PhD research.

CoE Singapore Membrane Technology Centre (SMTC)
Co-Director: Nanyang Professor Tony Fane
Co-Director: Associate Professor Wang Rong
Website: www.ntu.edu.sg/SMTC

Vision
To be the Centre of Excellence for world-class research and application in membranes for environment and water technologies (EWT).

Mission
To spearhead Singapore’s R&D efforts in fundamental and applied membranes technology.
- Research & Development – provides research with links to industry and international community;
- Education & Training – supports education and training for post graduates and researchers in membranes;
- Industry & Application - acts as incubator for novel membrane technologies.

Research and Training Activities
Established in 2008 and supported by EDB/EWI, SMTC research activities are mainly directed towards membrane technology for Sustainable Water and this is achieved by combining multidisciplinary talents across NTU as well as through collaboration with other universities and industry partners. To date, SMTC has up to 70 full-time researchers coming from ten countries.

Building on the successful research outcomes from the Temasek Professor Program on Membrane Technology for Sustainable at NTU (2002-2006), the Centre is establishing research activities within the following six programme themes:
1. Water production – water treatment, desalination
2. Water reclamation – pre-treatment and reversed reverse osmosis
3. Wastewater Membrane Bioreactors – conventional and novel
4. Energy issues – including Life Cycle Assessment
5. Special Needs – chronic and acute, decentralised
6. Sensors and monitors

CoE Residues and Resource Reclamation Centre (R3C)
Co-Director: Associate Professor Wang Jing-Yuan
Advisor: Professor Rainer Stegmann
Website: www.ntu.edu.sg/r3c

Vision
To conduct cutting edge research and strengthen Singapore environmental industry’s capability in the area of waste resource management with emphasis on use-inspired R3 (Residues, Resource and Reclamation) research and translation for Singapore, Asia and Pacific region.

Mission
To further its research philosophy ‘Wastes are not waste, but misplaced resources’ through activities such as:
- R3 research and translation in Singapore and the Region
- R3 resource and technology transfer centre
- Education and training for R3 professionals

Research and Training Activities
Officially launched on 5 October 2009, R3C, a centre supported by EWI/EDB provides a platform for urban waste management research and development, especially for resource recovery and remediation. The main aim is to support the Singapore industry in developing novel and appropriate technologies for the local and regional markets on urban waste management.

R3C aims to conduct research and translation work and ultimately to develop technologies on waste minimization, conversion of residues into resources, contaminated environment remediation, and other related fields. The research programmes within R3C are grouped into three multidisciplinary clusters including both basic and applied research in R3 field.

These three clusters include:
- Cluster 1: Waste to materials
- Cluster 2: Waste to energy
- Cluster 3: Contaminated sites remediation

R3C has a focal point for synergistic research collaborations with leading government agencies, industry partners and educational and research institutions, both locally and around the world. R3C has active collaborations with the key environmental players in Singapore, including the Ministry of the Environment and Water Resources (MEWR), the National Environment Agency (NEA), and the Public Utilities Board (PUB). R3C is also working with industrial partners including ecoWise, SembEnviro, Sulo, Lioapex, IUT, Keppel-Seghers, Alpha biofuels and CH2Mhill.

R3C's overseas partners are internationally renowned and highly regarded for their residues and resource reclamation research. In addition to performing research, R3C provides consultancy and advisory services to various agencies and corporations.

CoE Advanced Environmental Biotechnology Centre (AEB)
Co-Director: Professor Ng Wun Jern (NTU)
Co-Director: Professor Peter Steinberg (UNSW)
Website: www.ntu.edu.sg/AEB

Vision
A Centre of Excellence that will apply environmental biotechnology and bioprocesses to address environmental issues and provide the biotechnology and bioprocess R&D platform for Singapore’s environmental and water industry.
Mission
To address national and global issues relating to increased demand for fresh water, wastewater management, water resource and waste management, and ecosystem stress and health by applying environmental biotechnology to fill the knowledge gap that exists on the biology of engineered systems (i.e. bioprocesses), resulting in better translation of academic knowledge into industry.

Research and Training Activities
Officially launched on 10 May 2010, AEBC is the NEWRI Ecosystem’s latest member centre, supported by EWI/EDB. It is a unique collaboration between two Universities, NTU and UNSW, reflecting their respective complementarities and excellence in R&D, and representing a merger of the strong environmental biology and biotechnology platform at UNSW, with the technology based bioprocess expertise at NTU.

- It applies strong research platforms of fundamental and applied environmental molecular and microbiology to address issues of environmental bioprocesses and sustainability
- It develops biotechnologies relevant to geographical areas addressed by Singapore’s environmental and water technologies (EWT) industry
- It provides leadership in use-inspired R&D on bioprocesses
- It is a foundation centre to develop and build a strong NTU-UNSW educational and research axis, for Singapore and Australia, for the global research community as well as for water and environmental end users
- It establishes a vibrant collaborative program for postgraduate education and research, spanning several multidisciplinary programs as well as cutting edge research projects
- It aims to attract high profile researchers and industry to participate in defining solutions for global and local challenges through strong research platforms in fundamental and applied environmental biotechnology
- It aims to translate research outcomes into environmental solutions such as for reduced energy consumption, reduced use of potentially toxic chemicals, improved bioprocess efficiencies, and monitoring systems for tracking marine health and ecosystem imbalances

Environmental Chemistry and Materials Group (ECMG)
Co-ordinators: Associate Professor Lim Teck Thye and Associate Professor Richard Webster

Vision
Solving environmental and water problems with least chemical usage, energy consumption and waste stream generation

Mission
To develop cost-effective physico-chemical solutions for water treatment, used water reclamation, desalination, site remediation, residues treatment, resource reclamation, and water quality monitoring and modeling

Research Activities
The group comprises members with diverse expertise in science and engineering and R&D backgrounds in the fields of environmental science, materials, and chemistry. The team is engaged in activities:

- To develop novel, functional materials for environmental applications
- To develop sensitive analytical methods for the detection and quantification of emerging contaminants in urban waters and reclaimed waters
- To integrate systems for water treatment and used-water reclamation with minimal chemical usage or energy consumption
- To catalyse knowledge creation and technological improvements through synergistic collaboration with various entities within the NEWRI ecosystem
- To recommend effective measures for sustainable water resource management and protection of environment and public health
- To catalyse knowledge creation and technological improvements through synergistic collaboration with various entities within the NEWRI ecosystem

NEWRI Postgraduate Education Unit (N.PhD)
Coordinator: Associate Professor Tan Soon Keat

Vision
To prepare students to be at the forefront of Environmental Science and Engineering in generating manpower for the industry, and shaping Asia’s future leaders sensitive to environmental needs

Mission
To produce high calibre environmental engineers trained in fundamentals and equipped for professional practice

Scope of Programme
As a source of manpower for the industry, NEWRI collaborates with education units across NTU to prepare students to be at the forefront of Environmental Engineering and Science to better equip them for professional life. While the candidates are enrolled with the various Colleges and Schools, their research works are supported by and will be conducted in NEWRI’s research centres. These research centres have well-equipped laboratories with capacities and capabilities related to their particular focus domains – e.g. membranes, biotechnology, mathematical modelling, and wastes management. In addition to the preceding, NEWRI works with the School of Civil & Environmental Engineering in a Master’s programme.
Lien Foundation-NTU Environmental Endeavour (EE2)
Director: Professor Ng Wun Jern
Website: endeavour.newri.ntu.edu.sg

Vision
Providing for better life through environmental education, and to bring clean water and sanitation to deserving communities in the region

Mission
To provide affordable, innovative, and sustainable solutions for those without adequate clean water and sanitation in Asia

Core Activities of the Initiative
Founded by the Lien Foundation and Nanyang Technological University, Environmental Endeavour seeks to improve the living conditions of Asia’s developing communities through technology-based developmental work.

This second phase is administered by NEWRI to augment EE2’s efforts for renewed and stronger focus on water and sanitation with its expertise, innovations and resources in environmental and water research technologies.

The activities of EE2 are carried out via a 3-prong approach
- The Lien Fellowship Programme which seeks activities in education and implementation through innovative ideas from leading academics/researchers in Asia’s countries in order to tackle today’s water and sanitation challenges.
  - These Fellows must translate their ideas into successful solutions that can benefit their home communities
  - In the longer term this programme seeks to be recognized as a force for its cutting edge and enduring work in water sustainability throughout the Asia Pacific region
- The Lien Student Programme seeks to engage students by way of participation in community projects
- Lien Aid, the implementing arm, will focus on project development on site. Its mission includes developing innovative water and sanitation solutions based on appropriate technologies, on the ground support, and knowledge transfer to empower local continuation

These activities reflect NEWRI’s concern for the community and sustainability, and are of strategic relevance to the NEWRI Ecosystem as these represent NEWRI’s ‘window to the community’.

Institute of Environmental Science and Engineering (iESE) – An Associate Member of the NEWRI Ecosystem
CEO: Mr Eric Mun
Website: www.ntu.edu.sg/iESE

Vision
To become a leading technology company built on innovations in environmental science and engineering and serve as the Environmental Technology receptacle for Singapore

Mission
To lead in the business of Environmental Technology (ET) innovation and accelerate ET commercialisation to meet the regional needs for a sustainable economic development

Core Activities of the Initiative
Incorporated in Oct 2004 as a NTU subsidiary company, iESE aims to lead in the business of environmental technology (ET) innovation and commercialization through the undertaking of promising technology development generated by members within Nanyang Environment & Water Research Institute (NEWRI) and business collaboration with industry players. In this regard, iESE acts as NEWRI’s window to industry.

It is one of the few business entities that specialises in technology development/commercialisation and is wholly owned by a University, straddling between the industry and university. Through this unique platform, iESE’s business and value-added activities include technology test-bedding, commercialization, application development, environmental specialist consultancy, process modeling/simulation and feasibility/treatability studies. The company strives to generate maximum economic value and return for itself and stakeholders through its business activities in its niche areas - Environmental Technologies, Water and Energy.

Institute for Media Innovation (IMI)
Director: Prof. Nadia Magnenat-Thalmann
Website: imi.ntu.edu.sg

Vision
The Institute for Media Innovation (IMI) is an incubator of multidisciplinary, cutting edge, media-related research ideas. It strives to build a strong reputation as a leading, global Interactive Digital Media (IDM) hub. In response to Singapore’s national priority to develop IDM as a strategic R&D area, IMI aspires to facilitate and promote cross-disciplinary collaboration in media research at NTU.

Mission
- To develop cutting-edge new media research within IMI
- To lead the international collaboration BeingThere Centre on 3D teleconference at NTU
- To create synergy and interactions with the schools to empower New Media interdisciplinary research through integrated projects and joint PhD supervisions
- To promote and develop industrial applications in Singapore and elsewhere in the world

Overview
The Institute for Media Innovation (IMI) was founded upon Professor Bertil Andersson’s initiative in April 2008. At the launch of IMI, Professor Andersson said: “This Institute is dedicated to create an environment where technology and creativity can coexist and develop”. The Institute is directed by Professor Nadia Magnenat-Thalmann who is a world pioneer in IDM research, particularly in all aspects of Virtual Humans simulation.

The general objective of IMI Core Research framework is to create true synergies between the real and the virtual worlds. This means the development of a true interaction between real people and virtual or artificial creatures like virtual humans, virtual animals and robots in a way of creating a real social relationship.
Taking the lead in the development of cutting-edge communication technologies, the Institute for Media Innovation at Nanyang Technological University (NTU, Singapore), together with the Swiss Federal Institute of Technology Zurich (ETH Zurich, Switzerland) and the University of North Carolina at Chapel Hill (UNC-Chapel Hill, USA) have launched a new research centre which has started on December 15, 2010. All directors have come together to set up a new international research centre for telepresence and telecollaboration, known as the BeingThere Centre. The new proposed technologies are set to revolutionise the way humans communicate in the 21st century, in the same way that the telephone revolutionised long-distance communication when it was introduced in the 19th century. The BeingThere Centre represents a $23 million investment (approximately US$18 million or 17 million Swiss francs) by the three universities and the Media Development Authority of Singapore, and aims to leverage on the synergy between the universities, each of which are at the forefront of research and development (R&D) of the technology.

The collaboration will employ a team of 32 top scientists across three continents embarking on joint R&D projects to develop four prototypes of the telepresence system of the 21st century. The parties will share the intellectual property and commercialisation benefits arising from the joint research conducted at the BeingThere Centre.

Key Research Projects at IMI

1. BeingThere Centre on 3D Telepresence
   BeingThere Centre (the Centre) is an International Research Centre for 3D Tele Presence and Tele Collaboration mainly based at the IMI in NTU in Singapore. It is a joint effort between ETH Zurich, UNC Chapel Hill and NTU Singapore. To change the way that people communicate and interact with each other remotely by undertaking cutting-edge research and developing excellence in the area of Tele presence.

2. Autonomous Social Robots & Virtual Humans
   The goal of this research is to create synergies between the real and virtual worlds. Virtual humans are social agents in the virtual world, while social robots belong to the real, physical world. They are meant to interact with each other as well as with real humans. In order to create believable and long-lasting relationships, they must be empowered with personality and memory, and be able to display artificial emotions and moods. To achieve autonomous behaviour, they must be aware of their social environment, understand what is going on around them: who is doing what, what are the relationships between people, and how humans feel. This research is done in the framework of Telepresence in the BeingThere centre together with several professors from different schools in NTU.

3. Serious Game for Training & Education
   We develop educational games for learning and training purpose with the aid of virtual tutors or virtual trainers. This research is cross-school and interdisciplinary with inputs from School of Mechanical & Aerospace Engineering, School of Computer Engineering, National Institute of Education, School of Art, Design and Media. The research program also partners with local companies including Underwater World Singapore, PEC Ltd and AWWA Special School. Part of the projects under the program received funding support from industry.

4. Physics-based Simulation of Fashion
   IMI is working together with MIRAlab at the University of Geneva on a Virtual Try On application which combines virtual models, virtual fashion and garment simulation technologies into a single interactive application. Research has been led on fast physics based simulation models and interactive intuitive interface. In the application, the user has the possibility to dress a virtual mannequin by choosing a garment from a selection of clothes. The garment will automatically adapt to the 3D mannequin shape by means of a physical simulation. Through an easy-to-use touch-screen manipulation, the user can interactively change the fabric colour, fabric types, modify the design and select other options which will be immediately visualized. Once the mannequin has been dressed, the user can see her walk around in the garments he/she selected. Knowing that the creation of a real dress needs one week, this rapid prototyping technology will dramatically shorten the time to design clothes according to the customers’ taste.

5. Physiological Human
   With the collaboration of the new Lee Kong Chian School of Medicine, IMI is working on modelling the musculoskeletal system of any individual. With the aging population, it is important to be able to see the body parts as they are in reality in motion and be able to predict what is happening. Musculoskeletal disorders are common causes of different pathologies and physical disability, affecting many people across the world. IMI is making research on subject-specific 3D visualisation from MRI images so that medical doctors can see the motion of the articulation in 3D of each particular patient and make a more precise diagnosis. This study is very interdisciplinary as it implies medicine, biology, biomechanics and visualisation techniques. New Media is essential to this research as it allows visualizing anybody in motion as if we could walk through the body at different levels and see what happens.

6. Crowd Simulation
   Crowd simulation is the process of simulating the movement of a large number of virtual humans or characters. Virtual cities have become common in video games and other virtual applications. However, most of them are uninhabited or populated with only a few people. With crowd simulation technology, it becomes possible that large-scale virtual environments are populated with up to tens of thousands of virtual humans. Research in crowd simulation has been widely explored in a number of fields such as computer graphics, civil engineering, sociology and robotics. Crowds have wide applications for both real-time simulation and non-real-time simulation; virtual crowds are used to simulate epic battles in the movie industry; crowds are exploited to populate virtual worlds in computer games; in safety training area, trainees can participate in the evacuation scenarios to practice controlling crowds in emergency situations like earthquake, fire and flood.

   The research of crowd simulation in IMI focuses on the interaction and immersion of the virtual crowds. The immersive 3D display system has been successfully built, which has great potential to be used in the training and evaluation of emergency evacuation and other real-time applications of crowd simulation with interaction. IMI is working closely with colleagues of the Future Cities Laboratory in NUS to offer models to populate their cities.
Energy Research Institute @ NTU (ERI@N)
Executive Director: Professor Subodh Mhaisalkar
Co-Director: Professor Chan Siew Hwa
Website: www.erian.ntu.edu.sg

Vision
To be a global centre of excellence for the advanced research, development, and demonstration of innovative energy solutions.

Mission
To develop and maintain a research program and associated facilities, focusing on world-class energy research through a holistic, multidisciplinary approach that synergizes competencies of our researchers, stakeholders, and partners.

Objectives
- Advance research aimed at improving the efficiency of current energy systems while maximizing synergistic effects of alternative energy solutions.
- Foster a multidisciplinary and collaborative environment for scientists, engineers, social scientists, and others to interact and together promote relevant energy solutions and policies for the future.
- Enable interactions with research, policy, and economic development authorities as well as industries through collaborative knowledge creation and technology transfer in areas of strategic importance to Singapore and beyond.

Research Activities
The Energy Research Institute at NTU (ERI@N), inaugurated in June 2010, was set up with the intention of building on NTU’s existing research strengths, synergizing various research groups, and mobilising resources in energy-related research. ERI@N’s mission is to develop and maintain a research program and associated facilities, focusing on world-class energy research through a holistic, multi-disciplinary approach that synergizes competencies of our researchers, stakeholders, and partners. With this in mind, NTU has cemented important tie-ups with several leading industry players such as Gamesa, Rolls-Royce Singapore, Robert Bosch GmbH (Bosch), Det Norske Veritas (DNV), Singapore Technologies Kinetics (STK), and Vestas Technology R&D Singapore (Vestas) in addition to collaborating with renowned universities such as the University of Cambridge, University of California Berkeley, École Polytechnique Fédérale de Lausanne (EPFL) Switzerland, Imperial College London, Austrian Institute of Technology, Technischen Universität München (TUM) and the Norwegian University of Science and Technology (NTNU). ERI@N also demonstrates NTU’s interdisciplinary emphasis by providing a unique platform for various schools to interact and explore the areas of sustainable energy, energy efficiency and infrastructure, and socio-economic aspects of energy research.

ERI@N’s nucleus to harvest new energies for the future comprises four centres, namely, Centre for Sustainable Energy (CSER), Centre for Maritime Energy Research (CMER), Solar Energy and Solar Fuels Centre (SEFC), and Centre for Electromobility (CEM). These centres are equipped with major facilities for carrying out energy-related research, including three clean rooms for microfabrication and full facilities for solar cells, charge storage, fuel cells fabrication and characterization, and advanced materials synthesis and characterization. Among the other facilities the centres have at their disposal are battery and fuel cell prototyping facilities and test stations, a natural gas simulator reactor rig, open/closed-loop subsonic wind tunnels and towing tanks, hardware-in-the-loop wind/marine simulator, and AC-DC and micro-grid test-beds.

Centre for Sustainable Energy (CSER)
This centre was established in October 2009 with resources amounting to $60 million. It seeks to be a main driver of knowledge creation and technology transfer in sustainable energy technologies. Its core research areas include the following:
- Wind and Marine Renewable Energy, investigating turbines, generators, distributed grids, and hybrid systems.
- Energy Storage, investigating low power mobile electronics, electric vehicles, storage for renewable energies, and large energy charge storage systems.
- Sustainable Building Technologies, with key areas in management systems, simulation of the built environment, and HVAC efficiencies.
- Fuel Cells, focusing on materials research, catalysis and fuel cell systems.

With active participation from 65 NTU professors and strategic tie-ups with leading industry partners such as Robert Bosch GmbH (organic photovoltaics), Rolls-Royce Singapore (fuel cells and clean energy), Det Norske Veritas (clean energy technology), Gamesa and Vestas Technology R&D Singapore (both leaders in wind renewable energy), the centre is set to train over 100 research scientists and engineers.

Centre for Maritime Energy Research (CMER)
Launched in February 2010, the Centre for Maritime Energy Research (CMER) is a joint establishment between NTU and the Maritime and Port Authority of Singapore (MPA). CMER will undertake research and development activities pertaining to the application of clean energy technology. Leveraging on other research capabilities within ERI@N, the centre seeks to develop effective and environmentally-friendly solutions in the maritime domain. Projects ongoing in this area include micro grid management systems for shipyards, more-electric ships integrated with fuel cells and batteries, air emissions management, and electrification of ports. Key partners include DNV, ClassNK, ST Kinetics, Horizon Fuel Cells, Maersk Maritime Technology, AET Tankers, Vac-Tech Engineering, and Aspin Kemp & Associates.

Solar Energy and Solar Fuels Centre (SEFC)
Established in January 2010, the Solar Energy and Solar Fuels Centre (SEFC) provides a common platform for research in solar photovoltaics, solar thermal, photocatalysis, and photoelectrochemical conversions. SEFC works to create efficient and sustainable sources of fuel from sunlight, the Solar Fuels Lab, led by Professor James Barber, Imperial College London, and the Center for Nanostructured Photocatalysts, headed by Professor Michael Graetzel, EPFL Switzerland.

A significant ongoing project at the centre involves the use of nanowires and nanonets to fabricate high efficiency solar cells and batteries and also on novel energy harvesting concepts for solar cells and photocatalysis; these projects are supported under the National Research Foundation’s (NRF) Competitive Research Program.
Centre for Electromobility (CEM)
ERI@N's fourth centre, the Centre for Electromobility with Technische Universität München (TUM), Germany's leading university was launched in October 2010. This Centre will lead research in electric vehicles solutions for large tropical cities such as Singapore and around the world. Electromobility research will encompass developing novel high performance batteries, embedded systems, power train, controls, power electronics, as well as issues pertaining to infrastructure and driver considerations. Besides bringing together professors, research scientists and engineers from Singapore and Germany in multidisciplinary research; this program also brings together nine local and overseas companies to ensure that the technologies developed in this project will be exploited in Singapore and beyond.

Institute on Asian Consumer Insight (ACI)
Executive Director: Professor Bernd Schmitt
Website: www.aci-institute.com

About The Centre
ACI is a world-class, first-of-its-kind institute focused on Asian consumers. We help companies grow their business by developing strategies for Asian markets based on insight about Asian consumers.

ACI started as an initiative of the Singapore Economic Development Board (EDB) in 2011 and is hosted by Nanyang Technological University (NTU). We have launched various research projects focused on Asian businesses, markets and consumers, a Master of Science (Marketing) program, conferences and events, executive programs, business strategy retreats and company projects.

Research Activities
Consumer insight is a dynamic field with new theories, methodologies and findings being created constantly. ACI has identified several areas of research that are critical for insight on Asian consumers including strategy, innovation and growth in Asian markets; shopping and lifestyle; communications and new media; decision making and brands; and culture.

Institute of Catastrophe Risk Management (ICRM)
Executive Director: Professor Pan Tso-Chien
Website: icrm.ntu.edu.sg

Vision
The vision of ICRM is to become Asia’s leading research institute in catastrophe risk management and to help those at risk worldwide in general and Asia in particular

Mission
The mission of ICRM is:
To undertake multi-disciplinary research projects in science, engineering, finance, technology, economics and socio-political aspects related to catastrophe risk. Drawing strengths in natural catastrophes in the College of Engineering, ICRM will work with NTU institutions such as the Earth Observatory of Singapore, the Rajaratnam School of International Studies, the Nanyang Business School as well as researchers at local institutions. The ICRM will also form collaborative projects with government agencies and leading centers of catastrophe risk management in industry as well as with similar centers internationally.

To help the community to better understand the fundamental characteristics of risks related to natural and non-traditional disasters such as earthquakes, tsunamis, typhoons, volcanic eruptions, floods, droughts, and non-traditional risks due to food security, infectious diseases and terrorism.

About ICRM
In recent years, we have seen massive increase of human and economic losses due to catastrophic events. These events are either natural or manmade. This increase of losses is due to globalization, urbanization, and by some accounts, due to global climatic changes. As a result, the nature and effects of these disasters have changed. The high level of economic activities and the inter-relationship of nations to such activities have brought out some unique and non-traditional risk management issues.

In Asia, where the risk awareness is low and the risk is high, the situation poses special problems and challenges. These include understanding and recognizing risk, risk quantification (monetary, social and human) and risk management. NTU’s Risk Research Agenda is driven by the principle that catastrophic risk impacts the functioning and effectiveness of the whole fabric of society and businesses. Developing strategies for mitigating these risks will require a robust public-private partnership amongst government agencies, academia and industry players.

Understanding, communicating and managing catastrophic risk requires comprehensive methodologies for risk quantification. ICRM will be the first multi-disciplinary risk management research institute of its kind in Asia and amongst a handful of such centers in the world. The Institute will focus on catastrophe-triggered insurance/reinsurance risks, sovereign risk, societal risk and some non-traditional risks. It will play a lead role in NTU’s new wave of integrative research efforts and its strategic vision of Sustainable Earth. In Asia Pacific, Singapore can take the lead and develop a Center of Excellence to fill this need and to further strengthen its position as a major financial hub.
Institute for Sports Research(ISR)
Director: Pascal Joubert des Ouches
Founding Deputy Directors: Associate Professor Leong Kah Fai; and Associate Professor Alfred Tok Ling Yoong
Website: www.isr.ntu.edu.sg

Vision
To be a world class sports R&D institute for sports research and innovation and the leading research institution in the Asia-Pacific region
To be recognized by the sports industry as a world class sports innovation center delivering true innovative products design and technologies impacting the consumer market and sports practices

Mission
• Create a sustainable global footprint in the sports R&D landscape with focus on excellence and knowledge creation
• Carry out upstream research with strong commercialization potential so as to maintain a “Thought leadership Pole Position” in identified areas
• Provide Downstream Application Development
• Translate the millions invested in NTU, LU and ISR into commercially viable technology and companies

ISR envisions a multi- and inter-disciplinary collaborative environment where researchers, engineers and scientists interact with industry partners, elite athletes and healthcare professionals as well as with economists and social scientists. It is distinct with the following features:
• Excellence in sports technology research
• Materials innovation
• Western/Asian-centric innovation
• Application development with end user
• Product design and engineering

Research Activities
Jointly established in July 2011 by NTU and the Singapore Economic Development Board (EDB), ISR also benefits from an international collaboration with Loughborough University (LU).

The main ISR collaborators from NTU are the School of Materials Science and Engineering (MSE), the School of Mechanical and Aerospace Engineering (MAE) and NIE’s Physical Education and Sports Science (PESS) Academic Group. MSE is one of the largest materials engineering institutions globally and will introduce technologies such as defense materials, clean energy, biomimetics and nanotechnologies to the sporting goods domain. MAE is a well resourced mechanical engineering department with high caliber academic faculty, and significant expertise in design, manufacturing, robotics, aerodynamics and biomechanics. The PESS group specializes in biomechanics, blood chemistry, exercise physiology, psychomotor and pedagogy. It would provide additional support with their specialized laboratories for the sports science and medicine activities of ISR.

Some of the research and expertise topics includes:
• Apparels and technical textiles with innovative functions:
  o Dynamic compression effects
  o Built-in electronic functions for heat or health and sports performance management
  o Functionalized polymer fibers
• Impact protective equipment helmets and body armors (materials & structures)
• Aerodynamic improvement of fast moving sports products by mean of computer fluid dynamic
• Lightweight 100% thermoplastics composites recyclable sandwich structures
• Flexible Chemical/Molecular Sensors
• Robotics/Simulation/Virtual Reality

Maritime Institute (MI@NTU)
Executive Director:   Mr Lam Yen Chin
Deputy Directors: Professor Chan Siew Hwa
Professor Lua Aik Chong
Associate Professor Lo Yat-Man, Edmond

Vision
To be a premier global Maritime Institute with excellent reputation in research and innovation in the maritime domain which encompasses Naval Architecture, Marine Engineering, Offshore Technology, Maritime Technology and Environment, Maritime Clean Energy, Shipping, Port and Maritime Services

Mission
To establish a broad-based maritime education and research platform at NTU by leveraging on NTU’s core competencies and partnering the industry; thereby supporting Singapore’s aspiration to be a global maritime knowledge hub

Research Areas
• Clean technologies for treating emission streams to air and water
• Propulsion and power generation using alternative energy sources
• Naval architecture and marine engineering
• Deepwater technology and offshore engineering
• Advanced materials to save weight and reduce costs
• Methods and systems to enhance maritime security
• Advanced automation and optimization systems
• Improved information and communication systems
• Improved ship design for better fuel efficiency
• Freight logistics systems to improve operational efficiency
• Vessel routing and operational management for reduced environmental impact
• Port and cargo handling system design
• Intelligent cargo tracking
• Maritime finance & business forecasting
• Maritime governance and policy
• Maritime security
Examples of Research Projects
- Drag reduction in boundary layer flow by oscillation of the wall
- “Cool” coating for marine applications
- Energy Finite Element Analysis and System Analysis of Floating Wind Turbines
- Failure Analysis and Prevention for Ship and Offshore Structures
- Modeling and improving hull-propulsor integration and Fluid-Structure Interaction (FSI)
- Reduction of frictional resistance by air bubble lubrication for Surface Effect Ship
- Multi-disciplinary Optimal Design of Offshore Platform
- Study of the FSI Characteristics for Marine Riser Dynamic Response
- Sustainable and Customized Ship Architecture Design
- Deep Sea Pipe Heating
- LNG Regasification and Combustion Study for Marine Engines
- Optimization and Structural Vibration
- Utilization of Marine Engine Waste Heat to Drive a Quad-Generation Plant
- Self-healing and Multifunctional Composites
- Environmental Technology
- Development of carbon molecular sieve membranes for gas separation and carbon dioxide mitigation
- Hydrogen Production Methods
- Experimental Diagnostics of Complex Flows in Naval Architecture and Marine Engineering using cutting-edge technology
- Ship Design Optimization
- Interdependencies between PM (project management) and SE (systems engineering) - Developing the twin core competencies for complex offshore and marine projects

Maritime Education
- B.Eng (Mech Eng) with specialization in Marine and Offshore Engineering
- M.Sc (Mech Eng) with specialization in Naval Architecture and Marine Engineering
- Joint PhD with University of Southampton in Naval Architecture and Marine Engineering
- B.Sc and M.Sc in Maritime Studies
- EMBA in Shipping, Offshore and Finance

Joint Research Centres
CINTRA UMI CNRS/NTU/THALES 3288
Director: Professor Dominique Baillargeat
Website: cintra.ntu.edu.sg/Pages/default.aspx

Vision
Investigation of new technology niches through both:
- Academic research: leverage on synergies between the universities and research institutes to launch high level upstream research
- Applied research: leverage on strategic collaboration with the local R&T/D ecosystem to develop innovative technologies and transform concepts into applications

Mission
- To tap research talents from Singapore and Europe for collaborative research
- To focus on upstream dual-use cutting-edge technologies to address both homeland security and commercial applications
- To conduct research relevant to the ever-growing worldwide demand for innovative solutions

Research Activities
CINTRA UMI 3288 is a joint laboratory between Nanyang Technological University (NTU), the National Center of Scientific Research (Centre National de la Recherche Scientifique or CNRS) the largest governmental research organization in France, and Thales, the French electronics giant and a global technology leader in aerospace, space, defence, security and transportation industries. The MOU was signed on 7 October 2009 by former NTU President, Dr Su Guaning, Director General CNRS, Mr Arnold Migus, and Vice-President, Research & Technology of Thales Corporation, Dr Marko Erman, in the presence of Singapore’s former Minister of Education and Second Minister of Defence, Dr Ng Eng Hen, and France’s Minister of Higher Education and Research, Mrs Valérie Pécresse. This laboratory is located at NTU’s Research Technoplaza and brings together people from NTU, CNRS and Thales. CINTRA welcomes senior researchers, research fellows, PhD students and interns in strong association with more than 10 host NTU professors. Currently, more than 50 people are members of CINTRA.

CINTRA aims to harness the latest in science and technology to develop innovations in nanotechnologies for nanoelectronics and nanophotonics. The collaboration will provide opportunities to challenge and tackle critical issues and bottlenecks faced by existing technologies in microelectronic and photonic industries, promising innovations with superior performance beyond what is available today.

The scientific policy of CINTRA is based on three technological axes Carbon based nanoTechnologies, Nanowire based nanoTechnologies, Photonic materials and Nanostructures. They are mainly dedicated to three applications areas; Nanopackaging, Multifunctional materials and devices, Microwave-Photonics.

The current key focus of this joint laboratory is on technological process developments, characterization, modeling and design of new electronics and photonics-based embedded systems.
Electromagnetic Effects Research Laboratory (EMERL)
Director: Associate Professor See Kye Yak
Website: www.emerl.eee.ntu.edu.sg

Vision
To be a catalyst of interdisciplinary research centre of excellence in electromagnetic effects

Mission
To explore safe and innovative use of electromagnetic fields in emerging technologies to improve the quality of human life

Objectives / Research Philosophy
An initiative spearheaded by DSO National Laboratories in partnership with NTU. EMERL is the first national-level electromagnetic effects research and measurement test facility that caters to both defence and commercial sectors. With its state-of-the-art facilities and the latest advanced electromagnetic simulation tools, EMERL spearheads national research activities in electromagnetic compatibility (EMC) design at system, board and integrated circuit levels. Besides EMC, our dynamic team of talented researchers also develop cutting-edge electromagnetic concepts, techniques, devices and systems, with strong emphasis on emergent and multidisciplinary topics.

Research Activities
Research projects in EMERL cover the following areas: power electronics EMC, high-speed signal integrity, printed circuit board EMC, integrated circuit EMC, electromagnetic shielding, electromagnetic wave propagation, radio frequency interference, RF energy harvesting and bioelectromagnetics.

Energetics Research Institute (EnRI)
Director: Professor Ang How Ghee
Website: www3.ntu.edu.sg/EnRI/

Mission
A new generation of energetic materials, with special attention to capability development, international collaboration, innovation and cutting edge technology

RESEARCH: FUTURE DIRECTION
New Energetic Materials
The research focus of the Institute is on new materials with high energetic performance, ranging from oxidizers to metals. Its research on chemical synthesis of the high energy density materials includes the design of new synthetic routes that are novel, safe, non-polluting and cost-effective.

Safety and Performance
The Institute extends its research to physical and spectroscopic studies of selected energetic materials and metals even at the nano-scale. The critical issues of insensitivity, compatibility of energetic material compositions, and microstructures are examined in order to achieve new goals of enhanced energetic performance and the uncompromising demands of high safety standards.

Capability Development
Capability development will remain central to the future programs of the Institute in order to enable it to build a strong research foundation and new skills in advanced techniques and frontier technologies. Such new techniques to determine the detonation and combustion velocities and ignition delays would enable a more precise understanding of the principles governing detonation, deflagration and combustion processes of new energetic compositions.

Courses
EnRI has introduced two unrestricted elective courses: ER9001-Foundations in Energetic Materials and ER9002-Detonation Chemistry & Physics. ER9001 is offered in the first semester of each academic year. ER9002 is offered in the second semester of each academic year.

Modelling & Simulation
The universal technique of computational modeling and simulation will extend the institute's theoretical and basic research into diverse areas like identification of improvised energetic materials, optimisation of new energetic compositions and assessment of thermal hazard potential, may it be time-to-thermal-runaway, adiabatic decomposition temperature rise, explosion potential, shock sensitivity, or critical cook-off temperatures. The technique will also take its fundamental research from the bench to new applications.

Cutting-Edge Technology
The cutting edge technology based on energetic and piezoelectric materials requires multidisciplinary skills. A case in point is the initiation train, which is concerned with extremely fast processes operating at the detonation range where their mechanisms can be examined with precision using high speed photography applying simultaneously both framing (100 million frames per second) and streak camera (1ns/mm to 100µs/mm). Such a technique would enable precise measurement within a very short time duration in order to derive physical parameters like velocity of detonation of high energy materials, velocity of plasma evolved during detonation, detonation wave profile, estimation of C-J pressure, analysis of sympathetic detonation, critical diameter performance assessment, and precise ignition delay and function time. It is a state-of-the-art high precision miniaturised technology incorporating the latest green energetic materials. The achievement of much higher safety standards is primarily due to its insensitivity to unintended initiation by radio frequency, electromagnetic interference and electrostatic discharge.

The foregoing description illustrates the kind of research that are of interest to EnRI.

Fraunhofer IDM @NTU
Directors: Associate Professor Wolfgang Mueller - Wittig and Associate Professor Chee Yeow Meng
Website: www.fraunhofer.sg

Vision
• Sustainable positive development of research in interactive digital media technologies
• Promotion of applied research as well as the commercialization of IDM innovations
• Develop breakthrough innovations in digital space, especially with Visual Computing solutions for modern mobile devices such as the iPad2, iPhone, tablets, etc.
**Mission**

- **Applied R&D in Interactive Digital Media Technologies**
  To conduct R&D activities in the areas of Visual Computing with focus on Real-time Rendering, Virtual Reality (VR), Augmented Reality (AR) and Visual Analytics.

- **Link between Industry and Academic R&D**
  The Centre bridges the gap between academic research and the demands of the industry. It stays internationally competitive and current by engaging various strategic partners such as government agencies, industrial corporations, other research institutes, and the education industry.

- **Bridge to Europe and IDM Resource Centre**
  The Centre's emphasis on applied research in interactive digital media complements NTU's focus on basic research.

In other cities within the network of Fraunhofer Society, this combination of Fraunhofer’s applied research with basic research at universities has made significant scientific and economic impact. In Singapore, the synergistic link with NTU will be the cornerstone of the research centre.

As Singapore expands its international network of R&D institutions, the Centre will help to strengthen local capabilities in research and promote commercialisation opportunities in interactive digital media applications as well as contribute actively to conferences, exhibitions, seminars, workshops, etc. for academia, government and industry in the Asia-Pacific Region.

**Overview**
Fraunhofer IDM Centre@NTU is a research centre for Interactive Digital Media (IDM) operated jointly by Nanyang Technological University (NTU) and the Fraunhofer-Gesellschaft.

The Centre’s mandate is to promote and undertake applied research of direct utility to private and public enterprises.

Its research in interactive digital media technology covers a range of key topics in the area of Visual Computing. Research activities are focused on Real-time Rendering, Virtual Reality (VR), Augmented Reality (AR) and Visual Analytics with particular focus on science and engineering.

The overall aim of these visual solutions is to improve discovery process and gain better understanding with analysis techniques and visualisation methods, as well as support teaching and learning in a variety of science and engineering domains.

Fraunhofer-Gesellschaft (http://www.fraunhofer.de/en/) is Europe’s largest application-oriented research organisation, which has more than 80 research units and employs over 20,000 engineers and researchers worldwide.

In 1998, Fraunhofer IGD (http://www.igd.fraunhofer.de/en/Institut) and NTU founded the Centre for Advanced Media Technology (CAMTech). In May 2010, CAMTech transitioned to Fraunhofer IDM@NTU under the leadership of Professor Wolfgang Müller-Wittig and Professor Chee Yeow Meng.

Facilitated by the multi-agency Interactive Digital Media R&D Programme Office at Media Development Authority (MDA) and funded by the National Research Foundation (NRF), Fraunhofer IDM@NTU forms a part of the International Research Centres in Singapore (IRCS@SG).

**Joint PhD launched**
Fraunhofer IDM@NTU fosters international research activities through its network of partner universities.

Joint PhD Programmes with two leading European universities recognised for their strengths in engineering and computer science were launched as part of the Centre’s inauguration, further improving its research capabilities and outreach.

This joint doctorate in Visual Computing is the first of such to be offered in Singapore.

NTU will be partnering Technische Universität Darmstadt, Germany, and Graz University of Technology, Austria. Both programmes are expected to have its first batch of students by August 2012. In addition, 20 scholarships will be awarded to promising PhD students - 10 from NTU and the other 10 from the universities in Germany and Austria.

**Intelligent Systems Centre (IntelliSys)**
Director: Associate Professor Chen I-Ming
Website: www.ntu.edu.sg/intellisys/

**Mission**
- To conduct R&D programmes focusing on cutting-edge technologies related to control, communication, perception, decision-making, and autonomous action with applications in the industrial, commercial and military sectors

- To undertake technology innovation for creation and prototyping of new products and services relevant to industry partners

- To establish collaboration with other research institutions and organisations for the purpose of enhancing the state-of-the-art Intelligent Systems Technologies

**Research Philosophy**
- To become a R&D powerhouse on service-based and product-based intelligent systems with strong industrial relevance in terms of IP generation, technology transfer, and development

- To serve the interests of NTU and ST Engineering and build a reputation for the centre in the ability to work closely and effectively with the industry

**Research Activities**
IntelliSys is a research centre jointly set up by ST Engineering and NTU. It is the meeting point of application-specific problems and technologically viable solutions, and it serves as a hotbed for technological development and advancement in the area of intelligent systems. The Centre's emphasis is on the synergistic integration of physical systems with information technology and complex decision-making processes in the design, manufacturing, and operation of intelligent systems relevant to industrial users.
IntelliSys has 10 principal investigators mainly from the School of Electrical and Electronic Engineering, the School of Computer Engineering, and the School of Mechanical and Aerospace Engineering. The centre receives research grants from industry and government agencies such as MINDEF, DSO, NEA, and A*STAR, etc, to conduct research projects in the following areas:

- AI and Cognitive Technology: collaborative intelligence, context-awareness computing, optimisation, genetic algorithms, intelligent control
- Sensor Development: vision systems, impedance sensors and technology, wearable sensors
- Innovative Robotics and Haptics: unmanned aerial vehicles, mobile robots, humanoid robots, unmanned surface vehicles, entertainment robotics

NTU-JTC Industrial Infrastructure Innovation Centre
Director: Visiting Professor Lu Ming
Website: ntu-jtc-centre.ntu.edu.sg

Vision
To create a vibrant industrial infrastructure research ecosystem

Mission
To carry out research, development and demonstration (RD&D) projects to support Singapore's dynamic industrial landscape

Objective
The objective for the NTU-JTC I3 Centre is to create a systematic and structured platform to conduct RD&D projects to expand JTC's innovation capacity and build up our technical bench strength in specialized and complex projects over time.

Research Activities
The Centre provides seed funding to support RD&D projects to spearhead research and engineering efforts in developing innovative and sustainable industrial infrastructure and industrial real estate solutions.

In addition to providing funding, the Centre also organizes and carries out research projects. The Centre focuses its research efforts in four areas:

- Reclamation & Marine Infrastructure
- Sustainable Infrastructure
- Underground Infrastructure
- Infrastructure Systems and Materials

Current Research Projects:
- Empirical Study of Tidal Backwater Effects on Drainage Design at Jurong Island Ayer Chawan Basin
- Water Quality Simulation Study for Selat Jurong Waterway, Temasek Fairway
- Feasibility studies on vanadium-redox flow batteries for energy storage in buildings
- Customization of Decision Aid for Tunnelling (DAT) Software for Construction Risk Assessment Studies for the Underground Science City (USC) at Kent Ridge and Underground Warehousing & Logistics Facility (UWLF) at Tanjong Kling/Jurong Hill
- Shaft design optimization for construction and operation
- Feasibility Study on Bendable Concrete Precast Pavement
- Integrated Structures and Materials Design for Precast Concrete 66kV Substation against Progressive Collapse

SaRC (Satellite Research Centre)
Director: Assoc Prof Low Kay Soon
Website: www.sarc.eee.ntu.edu.sg

Vision
To be a centre of excellence in nano-satellite technology and distributed space mission for remote sensing and communication applications

Mission
- Research and develop Low Earth Orbit (LEO) distributed nano-satellite missions.
- Research in innovative space technologies for earth observation and communication applications
- Train undergraduate & postgraduate students through real satellite mission development

Research Activities
SaRC strives to be a centre of excellence in satellite research and training of students in innovative space technologies. The research and development activities include:

- Design and development of low earth orbit (LEO) nano- and pico-satellite for distributed space sessions;
- Satellite ground system designs for mission testing, control, operation and launch support; and
- Research in space science, technologies and applications for future satellite. Its first milestone satellite development, X-SAT, in collaboration with DSO National Laboratories has been successfully launched from the Satish Dhawan Space Centre, India, in April 2011. X-Sat is the first Singapore-built satellite designed and wholly developed within NTU. It is a remote sensing micro-satellite using an electro-optical instrument with near real-time data downlink capability. High resolution earth images of 12m resolution have been transmitted back to the ground station since May 2011. The X-SAT team received the Defence Technology Prize 2011.
Temasek Laboratories at NTU (TL@NTU)
Director: Associate Professor Gan Chee Lip
Website: www.ntu.edu.sg/temasek-labs

Mission
To explore the frontiers of science and develop strategic technology that will deliver effective solutions for the defence and security of Singapore

Research Activities
Our research activities are organized under Four clusters:

1) Microsystem Technologies Cluster
   a. Microsystems. We embark on a wide range of R&D activities spanning from Materials to Devices and Monolithic Integrated Circuits to Thermal/Packaging Analysis. Our current focuses are in: (1) GaAs MMIC, (2) MMIC design and characterization, (3) GaN MMIC, (4) GaN growth, (5) Thermal/Packaging analysis, (6) RF MEMS and (7) Silicon MEMS.
   b. Photonics. We conduct applied research in microwave photonics focusing on three areas: photonic components, photonic subsystems and optical sensors.
   c. Signal Processing Systems on Chip. We develop VLSI circuit modules and techniques as building blocks to enable programmable platforms integrating many functionalities onto a single chip.

2) Sensor Systems Cluster
   a. Radar. We research on new radar concepts (like digital radar and MIMO radar) and advanced radar signal processing techniques and design.
   b. Computer Vision. We conduct camera-array-based computer vision research to enhance the recognition ability or visibility of the objects of interest hidden by foliage.

3) Physical Sciences Cluster
   a. Advanced Materials. Our research focus is on advanced materials for soldier protection and survivability.
   b. Laser and Electro-Optics. We conduct applied research in optical sciences and laser technology.
   c. Tropical Weather. Our goal is to improve mesoscale weather forecast in Southeast Asia for Singapore through research on numerical weather prediction models, atmospheric data retrieval from remote-sensing instruments and data assimilation techniques.

4) Information and Network Systems Cluster
   a. Sensor Array Research. We conduct applied research in sensor array; including mathematical formulations, sensor array processing techniques, algorithm developments and experimental investigations.
   b. Speech Processing. We conduct advanced research in automatic speech recognition.
   d. Signal Research. Our research focuses are on communication receiver signal processing, demodulation and decoding of wireless communication signals.
   e. Information Systems. Our current focus is on Cognitive Information Systems research.

College Research Centres

College of Humanities, Arts and Social Sciences (HASS)

Centre for Liberal Arts and Social Sciences (CLASS)
Director: Professor Luke Kang Kwong
Website: classcohass.ntu.edu.sg

About the Centre
The Centre for Liberal Arts and Social Sciences (CLASS) is the key research hub for the College of Humanities, Arts, and Social Sciences. It was created in 2006, at the time under the School of Humanities and Social Sciences, and was established as a College-level centre in April 2010. Its aim is to promote research, including inter-disciplinary research, among the Schools in the College. CLASS also provides a platform for interaction among local and international scholars from various disciplines.

Mission
• To establish NTU as a centre of excellence for interdisciplinary research in the humanities, arts, communications, and social sciences. The centre offers a logistical and intellectual space for scholars to engage in original and socially relevant research

• To promote and facilitate research grant applications by HASS faculty through workshops and schemes

Research Activities
The activities supported by CLASS include talks, seminars, workshops, symposiums, conferences and hosting visiting scholars and distinguished lecturers. CLASS events seek different levels of discourse – from academic research to public education – and involve eminent scholars, researchers, policy makers, as well as members of the public.

CLASS hosted a number of workshops, symposiums and conferences during 2011, including:
1) Afterlife and Death in a Digital Age
2) Resilience: An Interdisciplinary Dialogue
3) The Contemporary: An International Conference of Literature and Arts
4) Second Honours Symposium for Asian Ph.D. Students in Communication Research
5) LCC Roundtable on Academic Writing

CLASS also hosted “The Idea of Political Meritocracy: A Nanyang Technological University Interdisciplinary Symposium” in January 2012. Several high-profile events and conferences are in the pipeline for 2012 and beyond.

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College of Business (NBS)

Asian Business Case Centre (ABCC)
Director: Associate Professor Wee Beng Geok
Website: www.asicase.com

Mission
The Asian Business Case Centre (ABCC) is part of the Nanyang Business School. Its mission is to build a virtual community of people in case writing, teaching, learning and research about Asian management and the Asian business experience. Since its inception, the ABCC has published more than 225 case studies (English and Chinese), teaching notes and industry/background notes written by NTU faculty. The ABCC also publishes cases submitted by faculty from other universities in the region. ABCC cases are included in the Harvard Business School case study collection as well as the collection of the European Case Clearing House situated in Cranfield University, England.

Research Activities
- Provide research, case writing and editorial support to faculty for publication of teaching case studies under the Nanyang Case Collection
- Collaborate with industry partners such as Ministry of Manpower, Design Council, and Maritime & Port Authority of Singapore
- Current collaborators are:
  - Singapore Totalisator Board - research, writing and publication of business case studies/reports to increase understanding and scholarship of specific non-profit sectors (e.g. social service and arts) in Singapore
  - Spring Singapore - research, writing and publication of business case studies/reports on the role of standards in development of business and industry in Singapore
- Conduct workshops based on field research for knowledge exchange and dissemination to industry practitioners
- Research, writing and publication of business case studies for the prelims and finals of the annual International Case Competition hosted by NBS
- To write and translate cases in the Nanyang Case Collection into Chinese
- Publication of Casebooks under the Asian Management Case Collection Series
  - Government Linked Companies and other Organizations in Singapore
  - Hospitality Industry in Asia
- 海洋管理案例：新加坡的政联公司与机构
- 海洋酒店管理案例精选
- Collaboration with Cornell-Nanyang Institute of Hospitality Management (CNI) to survey best practices in the Asian hospitality industry and publication of:
  - Exploring Best Practices in the Hospitality Industry in Asia
  - Translation of the Exploring Best Practices Casebook into Chinese (work-in-progress)
- Case review, editorial support and publication of cases submitted by faculty from other universities in the e-journal – ‘Asian Case Collection’ on ABCC web portal www.asiasee.com

S. Rajaratnam School of International Studies (RSIS)

Institute of Defence and Strategic Studies (IDSS)
Director: Ambassador Barry Desker (concurrently Dean of RSIS)
Website: www.rsis.edu.sg/idss/

Vision
To be the world’s foremost think tank on Asia Pacific defence and security affairs

Mission
To conduct rigorous, cutting-edge research on defence and security-related issues and developments affecting the Asia Pacific region in the service of the Nation and the global research community.

Research Focus
IDSS’ faculty and research staff conduct both academic and policy-oriented research on the sources of strategic stability and security in the Asia Pacific and the means to ensure a stable and secure region. No Asian peace and prosperity, Singapore’s included, are possible without regional stability and security. To that end, IDSS’ research agenda aims to understand and explain drivers and booster of insecurity that destabilise or threaten to destabilise the Asia Pacific and its sub-regions (Northeast Asia, Southeast Asia, South Asia, etc.). Secondly, IDSS explores and assesses the requisite structural conditions and the available modalities (unilateral, bilateral and multilateral) that could mitigate instability and strengthen order and security in the region.

Research Activities
While IDSS research programmes conduct research on specialisation-specific issues, these researches all work towards supporting IDSS’ broad research focus. IDSS currently hosts nine distinct programmes, of which four are functionally orientated and five are country/area-based.

Functional Programmes:
- Maritime Security Programme
- Military Transformations Programme
- Multilateralism and Regionalism Programme
- Contemporary Islam Programme

Country/Area Programmes:
- China Programme
- Indonesia Programme
- Malaysia Programme
- South Asia Programme
- United States Programme
School Research Centres
College of Engineering

Advanced Materials Research Centre (AMRC)
Director: Associate Professor Chen Zhong

Vision
To establish a world-class cross-disciplinary programme in nanomaterials discovery, development, and exploitation

Mission
To develop new approaches and understanding in the synthesis of advanced and innovative functional materials for applications ranging from Clean Energy to Defence Materials

Objectives
• To build upon the strengths in Clean Energy to Defence Materials research and work closer with relevant industries for the commercialization
• To expand into new areas including Future Soldier System, Solid Oxide Fuel Cell, Smart Materials and Defense Material

Research Activities
AMRC is a university-wide research centre that focuses on the synthesis of advanced and innovative functional materials for applications ranging from Clean Energy to Defence Materials. The Centre focuses on the areas of Future Soldier system, Solid Oxide Fuel Cell, Smart Materials and Defence Materials. Its main research facilities include materials synthesis for organics and in-organic materials, thin film deposition, as well as materials characterisation (morphology, thermal, and structure characterisation).

The AMRC hosts several multidisciplinary research programmes with participation of faculty from the Schools of Materials Science and Engineering (MSE), Mechanical and Aerospace Engineering (MAE), Electrical and Electronic Engineering (EEE) and Temasek Lab in NTU.

Several notable contributions were made by AMRC in the field of Defence Materials. Defence Organization has contributed a total of $5million to Professors Ma Jan, Lee Pooi See, Lu Xuehong, Chen Zhong for their research on defense-related topic.

Biomedical Engineering Research Centre (BMERC)
Director: Professor Subbu S Venkatraman
Website: www.ntu.edu.sg/bmerc

Vision
• To improve quality of life through pioneering scientific and technological discoveries
• To mould future leaders in biomedical engineering
• To synergise multidisciplinary advancements in order to create tomorrow’s medical technologies

Mission
• To create significant research impact through strong coherent synergies between the biomedical sciences and engineering
• To apply practical solutions from research results that lead to innovative methods and products

Research Activities
In conjunction with the setting up of the Centre for Biomimetic Sensor Science, the main activities of BMERC were integrated with those of CBSS.

Currently activities include working with CBSS on training students and researchers for careers in biomedicine and in biosensing. A collaborative effort with Tan Tock Seng Hospital (TTSH) is under way, and will provide seed funding for collaborative research between NTU technologists and TTSH medical faculty. BMERC directors and deputy directors will be the gatekeepers for the funding awards and progress of the research efforts. If these collaborations yield substantial follow-up grants, it is anticipated that BMERC may request additional space for inter-disciplinary research, or be merged with the proposed Nanyang Institute of Engineering in Medicine and Healthcare.

Bioinformatics Research Centre (BIRC)
Director: Professor Jagath Rajapakse
Website: www.ntu.edu.sg/birc

Mission
• To provide an interdisciplinary environment and training for students and researchers to engage in leading and cutting-edge research in computational biology and bioinformatics, and thereby become a part of the life sciences workforce in Singapore and elsewhere

Vision
• To dedicate itself to the advancement of computational biology and bioinformatics through education, research, and scientific breakthroughs, leading to discoveries of new medical drugs and therapies

Research
BIRC is the focus of the education, research and development, and human-resource training in bioinformatics at NTU. Research includes development of techniques and tools for computational analysis and visualisation of life sciences data and processes, leading to the understanding of biological phenomena and the discovery of novel drugs. BIRC also facilitates teaching and research projects of MSc (Bioinformatics) programme and PhD (Computation and Systems Biology) programme of Singapore-MIT Alliance.

Research Areas
• Biological Databases Text Mining
• Bio-Sequence Analysis
• Disease Informatics
• Drug Discovery
• Functional Genomics
• High Performance and Hardware Implementations
• Image Informatics
• Immuno Informatics
• Neuro Informatics
• Proteomics
Centre for Advanced Bionanosystems
Director: Professor Li Changming
Website: www.ntu.edu.sg/home/ecmli

Mission
To lead scientifically and technologically in advanced bionanosystems innovation and accelerate commercialisation to meet Singapore's, the regional and global needs for sustainable economic development.

Overview
Innovative biological systems and devices such as biosensors, molecular drug delivery devices, electronic bioenergy systems, and molecular machines provide great potential to enhance quality of life, improve healthcare and strengthen biodefense. The most significant impact of bionanosystems is envisaged to be in health and medicine: diagnostics, treatment and prevention. Particularly, there is a great need in global health care for novel approaches to meet the needs of ageing populations and poor countries. Biotechnology and its based advance bionanosystems can enable cheaper, safer and more ethical production of a growing number of traditional as well as new drugs and medical services.

The excellence research centre applies state-of-the-art methods to investigate and develop advanced bionanosystems, particularly focusing on micro/nano array sensors, Lab-on-chip systems, drug delivery devices, and bioelectronics and biofuel cells. The centre not only produce high-impact publications, but also delivers intellectual properties to Singapore’s economic development and particularly supports Singapore’s economy development in emerging technologies. The centre serves as a focal point of university undergraduate students, researchers, faculty members and research students for fostering highly interdisciplinary research at the cross-road of chemical engineering sciences, life sciences, electronics and nano sciences, and attracts remarkable research funds and international investment.

Core R&D Areas:
- Bionanomaterials and applications
- Array biosensor and lab-on-chip system
- Micro/nano drug delivery system
- Bio/nano electronics
- Green energies (Biofuel cells, solar cells, Li Batteries and Super capacitors)

Centre for Advanced Information Systems (CAIS)
Director: Associate Professor Sourav Saha Bhowmick
Website: www.cais.ntu.edu.sg

Mission
To conduct frontier research in next-generation information and knowledge computing with the overall objective of enhancing human needs and aspirations

To establish strong international reputation by publishing research results in top international conferences and journals, and by establishing research collaboration with other renowned research institutions abroad

To build strong relationship with industry by transferring commercially-viable research results to the industry

Vision
Enhancing human needs and aspirations through next-generation information and knowledge management

Research
The research focus of CAIS can be broadly classified into two categories, namely core research and interface research. In core research, we explore fundamental problems in the areas of advanced data management, data mining, and information security & privacy that are of significance in the 21st century. Interface research, on the other hand, focuses on multidisciplinary research by exploring novel problems that take place at the interfaces of traditional data management and across traditional subject boundaries. Specifically, we explore the role of data management and mining in future healthcare, future business, new media/social networking, new engineering, and sustainable earth. We believe that novel multidisciplinary research in these areas is needed to solve many of the major research challenges of 21st century, such as:

Research Activities
- Next-generation data management
- Large-scale data mining

Centre for Biomimetic Sensor Science (CBSS)
Director: Professor Bo Gunnar Liedberg
Website: www.cbss.ntu.edu.sg

Vision
- To establish a strong and truly multidisciplinary sensor activity at NTU
- To exploit new sensor technology for biomedical, environmental and industrial applications
- To develop new sensor architectures capable of detecting biomarkers for cancer and infectious diseases, as well as environmental toxins

Mission
- To develop a deeper understanding of i) optical and electrical transduction mechanisms; and ii) the structure-function relationships of potential sensor materials/layers by pursuing both fundamental and applied research projects
- To establish strong links to industrial partners active in the diagnostic and (bio)analytical sectors

Research Activities
Centre for Biomimetic Sensor Science (CBSS) relies on a multidisciplinary cooperation between three international research constellations: The School of Materials Science and Engineering (MSE), Linkoping University (LiU) through the Division of Molecular Physics, and Austrian Institute of Technology (AIT) working jointly on the development of the next generation biosensors. MSE has a strong background in materials preparation, nanoscale patterning, electroactive materials including carbon nanotubes and graphene, and device fabrication. The two European partners, on the other hand, have significant experience in surface characterization of thin molecular films and biosensing using primarily optical transducer technologies. They contribute also with expertise in soft matter surface science, more specifically in lipid and peptide chemistry.
This base of both basic and applied science groups, together with strategic recruitment, has enabled us to gather a competitive research group.

The research projects initiated within CBSS have a strong flavor of basic science. The focus so far has been on the development of new and robust detection platforms, novel sensor concepts, and on the synthesis, characterization and application of new materials. A major task during 2011 has also been to establish a dedicated laboratory for surface characterization and sensor development. Today the focus is on the design of new sensor and probe stations for future application scenarios as well as on start up of a series of applied projects.

Centre for Biotechnology (CBT)
Director: Associate Professor Vincent Chan
Website: www.ntu.edu.sg/scbe/cbe/CBT

CBT capitalises on chemical engineering sciences to exploit several frontiers of biotechnology including tissue regeneration, virus-cell dynamics, cell-based biosensor, cell biophysics and systems bioengineering. Researchers at the Centre apply state-of-the-art methods in soft lithography, genetic engineering, biomolecular engineering, bio-surface engineering and biophysics to design novel cell therapy, engineered tissue equivalents, biopharmaceuticals, oral vaccines, and biosensor. Most importantly, CBT serves as a focal point for Chemical and Biomedical Engineering undergraduate students, faculty members and research students to foster highly interdisciplinary research at the crossroad of Chemical Engineering Sciences, Life Sciences and System Engineering.

Centre for Computational Intelligence (C2i)
Director: Associate Professor Ong Yew Soon
Website: www.c2i.ntu.edu.sg

Mission
- To contribute to the development of the University's computing capabilities and resources, and establish an internationally recognised centre of excellence in the field of Computational Intelligence
- To provide opportunities for staff and students to develop their skills and reputation, foster research collaboration and facilitate international exchanges, and develop the necessary framework to support these activities
- To focus on complex real-world problems and devise innovative techniques, tools, and solutions, improving along the way our understanding of cognitive architectures, reasoning, problem solving, and general intelligence
- To promote the application of Computational Intelligence techniques and facilitate their transfer from the research to the user community, seeking new opportunities for industrial projects and commercial ventures

Research
Researchers in C2i investigate natural and artificial systems to comprehend principles that render intelligent behaviour possible in complex changing environments. The Centre's core research is focused on devising intelligent machines capable of learning, understanding and reasoning about past actions, so as to provide creative solutions to real-world complex problems.

Research Areas
- Cognitive and Neuro Systems
- Decision Support Systems & Optimization
- Evolutionary, Memetic and Statistical Learning
- Fuzzy Systems
- Intelligent Multi-Agents
- Intelligent Systems and Devices
- Machine Learning
- Nature-Inspired Systems

Centre for High Performance Embedded Systems (CHiPES)
Director: Professor Thambipillai Srikanthan
Website: www.chipes.ntu.edu.sg

Mission
- Undertake use-inspired basic research into novel algorithms and their architectural translations to create Intellectual Property (IP) for order-of-magnitude improvement in next generation embedded computing systems
- Undertake basic research into Design Methodologies for next generation embedded systems that demand stringent design constraints, shorter Time-To-Market (TTM) and lower Non-Recurring Engineering costs (NRE)
- Rely on its state-of-the-art knowledge base and research expertise to serve as a knowledge base to facilitate world-class training in Embedded Systems Engineering
- Contribute to the development and refinement of curricula at both undergraduate and graduate levels based so as to maintain industry relevance in this strategic area of importance to Singapore

Research
CHiPES carries out use-inspired research, development and timely training in embedded systems engineering using state-of-the-art tools and technologies to spur next-generation innovation and to enable an order-of-magnitude improvement in developer productivity. It relies on its state-of-the-art knowledge base to facilitate world-class training in Embedded Systems Engineering.

Research Areas
- Algorithms to Architectures
- Computer Arithmetic and Security
- Design Methodologies
- Embedded Signal Processing
- Embedded Software
- Human Computer Interaction
- Reconfigurable Computing
- Vision Enabled Sensing

Centre for Infrastructure Systems (CIS)
Director: Associate Professor Wong Yiik Diew
Website: www.cis.ntu.edu.sg

Mission
To be a centre of excellence in research and education in infrastructure system planning and development
Current Areas of Research and Consultancy Focus
To work closely with industries to develop innovative technologies in the areas of:
- Road transport infrastructure design, operations and management
- Green and smart construction materials
- Urban Infrastructure construction and management
- Underground transport networks
- Green transport and logistics

Technology Exchange
- Research into road transport infrastructure design, operations and management (LTA)
- Research into smart construction and green materials (JTC)
- Research into transportation-centric aspects of electric vehicles (TUM)
- Working with various organisations to jointly undertake R&D projects for industry applications

Education and Training activities:
- Coursework programmes Transportation; MSc (International Construction Management);
- Graduate Diploma in Construction Management
- Conduct seminars, short courses, and lecture series in infrastructure-centric fields

Centre for Mechanics of Micro-Systems (CMMS)
Director: Associate Professor Du He Jun
Website: www.cmms.mae.ntu.edu.sg

Vision
CMMS believes that:
- Mechanics (of systems and materials) is the key to improve the performance of micro/nano-systems;
- Simulation and testing technologies, which enable better design and manufacturing of micro-systems, are in great demand to put micro-machines and nano-technology to practical use;
- Many new micro-systems or machines will one day become as effective and powerful as the Hard Disk Drive (HDD) is today;
- HDD will continue to be a major industry in Singapore and support from academics will be in demand.

Objectives
- To develop new and improved mechanical design methodologies techniques for micro/nano-system applications
- To establish a micro/nano-system mechanics laboratory with advanced mechanical design analysis and testing capabilities
- To develop a core team of researchers on mechanics of micro/nano-systems and provide industry with required expertise by training research fellows and postgraduates specialised in micro-system mechanical design
- To initiate joint projects with local industries and to provide them with expert consultancy on micro-system mechanics

Research Activities and Focus Areas
Although the scope of research includes mechanics of all kinds of micro-systems, the research activities in CMMS can be broadly divided into two focused areas.

One focused research area is on HDD Mechanics (mostly in close collaboration with DSI and the industry). This includes the following topics:
- Shock resistance
- Simulation and control of vibrations
- Servo control
- Noise control and simulation of acoustics
- Mechanism (Kinematics and Dynamics) simulation and design
- Aero-elasticity (fluttering)
- Aerodynamics and slider design
- Sensing and actuating
- Tribology
- Mechanics of Materials

The other focused area of research is to develop enabling technologies for design and manufacturing of micro/nano systems devices.

This includes the following topics:
- Investigation of mechanism of micro joining
- Monitoring of micro processing
- Methods and software packages for topological optimization of flexural mechanisms
- Simultaneous sensing and actuating
- Crack-free coating SMA and PZT thin films
- MEMS and Biomems
- Molecular sensing devices/systems
- Nano-composites
- Nanotechnology

Centre for Multimedia and Network Technology (CeMNet)
Director: Associate Professor Cham Tat Jen
Website: www.cemnet.ntu.edu.sg

Mission
Towards ubiquitous computing where communications and media transcend devices, mobility and activities. Enhanced user experience can be achieved through the deployment of network, effectors and location and context-awareness technologies into our daily lives.

Research
CeMNet is recognised for research work in three core areas: Multimedia Understanding, Intelligent Environments as well as Network Technologies, Protocols and Services.
Research Areas
- Broadband Network Protocols and Services
- Interactive SmartSpace Integrating Cameras, Projectors, Microphone Arrays, other Sensors and Actuators
- Multimedia Signal Processing and Communications
- Pervasive and Seamless Mobile Communication
- Semantic Understanding of Multimedia Data for Efficient Indexing, Storage and Retrieval
- Software Defined Radio

EXQUISITUS, Centre for E-City
Director: Professor Xie Lihua
Website: www.exquisitus.eee.ntu.edu.sg

Vision
To be a world leader in energy resilience, sustainable environment and future mobility, providing system, control and electro-solutions to complex challenges of cities, particularly in areas relating to energy and environmental sustainability and urban mobility

Mission
To develop multi-disciplinary research capabilities and to provide technical expertise services in Singapore in the areas of smart sensory systems, clean and renewable energy, energy efficiency, sustainable manufacturing and environments, and intelligent transportations

Research Activities
The EXQUISITUS is a Centre of Excellence to advance research and development (R&D) in electrical systems for future cities. It will develop key technologies in power electronic devices, intelligent control and optimization, and autonomy for applications in environmental monitoring, sustainability, renewable energy systems, transportation systems, aerospace engineering, maritime engineering, and defence. The centre’s research activities can be broadly divided into the following major areas: energy conversion devices, clean and renewable energy systems, energy storage, smart grids, energy efficient buildings, control system technologies, mobile robotics, and intelligent transportations.

INFINITUS, Infocom Centre of Excellence
Director: Associate Professor Tan Yap Peng
Website: www.infinitus.eee.ntu.edu.sg

Vision
To be a vibrant hub of activity with marine and offshore engineering, shipping business and logistics with major research activities in hydrodynamics, marine and offshore engineering, shipping business and logistics

Mission
To function as a world-class research and development catalyst for feasible commercialization of technologies in solid state lighting and displays for the prosperity of Singapore’s economy

Research Activities
INFINITUS is a Centre of Excellence for information and communication engineering with seven research programs in (1) Communications and Network Systems, (2) Advanced Sensing, (3) Security, (4) Data Mining and Analytics, (5) Video Analytics, (6) Navigation and Positioning, and (7) Radio Frequency and Microwave Engineering

Luminous! Centre of Excellence for Semiconductor Lighting and Displays
Director: Nanyang Associate Professor Hilmi Volkan Demir
Website: www.luminous.eee.ntu.edu.sg

Vision
- To be the TOP research center dedicated to solid-state lighting in Singapore by 2012
- To be strategically positioned as one of the leading semiconductor lighting and display Centers of Excellence in Asia Pacific by 2014
- To serve as a global semiconductor lighting and display research hub for excellence in creative and innovative lighting and displays
- To contribute to research outputs (SCI publications, patents, PhD training, industrial collaboration) and visibility of NTU EEE

Mission
- To develop leading edge ‘green’ solid-state lighting and displays by generating new knowledge, new know-how, and new technologies
- To generate innovative solutions enabled by nanophotonics and exploit quantum-confined and design-based nanostructures
- To make a strong technological impact in Singapore and around the globe for energy efficiency in lighting and displays and combating climate change
- To function as a world-class research and development catalyst for feasible commercialization of technologies in solid state lighting and displays for the prosperity of Singapore’s economy

Research Activities
LUMINOUS! pursues various multidisciplinary research that offers potential solutions addressing energy efficiency and photometric quality problems in lighting. LUMINOUS! aims at developing and demonstrating a new class of solid-state lighting devices that employs semiconductor nanocrystal quantum-dot emitters as nanoluminophors. Its key competencies include white LEDs and OLEDs for solid-state lighting and displays, nanocrystal quantum-dot nanoluminophors, phosphors, ZnO-based transparent electrodes and emitting devices, organic photovoltaics, electrochromics for smart windows and low-power displays.

Maritime Research Centre (MRC)
Director: Associate Professor Tan Soon Keat
Website: mrc.ntu.edu.sg

Vision
- To contribute to research outputs (SCI publications, patents, PhD training, industrial collaboration) and visibility of NTU EEE

Mission
- To make a strong technological impact in Singapore and around the globe for energy efficiency in lighting and displays and combating climate change
- To function as a world-class research and development catalyst for feasible commercialization of technologies in solid state lighting and displays for the prosperity of Singapore’s economy

Research Activities
LUMINOUS! pursues various multidisciplinary research that offers potential solutions addressing energy efficiency and photometric quality problems in lighting. LUMINOUS! aims at developing and demonstrating a new class of solid-state lighting devices that employs semiconductor nanocrystal quantum-dot emitters as nanoluminophors. Its key competencies include white LEDs and OLEDs for solid-state lighting and displays, nanocrystal quantum-dot nanoluminophors, phosphors, ZnO-based transparent electrodes and emitting devices, organic photovoltaics, electrochromics for smart windows and low-power displays.

Maritime Research Centre (MRC)
Director: Associate Professor Tan Soon Keat
Website: mrc.ntu.edu.sg

Vision
- To establish a focused national and regional research centre with major research activities in hydrodynamics, marine and offshore engineering, shipping business and logistics
- To be a vibrant hub of activity with marine and offshore organizations and the maritime community; and to host courses, R&D programmes, and projects, as well as seminars and conferences on relevant subject areas
- To gather and nurture a team of enthusiastic and dedicated staff who will be a source of pride and aspiration for students and researchers, faculty, and the maritime community
Mission
- To establish a focal point for research and development for the local and regional maritime industry
- To develop innovative approaches towards marine and offshore engineering, port management and management of coastal environment resources
- To support continuing education and professional training in maritime business, port and terminal operations, marine and offshore engineering, maritime practices and coastal management
- To act as the catalyst to promote and facilitate the cooperation in the maritime industry and training of manpower to support the maritime clusters

Research Activities
MRC excels in hydrodynamics, hydraulics, environmental engineering, and logistics. Representative activities include Active Operator Guidance System for Ship, South China Sea Circulation Model, Two-ship Interactions, Development of a Shipboard Quality Assurance System for Bunker Fuel Transaction, and Design of an Optimised Liner Service Planning.

The Centre focuses on the initiation and undertaking of research to develop technologies and IT applications in the port and maritime field, management of joint R&D projects between the MPA and NTU, as well as collaboration with local and international institutions and industry partners.

MRC’s research facilities include Hydraulics Laboratory, Environment Laboratory, Geotechnics Laboratory and Construction Technology Laboratory, Protective Engineering Laboratory, Spatial Information Laboratory, Transportation Laboratory, and numerical simulation and computational facilities.

Nanyang Centre for Underground Space (NCUS)
Interim Director: Associate Professor Zhao Zhiye
Website: www.ncus.ntu.edu.sg

Mission
NCUS aims to scientifically lead Singapore’s deep underground development efforts enabling the nation to plan the use of its key resources (space, materials and environment) effectively in three dimensions. This presents a major innovation challenge that has not yet been fully achieved in other world cities.

The NCUS’s research focus includes:
1) Conceptualize, plan and undertake feasibility studies for large-scale deep underground space utilization in Singapore
2) Lead technology development and innovation for underground space development at the national and international scene
3) Attract, retain and support world-class researchers to perform high-impact research in Singapore for underground development
4) Establish a broad-based education and research platform at NTU in the area of rock engineering and underground development, in line with the goals of NTU’s Sustainable Earth Peak.

Research and Other Activities
Current projects:
- Underground Space for a Sustainable NTU Campus (SEO/NCUS)
- Concept Study on Co-location of Underground Utilities, a project partner (MND)

NCUS will co-organize the following two conferences in 2013:
- First International Conference on Rock Dynamics and Applications, Lausanne, 6-8 June, 2013, Switzerland
- 11th International Conference on Discontinuous Deformation Analysis (ICADD 11) is 27-29 August 2013, Japan

Natural Hazard Research Centre (NHRC)
Acting Director: Associate Professor Lo Yat-Man, Edmond

Vision
NEERC’s vision is to employ NTU's cutting-edge research and development capabilities in earthquakes-resistant construction technologies and practices for risk mitigation in high-seismic zones of Asia.

Mission
NEERC integrates existing local knowledge with NTU's experience and expertise to develop practical solutions for seismic risk reduction on a needs-based approach. The aim is to synergize in-depth research with application work on earthquake resistant building materials & construction technologies.

Research Activities
NEERC will focus on research and development work related to seismic loads characterization and strengthening of structures. The Centre will be involved in research on structural strengthening of existing buildings to increase their resilience to withstand earthquakes. Besides, the Centre will collaborate with funding agencies to implement the technologies developed in areas facing high seismic risks.

The centre collaborates with local universities and academic institutions in countries where it has projects to enable transfer of technology and facilitate in the capacity building of academic, government and NGO staff who work in seismic strengthening related areas. The Centre has collaborated with the Temasek Foundation, to work on strengthening and retrofitting work in the follows projects:

- Strengthening, Retrofitting of 10 schools in 5 cities (Dehradun, Tehri Garhwal, Shimla, Guwahati and Patan) in India along with training of 50 master trainers and 200 local builders.
- Strengthening and retrofitting of 6 schools in 3 provinces (Jiangsu, Shaanxi, Yunnan) in China along with training of 30 master trainers and 120 local builders.
- Upcoming project on strengthening of 12 schools in 6 provinces of Philippines (Albay, Benguet, Cebu, Ilocos Norte, Ililo and Metro Manila) along with training of 60 master trainers and 240 local builders.
- NEERC is seeking to expand its focus area for future programmes to include strengthening of non-structural elements in schools and hospitals and the training of academics, sector professionals and experts on earthquake engineering related topics.
The centre is also working in collaboration with Temasek Foundation to expand the school seismic safety initiatives to other countries in Asia like Nepal and Vietnam.

**NOVITAS, Nanoelectronics Centre of Excellence**

Director: Associate Professor Ng Geok Ing  
Website: www.novitas.eee.ntu.edu.sg

**Vision**  
To become a global research center of excellence in nanoelectronics and contribute to significant positive global social and economic impact

**Mission**  
- By spearheading the research and development of novel electronic materials and devices for next-generation integrated circuits and systems
- By spearheading multidisciplinary research of future electronic materials, devices and system integration technologies
- By engaging actively, via partnership with industrial and academic allies, in the search for disruptive electronic materials and device technologies
- By providing quality educational training and nurturing young talents in the areas of nanoelectronics

**Research Activities**  
NOVITAS has strong expertise in material growth and characterization, device and IC processing, electrical and biophotonics, and other related broadband information technology systems. The centre's research activities are divided into four programmes namely: (1) Novel Photonic Materials and Devices focusing on organic and inorganic photonic materials and devices, nanomaterial structures, silicon photonics, semiconductor lasers and detectors, surface plasmon resonance biosensors and semiconductor nano rods labeling of live human cancer cells biomedical photonics, (2) Photonic Nano-Structures and Applications focusing on surface plasmonics, photonic crystals, metamaterials and devices, and magnetic opto-electronic devices, (3) Optical Fiber Technology focusing on fiber lasers, fiber-based sensors, special fibers for wavelength conversion, ultra-short pulse generation and super-continuum generation, and (4) Advanced Optical Communications focusing on energy-efficient optical systems to green optical networks.

**Ocular Therapeutic Engineering Centre (OTEC)**

Directors: Professor Subbu Venkatraman and Adjunct Assistant Professor Tina Wong  
Website: www.optimus.eee.ntu.edu.sg

**Vision**  
To facilitate applied research in ocular drug and gene delivery

**Research and Other Activities**  
Glaucoma is the major eye disease of interest, followed by uveitis and infections

**Parallel & Distributed Computing Centre (PDCC)**

Director: Professor Cai Wentong  
Website: pdcc.ntu.edu.sg

**Mission**  
The mission of Parallel and Distributed Computing Centre (PDCC) is to form a centre of excellence in the areas of parallel and distributed computing; to carry out research where goals of the projects are connected to real concerns; and to enhance the research profile of the University by putting the name of the Centre on the international research map. In pursuit of its mission, PDCC strives to seek new industrial projects where parallel and distributed processing can provide a solution to real problems, to conduct leading edge research and advance knowledge, and to foster research collaborations both nationally and internationally

**Research**  
PDCC has organized several leading international conferences in the areas of parallel and distributed computing (e.g., CCGrid 2006, PADS 2006, DS-RT 2009, MASCOTS 2011, and ICPADS 2012). Particularly, it has gained an international reputation for its research on distributed simulation and collaborative technology. It has excellent computing equipments and network infrastructure including a CPU/GPGPU cluster and several Linux clusters.

**Research Areas**  
Current research activities in PDCC can be broadly grouped into the following areas
- Large Scale Simulation: Agent-based Simulation, Decision Support Systems, Virtual Environments
NTU-MINDEF Protective Technology Research Centre (PTRC)
Director: Professor Tan Kang Hai
Website: www.ntu.edu.sg/ptrc

Mission
The threefold mission of PTRC is:
- To spearhead research efforts in developing advanced protective technology;
- To provide scientific and engineering solutions to meet the national needs in weapons and defence systems; and
- To address emerging national challenges for both government and industry in the field of protective technology and homeland security.

Research Focus
PTRC focuses its activities on three functional areas:
1. Research and Development
2. Education and Training
3. Technology Transfer

The functional areas comprise the following activities:
- Conducting focused R&D programmes in dynamic and weapon effects on buildings and infrastructures
- Establishing collaborations with local and foreign universities, research centres, and industries
- Effecting technology transfer
- Maintaining a resource centre
- Providing specialised advisory services

Research Facilities
The Protective Engineering Laboratory housed in the School of Civil and Environmental Engineering is designed to conduct dynamic load testing of full-scale structural components. The laboratory has a system of L-shaped reaction walls with multi-cell design, a large shake table that can stimulate earthquake ground motions, and many dynamic actuators of various capacities to support protective engineering research.

Highlights of Research Activity
NTU-MINDEF Protective Technology Research Centre was established on 29 September 1998 via a Memorandum of Understanding (MOU) between the Ministry of Defence (MINDEF) and NTU. Under the strong leadership of the Director, PTRC has developed into the leading centre of excellence in underground technology and rock engineering, as well as building security. This is prominently reflected in PTRC’s contribution of essential technologies towards the engineering as well as the construction of underground ammunition facilities. Besides building up PTRC’s strength in underground technology and rock engineering, the PTRC research team has also completed a milestone study on the response of high-rise commercial buildings to blast loading. The study results have not only helped identify the R&D needs for building protections in the post-911 era, but also provided the basis from which a national programme on building protection was initiated. Associated with this, PTRC/NTU has signed an MOU with the Ministry of Home Affairs (MHA) in February 2010 to provide a general framework for collaboration on education, research and development and technical consultancy projects in Building Security.

Robotics Research Centre (RRC)
Director: Associate Professor Gerald Seet Gim Lee
Website: www.mae.ntu.edu.sg/AboutMAE/Divisions/RRC

Mission
- To consolidate, focus and accelerate robotics research activities within the University;
- To bring together researchers in the area of robotics into a conducive environment equipped with state-of-the-art research facilities;
- To cooperate with industrial partners and government agencies in fields of strategic importance to robotics;
- To provide consultancy services to the local industry in robotics and related areas.

Research Activities
The Centre emphasises its research on:
- Customised robotic solution for hazardous applications;
- Domain applications: underwater robotic vehicles, underwater imaging, mixed-multi agent collaboration, biomedical manipulation and sensing;
- Mobile robotic “hardware-in-loop” simulation.

The Robotics Research Centre (RRC) was formed in May 1994, as an inter-school centre of the Nanyang Technological University, Singapore. Today RRC has equipment assets of over S$5 Million and research grants amounting to S$10 Million. It has supported the research of over 70 M.Eng. and Ph.D. candidates, and currently supports over 40 researchers. The research focus of RRC remains firmly focused on intelligent robotic systems in specialised application. The RRC provides modern state-of-the-art equipment and a stimulating environment for those who are participating in research activities. Research facilities include high speed imaging and laser illumination system, complex mobile robot systems, industrial manipulators, dynamic simulation and analysis software, suite of sensors and mobile platforms.

The centre is consulted by defence and industrial sectors for robotic/mechatronic solutions. In addition, it hosts research attachments of students from various countries including Korea, France, Switzerland, India, America and Poland. The RRC has become synonymous with robotics research and application in Singapore and the region. Its research partners include the Defence agencies, Police, Hospitals and Interactive Media, collaborating on novel applications and sensing systems.

VALENS, Centre of Excellence for Bio-Instrumentation, Devices, and Signal Processing
Director: Associate Professor Ser Wee
Website: www.valens.eee.ntu.edu.sg

Vision
To become an internationally reputable research centre on biomedical research, where impactful research outcomes are generated and innovative ideas are commercialized

Mission
To conduct research and development of EE-based technologies for biomedical applications
Research Activities
VALENS is a centre of excellence for bio-medical research. The Centre’s research activities focus on four major areas, namely: (1) Opto- and Micro-Fluidic Bio-Devices, (2) Bio-Imaging and Signal Processing, (3) Bio-Instrumentations, and (4) Distributed Diagnosis and Home Healthcare Technologies. Many of our research projects involve active participation from clinicians and international research partners.

VIRTUS, IC Design Centre of Excellence
Director: Professor Attila Alvandpour
Website: www.virtus.eee.ntu.edu.sg

Vision
To become a global IC design power hub for creative and innovative excellence

Mission
To provide the highest quality in education and create leading-edge research in IC design so as to shore up future research areas and industries

Objectives / Research Philosophy
i) Sustain & Rejuvenate Singapore’s Future Economic Growth
   - Venture more into Discovery, Design and Development (DDD) IC design activities
   - Foster innovation and entrepreneurial spirit and culture among Singaporeans

ii) Promote Environmental Friendliness
    - Reduce Singapore’s water and energy dependency via low-power IC design

iii) Provide a Continual Stream of Technical Prowess
    - Mould an outstanding cluster of IC design professionals to nourish IC design companies

iv) Inculcate Intellectual Property (IP) Entrepreneurship
    - Infuse an active IC design community that thrives on the ownership and management of IP

Research Activities
VIRTUS advances discovery and design (D&D) as well as research and development (R&D) in IC design and technology for applications in medical technology, clean technology and consumer electronics. Jointly funded by the Nanyang Technological University and Economic Development Board, the Centre’s research areas are mainly in analog, mixed-signal, power management and data converters, energy harvesting, low-power RF and mm-wave IC’s, and new technology directions such as 3D-integration and physical design, 3D RF and mixed-signal circuits, and terahertz IC.

College of Science
Biomedical Structural Biology Laboratory
Director: Professor Pär Nordlund
Website: www.ntu.edu.sg/CSBDD

Vision
To provide detailed mechanistic understanding of proteins in disease process, as well as molecular tools, to accelerate the rate of development of novel therapeutics

Mission
The high cost of drug development in the pharmaceutical industry is approaching non-sustainable levels. Academic research therefore has an increasingly important role to generate enabling knowledge and drive innovation to accelerate drug development. The NTU Centre for Biomedical Structural Biology (Est. 2009) is addressing several key problems in current preclinical biomedical research and drug development.

Research and Training Activities
The research groups associated to the centre study pathways and macromolecular complexes of fundamental importance to disease process. Examples of processes targeted by research groups associated to the centre are:
- Telomerase, a key complex in cancer development (Professor Daniela Rhodes)
- Dengue virus and Malaria infections (Professor Julien Lescar)
- Cancer pathways, including oncogenic Herpes viruses (Professor Pär Nordlund)
- Translation machineries - antimicrobial targets (Associate Professor Yonggui Gao)
- Membrane transport and signaling (Associate Professor Saeid Eshaghi)

Many of the proteins studies are potential drug targets and the mechanistic and structural information can be directly applied to accelerate drug design using structure-guided strategies.

Groups at the centre are also developing methods and platforms which can assist in accelerating therapeutic development. Examples are:
- Methods for improving efficacy of protein drugs and vaccines
- Methods for rapid generation of lead drugs using structure-based strategies
- Community high-throughput protein production platform, to drug design programs as well as mechanistic studies

The Centre train PhD-students and organise workshops in these areas, as well as contribute to undergraduate training at NTU.

Centre for High Resolution Instruments for Science (C.H.R.I.S.)
Director: Nanyang Associate Professor Christos Panagopoulos
Website: phyne.spms.ntu.edu.sg/Facility/chris/

Vision
To draw on the properties of magnetic topology in digitally synthesised materials in order to utilise their low dimensional arrays towards a new avenue for logical bit-wise operations
Mission
We challenge to bring topologically protected field configurations with particle-like properties to the bench of research and development, crossing the disciplines of particle physics and the technology of energy and information storage. C.H.I.S designs, develops and employs home-built multifunctional device fabrication and scanning probe systems operating over a wide magnetic field and temperature range.

Research Activities
Our research offers the perspective of the study of local excitations on a discrete atomic lattice opening new vistas in topologically protected spin and charge textures. The unique and pioneering experimental systems available in the Centre enable us study directly and simultaneously both the electronic and magnetic properties of low-dimensional systems, and manipulate the topologically quantized winding number of magnetic textures towards logic operations.

College of Humanities, Arts and Social Sciences
Centre for Chinese Language and Culture (CCLC)
Director: Associate Professor Lee Guan Kin
Deputy Director: Associate Professor Crossland-Guo Shuyun
Website: www.cclc.hss.ntu.edu.sg

About the Centre
Centre for Chinese Language and Culture (CCLC) was officially set up in April 1984, geared towards excellence in teaching and research, and offering courses related to Chinese language and culture for NTU students to take as general education requirement. Since September 2003, CCLC has transferred its teaching responsibilities to the Division of Chinese, HSS, and has continued to strive for excellence in the research of Chinese language and culture and the related academic activities.

Mission
- To facilitate, coordinate and encourage inter-disciplinary and discipline-specific research in Chinese language and cultural issues of interest in the Chinese world;
- To provide a platform for interaction among international and local scholars from various disciplines to exchange latest research findings and ideas;
- To organise a range of integrated activities such as international conferences, public lectures, academic seminars, public forums and workshops;
- To produce academic publications including working papers, monographs, books and journals;
- To serve as the point of contact between NTU and similar research centres in other international and local academic institutions; and
- To serve as a rallying site for NTU alumni and a contact point between NTU and its alumni.

Research Areas
- Chinese Tradition and Modern Cultures in Asia 华人传统与文化
- Chinese Language and Dialects in Asia 华族语言与方言
- Chinese Literature in Asia 华文文学
- Chinese Migration and Networks: Local and Global Issues 华人移民与网络
- Chinese Education in Southeast Asia 东南亚华人教育

Research
Since its setup, CCLC has undertook research projects in the fields of Southeast Asian Chinese Language and Dialects, Southeast Asian Literature in Chinese, Southeast Asian Chinese History and Folklore, Literary and Social Traditions in the Chinese World, and so on. CCLC has been awarded external research grants by MOE, Lee Foundation, and Chiang Ching-Kuo Foundation (CCK), and has invited local and overseas scholars to be engaged in collaboration projects together with local and overseas institutions and organizations. Research results are published as monographs under CCLC’s book series.

Academic Activities
CCLC, as an important research institution in the region of Southeast Asia, has a well-established reputation, locally and internationally, with successful academic activities including international conferences, workshops, seminars, public lectures and forums. Especially, CCLC has been organizing the “Tan Lark Sye Professorship in Chinese Language and Culture Public Lecture Series” by inviting prominent scholars and professors from various countries to deliver public lectures on the topics related to Chinese language and cultural studies, Chinese literary and education studies, and studies on Chinese migration and networks, etc. The public lectures have been well-received by eminent scholars, researchers as well as members of the public, especially the NTU alumni.

CCLC has also organized joint seminar series, international conferences and workshops, with local and overseas institutions and organizations.

Academic publications
In the past 16 years, CCLC has attached great importance to academic publications including book series, journals, monographs and public lecture series and so on. Its major publication projects are as follows:

1. Nantah Journal of Chinese Language and Culture 《南大语言文化学报》 (14 issues published)
2. Nantah Chinese Language and Culture Series “南大语言文化丛书” (23 monographs published)
5. The Tan Lark Sye Professorship in Chinese Language and Culture Public Lecture Series “陈六使中华语言文化教授基金公开演讲系列” (2 collections of the public lectures published since 2010)
6. Chinese Migration in Comparative Perspectives: Adaptation and Development 《华人移民比较研究：适应与发展》 (1 edition in English, and 1 edition in Chinese, both of which are jointly published by CCLC and CHC, as the outcome of an international conference held in October 2007)
New Publications (2011-2012)

<table>
<thead>
<tr>
<th>Type</th>
<th>Title</th>
<th>Publication (Month/Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Journal</td>
<td>The International Journal of Diasporic Chinese Studies Vol. 3.2</td>
<td>Dec 2012</td>
</tr>
<tr>
<td></td>
<td>Nantah Journal of Chinese Language and Culture Vol. 7.2</td>
<td>Mar 2012</td>
</tr>
<tr>
<td></td>
<td>The International Journal of Diasporic Chinese Studies Vol. 3.1</td>
<td></td>
</tr>
<tr>
<td>Book Series</td>
<td>Contemporary Reflections on the May Fourth Movement《五四运动的当代回响》</td>
<td>Jun 2011</td>
</tr>
<tr>
<td></td>
<td>The Study of Oracle Bone Inscriptions《甲骨学研究集》 by Woon Woei Lee &amp; Wong King Sun (eds.)</td>
<td>Oct 2011</td>
</tr>
<tr>
<td></td>
<td>Teh Hoon Heng’s Nantah Story《郑菊兴讲南大故事》 by Teh Hoon Heng</td>
<td>May 2011</td>
</tr>
<tr>
<td></td>
<td>Drama Box and the Social Theatre of Singapore: Cultural Intervention and Artistic Autonomy《戏剧盒与新加坡的社会剧场：文化干预与艺术自主性》 by Ng How Wee</td>
<td>Apr 2011</td>
</tr>
</tbody>
</table>

Centre for Asian Art and Design (CAAD)
School of Art, Design and Media
Director: Professor Vibek Sorensen
Advisors: Associate Professor Kwek Kian Woon, Professor T. Kanaga Sabapathy, Visiting Professor Kirti Trivedi, Visiting Professor Ishu Patel
Website: www.adm.ntu.edu.sg

Mission
The centre is devoted to researching and preserving historical and contemporary Asian Art and Design, to producing new knowledge through these studies and to leveraging and transferring this knowledge to further the cause.

About the Centre
An interdisciplinary research centre of the School of Art, Design and Media (ADM), Nanyang Technological University, Singapore, the Centre for Asian Art and Design (CAAD) focuses on the study of the historical and related contemporary issues in Asian Art and Design, with emphasis on their influence on local, regional and international cultures. This includes the way Asian cultures are encoded and expressed through a range of art and design fields, as well as the translation of international art and design knowledge into practice in Asia. It involves the study of cosmology and human relationships to nature and to traditional and contemporary technologies. This includes not only the social, built, and natural environments, but aesthetics, art and design concerns and how they impact life and living conditions, with ethnographic documentary and digital technologies playing a central role. They are closely connected to the folk and fine art traditions of the region, and therefore a component of the center’s activities involve fine artists as well as master craftspeople of the past and present. International design today must respond to a widening array of cultures around the world, and therefore, it is moving away from the concept of European modernism as universal. Not only is there a large Asian diaspora, including many Asian artists and designers who have been educated around the world and have through this process brought their cultures into dialogue with international cultures, but the largest demographic in the world today is Asian. It may be that the future of international design will be an international form of Asian Design.

Key Areas of Study
- Asian and International Visual Music as a contemporary expression of these interrelationships
- Asian and International Experience Design
- Film and video, including ethnography

Our Activities
Our centre activities include:
- Hosting of artists and designers-in-residence, visiting professors and post-doctoral scholars
- Organising of research symposia, workshops and conferences such as “Motion Arts Tradition and Animation in Asia”, “Ancient Artworks in Context”, “From Gamelan to Kabuki: Time, Motion, Intermedia” and a performance/Installation by Dr Jaroslav Kapucinski, “Where is Chopin?”
- Pioneering projects in Asian art, design and cultural preservation, such as the use of motion capture to portray, preserve, and extend the movements of Asian dancers and Chinese Martial Arts (i.e. Wushu) into new creative works

Economic Growth Centre (EGC)
Director: Professor Lim Chong Yah
Deputy Director: Associate Professor Tan Khye Chong
Website: egc.hss.ntu.edu.sg

Mission
The Economic Growth Centre was established by the Division of Economics in 2004. The Centre has three research units: the Econometric Modelling Unit, the Exchange Rate Dynamics Unit, and the Survey and Social Research Unit. The Econometric Modelling Unit aims to make regular forecasts on the performance of the Singapore economy. The Exchange Rate Dynamics Unit aims to meet old-age requirements, and the reasons for selecting Singapore as a regional base by multinational corporations. The Centre also organises conferences, workshops and public talks on key issues relevant to Singapore and the region. It provides and designs executive and professional workshops ‘tailor-made’ for government ministries, statutory boards, private organisations, foreign governments and international agencies. Other activities of the Centre include joint research workshops, research seminar series and research collaborations with overseas and local universities.
### Research Activities
#### (1) Research Seminars in 2012

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Speaker</th>
</tr>
</thead>
</table>
| 11 January 2012| Uncertainty and capital accumulation: Empirical evidence from a structural model with heterogeneous firms | Professor Steve Bond  
Department of Economics  
Nuffield College  
Said Business School  
University of Oxford |
| 13 January 2012| Estimating Context-Independent Treatment Effects in Education Experiments | Associate Professor Steven Lehrer  
Department of Economics  
Queen's University       |
| 18 January 2012| Exposure Problem in Multi-unit Auctions                               | Associate Professor Hikmet Gunay  
Department of Economics  
University of Manitoba, Canada |
| 25 January 2012| Conflicts of Interest in Persuasive Communications                    | Dr Kaiwen Leong  
Princeton University       |
| 26 January 2012| The Kyoto Protocol, the Copenhagen Accord, the Cancun Agreements, and Beyond: An economic and game theoretic exploration and interpretation | Professor Parkash Chander  
National University of Singapore |
| 31 January 2012| Reputation Turnaround through Voluntary Ownership and Management Turnover | Au Pak Hung  
Department of Economics  
Northwestern University    |
| 2 February 2012| Developing Shared Knowledge                                           | Dr Hongyi Li  
Post-Doctoral Associate  
MIT-Sloan School of Management |
| 6 February 2012| How Do We Analyse Global Catastrophic Risks Rationally?               | Professor Yew-Kwang Ng  
Department of Economics  
Monash University |
| 7 February 2012| An Analysis of Policy Effect on Equal Opportunity for Health: Evidence from U.K. and U.S. | Chen Jie, Yvonne  
Ph.D. Candidate  
Yale University |
| 8 February 2012| Mental Equilibrium and Rational Emotions                             | Professor Eyal Winter  
Silverzweig Professor of Economics  
Director, Center for the Study of Rationality  
The Hebrew University of Jerusalem |
| 15 February 2012| What Do You Think Would Make You Happier? What Do You Think You Would Choose? | Assistant Professor Daniel J. Benjamin  
Economics Department  
Cornell University |
| 16 February 2012| Moral Hazard in Expert Service Markets – Evidence from an Intervention to Reduce Health Care Spending in China | Bingxiao Wu  
Ph.D. Candidate  
Kellogg School of Management  
Northwestern University |
| 21 February 2012| Whose Opinion Counts? Political Processes and the Implementation Problem | Assistant Professor Rene Saran  
Assistant Professor of Economics  
Maastricht University |
| 22 February 2012| Happiness and Productivity                                           | Professor Andrew J Oswald  
Visiting Fellow, and Acting Research Director  
IZA, Bonn & Department of Economics  
University of Warwick |
| 24 February 2012| Yield Spreads as Predictors of Economic Activity: A Real-Time VAR Analysis | Assistant Professor Kundan Kishor  
Assistant Professor  
University of Wisconsin–Milwaukee |
| 14 March 2012  | “Efficient Wage Bargaining in a Dynamic Macroeconomic Model”           | Professor Volker Böhm  
Bielefeld University, Germany  
Visiting Professor at Nanyang Technological University, Singapore |
| 21 March 2012  | Marshallian Externality, Industrial Upgrading, and Industrial Policies (joint with Justin Lin and Jiandong Jú) | Assistant Professor Wang Yong  
Hong Kong University of Science and Technology and the World Bank |
| 28 March 2012  | A Mechanism for Booms and Busts in Housing Prices                     | Assistant Professor Marten Hillebrand  
Karlsruhe Institute of Technology, Germany |
| 10 April 2012  | An Improved Estimation to Make Markowitz’s Portfolio Optimization Theory Users Friendly and Estimation Accurate with Application on the US Stock Market Investment | Professor Alan Wong Wing-Keung  
Department of Economics  
Hong Kong Baptist University |
| 25 April 2012  | “The Insurance Role of Rosca in the Presence of Credit Markets: Theory and Evidence” | Professor Ke Rongzhu  
Department of Economics  
Chinese University of Hong Kong |
<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Speaker</th>
</tr>
</thead>
</table>
| 26 January 2011 | Demand for hospital care and private health insurance in a mixed public-private system: empirical evidence using a simultaneous equation modeling approach | Dr Terence Chai Cheng  
Research Fellow  
Melbourne Institute of Applied Economic and Social Research  
University of Melbourne |
| 9 February 2011 | Dynamic Cross-currency Linkages of the LIBOR-OIS Spreads | Dr Philip Inyoeb Ji  
Department of Accounting and Finance  
Monash University Australia |
| 21 February 2011 | Intermittent Reinforcement and the Persistence of Behaviour: Experimental Evidence | Prof Marie-Claire Villevial  
GATE (Groupe d’Analyse et de Théorie Economique)  
University of Lyon-France |
| 7 March 2011 | Impacts of the Global Economic Crisis on Japan, China and India, and their Strategies for Future Economic Development | Dr Lim Hua Sing  
Professor, Graduate School of Asia Pacific Studies, Waseda University  
Director, Institute of Chinese Economies, Waseda University |
| 9 March 2011 | Asset Market Liquidity and Crisis | Assistant Professor Kaiji Chen  
Department of Economics  
Emory University |
| 16 March 2011 | Financial Frictions on Capital Allocation: A Transmission Mechanism of TFP Fluctuations | Assistant Professor Zheng Michael Song  
Department of Economics  
Chinese University of Hong Kong and Fudan University |
| 23 March 2011 | Credit Volume, Default Risk and Collateral in a Dynamic Model with a Banking System | Dr Marten Hillebrand  
Assistant Professor  
Karlsruhe Institute of Technology |
| 24 March 2011 | Does Marriage Work as a Savings Commitment Device? Experimental Evidence from Vietnam | Dr Tomomi Tanaka  
School of Politics and Global Studies  
Arizona State University |
| 29 March 2011 | Gradual Repayment with Sequential Financing in Micro-finance | Professor Prabal Roy Chowdhury  
Professor of Economics  
Indian Statistical Institute  
New Delhi, India |
| 31 March 2011 | Identification pathologies and their effects on GMM test statistics for dynamic panel data models | Professor Maurice Bun  
Tinbergen Institute and University of Amsterdam |
| 13 April 2011 | Evolutionary Finance and Dynamic Games | Dr Xu Le  
School of Social Sciences  
The University of Manchester |
| 8 August 2011 | Spatial Econometrics: Developments and Challenges | Professor Peter M. Robinson  
Toke Professor of Economic Science and Statistics  
Department of Economics  
London School of Economics |
| 8 August 2011 | Balanced Monetary Expansion | Professor Volker Bohm  
Department of Economics  
Bielefeld University Germany |
| 10 August 2011 | Forecasting with Panel Data | Professor Badi H. Baltagi  
Distinguished Professor of Economics and Senior Research Associate, Center for Policy Research  
Syracuse University |
Department of Economics  
University of Victoria |
| 23 August 2011 | Japan’s Economic Development and its Implications for Asia | Dr Lim Hua Sing  
Professor, Graduate School of Asia Pacific Studies, Waseda University  
Director, Institute of Chinese Economies, Waseda University |
| 24 August 2011 | The distribution of wealth in the Blanchard-Yaari model | Professor Shenghao Zhu  
Department of Economics  
National University of Singapore |

<table>
<thead>
<tr>
<th>No</th>
<th>Title</th>
<th>Author</th>
</tr>
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<tbody>
<tr>
<td>2011/05</td>
<td>Foreign Output Shocks and Monetary Policy Regimes in Small Open Economies: A DSGE Evaluation of East Asia</td>
<td>Joseph D. ALBA Wai–Mun CHIA Donghyun PARK</td>
</tr>
<tr>
<td>2011/04</td>
<td>Dynamics Between Strategic Commodities and Financial Variables</td>
<td>Thai-Ha LE Youngho CHANG</td>
</tr>
<tr>
<td>2011/03</td>
<td>The Impact of Oil Price Fluctuations on Stock Markets in Developed and Emerging Economies</td>
<td>Thai-Ha LE Youngho CHANG</td>
</tr>
<tr>
<td>2011/02</td>
<td>Oil and Gold Prices: Correlation or Causation?</td>
<td>Thai-Ha LE Youngho CHANG</td>
</tr>
<tr>
<td>2011/01</td>
<td>Ownership Structure of Firms and Their Export Performance: Evidence from Korea</td>
<td>Sangho KIM Donghyun PARK</td>
</tr>
</tbody>
</table>
**Singapore Internet Research Centre (SiRC)**

**Director:** Professor Ang Peng Hwa  
**Deputy Director:** Associate Professor Margaret Tan  
**Website:** www.sirc.ntu.edu.sg

Launched in January 2004 and hosted at the Wee Kim Wee School of Communication and Information at Nanyang Technological University, Singapore, the Singapore Internet Research Centre (SiRC) is recognized as a premier Asian research institute on the new media. SiRC initiates and conducts research related to new media/internet across Asia, including East, Southeast, and South Asia and brings Asian experiences and perspectives to the global discussion about the development, impact, and potential of the Internet. SiRC focuses research attention on the experiences of Asian nations with the Internet. The SiRC associates engage in a wide variety of collaborative research efforts with other researchers around the globe.

SiRC is currently headed by Professor Ang Peng Hwa and receives its core funding from the School.

**Vision**

- To be a key node for internet and new media research in Asia, covering social, political, and cultural impact of information technologies
- Bring Asian experiences and perspectives to the global discussion about the innovation, development and impact of the internet and information technologies

**Mission**

- Initiate and conduct research related to the internet and new media across Asia
- Supported through the following strategic thrusts:
  - Education (including training)
  - Service (including consulting)
  - Public policy advocacy

**Research Activities**

A top-flight research centre should have activities in four key areas: research, education, service and public policy advocacy.

In research, SiRC has produced a commendable list of publications and conference presentations. SiRC has in the past few years spearheaded numerous research projects, conducted workshops and conferences, hosted visiting fellows, all of which have helped build our international profile and media contacts. In teaching, faculties are involved in bringing state-of-art knowledge to the classroom. In training, workshops have been held for the internet community, such as, workshops on the legal issues bloggers are facing. In public consulting and policy advocacy, faculties were present in the high-level Advisory Council for the Impact of New Media on Society (AIMS) and contributed to the final report of the Council.

Designed to support research projects that will strengthen the body of methodologically sound and theoretically-based social science research in Information Societies, the Strengthening Information Society Research Capacity Alliance (SIRCA II), one of the latest and second biggest grant award to-date to SiRC by the International Development Research Centre, aims to improve the inter-disciplinary research skills of emerging scholars in ICTD and Information Societies in the Global South. Learning from the experience of building capacity in the ICTD field in Asia, SIRCA II includes researchers from Africa, Latin America as well as Asia, in order to address the very lack of Southern scholars in this area of study. SIRCA II is currently funding 15 grant awardees, reaching out to emerging ICTD scholars in 15 countries from the three regions.

The SiRC is well placed to continue to work on our primary task of investigating the impact of new media on society, with emphasis on Singapore and Asia. The importance of understanding the social impact of such new media forms as interactive digital media (IDM) has been recognized by the Singapore Government and two senior members of the Centre are in fact contributing to the first report of the Advisory Council on the Impact of New Media on Society (AIMS).

SiRC will continue to look for new ways to improve the Centre’s local and international profile, research projects as well as media contacts through meaningful projects.

**College of Business (NBS)**

**Centre for Accounting and Auditing Research (CAAR)**

**Director:** Professor Tan Hun Tong  
**Website:** s3ap0005:6400/Research/ResearchCentres/CAAR/Pages/CAAR.aspx

**Mission**

- To promote quality academic and applied research in accounting and auditing as well as to foster links with industry through joint research and consulting

**Research activities**

- Planning, conducting, and providing administrative support for research on significant issues relating to accounting or auditing
- Organising research seminars, workshops, round-table discussions and forums on emerging or controversial issues affecting the accounting and auditing profession
- Circulating working papers and other monographs to disseminate research findings amongst academics and professionals
- Organising or supporting the organisation of local and regional accounting conferences for academics and professionals in the Asia-Pacific region.
- Please refer to [http://www.isarhq.org/](http://www.isarhq.org/) for details of the International Symposium of Audit Research (ISAR)
Centre for Asia Pacific Technology Law (CAPTEL)
Director: Associate Professor Tan Soo Kiat, Harry
Website: captel.ntu.edu.sg/home.htm

Mission
The Centre for Asia Pacific Technology Law & Policy is an interdisciplinary research centre founded to explore the challenges of new technologies on the development of law and policy so as to promote development of its role in the Asia Pacific Economies. CAPTEL is a research centre located in Nanyang Business School, Nanyang Technological University. It is one of the first technology law and policy centres in the world to be founded in a business school. It is within the fertile environment of business academia and industry that the centre's early days were sown.

As a result, CAPTEL was created specifically to be a centre for research and consultancy in technology law and policy for the promotion of the Asia Pacific region.

It is a centre created to accommodate a diverse cross-discipline expert for the purposes:
- Of developing a vehicle for applied legal research and policy development
- As a regional think tank for institutions seeking expert advice and consulting
- Developing joint research in technology law and policy between Schools in NTU and with other top research arms and centres
- To be the organisational platform for academics for academic exchanges
- Developing leading edge industry oriented programmes
- To be a repository of knowledge on specific areas of information and technology law being developed in the Asia Pacific region

The core objective of the centre is to conduct developmental research on technology law and policy. To achieve this objective, the centre will have multi-track themes to reflect the diverse expertise from the School and associate fellows:

- **Protection Regimes for Intellectual Property Rights**
  The laws relating to the protection of intellectual property of new technologies and to the new property developed by the use of new technologies.

- **Legal Infrastructure for E-Business**
  Research on the development of International Treaties, Codes and Model Laws and their impact on E-Commerce.

- **Regulation of the Internet**
  Researching the development of Standards for Internet Regulation to manage Internet conduct in the Asia Pacific; Content regulation.

- **IT Laws**
  Cybercrime, Technology Security, Privacy and other IT laws.

- **Telecommunications Law**
  Access Issues.

- **Biotechnology Law & Ethics**
  Research in related laws and policy and regulatory infrastructure.

- **ICT Competition Law**
  Development of a repository database of relevant laws and cases in the region for further research

- **Collecting and sharing with the Public information on the region's reported cases and developments affecting technology.**

Center for Innovation Research in Cultural Intelligence + Leadership (CIRCQL)
Executive Director: Professor Ang Soon
Director of Research: Associate Professor Ng Kok Yee
Website: www.cci.ntu.edu.sg

Mission
To lead in the generation of Knowledge, Assessments, and Programs (KAP) for growing culturally intelligent individuals and organizations

Research Activities
I. Developing and validating novel and rigorous methodologies/instruments for assessing cultural intelligence

II. Establishing the predictive validity and impact of cultural intelligence through field and experimental studies. Findings of our studies are disseminated in international publications and conferences

III. Partnering corporate and government organizations in R&D on CQ and global talent issues, and in developing their global leaders through CQ training and coaching programs. Participants in our programs come from various continents including Asia, North and South America, Europe and Australia

IV. Enhancing CQ and global leadership skills development in undergraduate and graduate students in the university through innovative pedagogies and systematic assessment of students' learning outcomes

Insurance Risk and Financial Research Centre
Centre Director: Jun-Koo Kang, Distinguished Professor of Finance

About the Centre
The Insurance Risk and Finance Research Centre sponsors and directs primary research on insurance risk, Asian capital markets, and other important finance-related issues in the Asia-Pacific region. It seeks to provide a platform for dialogue among academics, industry, and regulators to facilitate the growing role of insurance and finance in the region's economic development.

Founded in March 2011, in partnership with global reinsurer SCOR, the Centre draws on the expertise of the School's Banking and Finance faculty as well as SCOR's global research network. Financial research on Asia's capital markets, particularly stock markets in China, is supported by Rega Capital Management of Hong Kong, and other corporate sponsors. The work of the Centre comprises:

- Risk research related to insurance and actuarial topics
- Financial research on Asian capital markets and other relevant topics
- Conferences on insurance risk and finance
- Research seminars
- Semi-annual publications
Advisory Board
The Centre’s research plans and activities are directed by an Advisory Board which will meet twice yearly to define, decide and oversee the Centre’s research projects.

Prof Gillian Yeo
Interim Dean, Nanyang Business School

Prof Jun-koo Kang
Head of Bank and Finance Division, Nanyang Business School

Mr Jean-Luc Besson
Director, SCOR

Mr Michael Dacoragna
Deputy Chief Risk Officer, SCOR

Mr Ben Ho
CEO Asia Pacific, SCOR

Prof Shaun Wang
Thomas P. Bowles Chair of Actuarial Science, Georgia State University

Information Management Research Centre (IMARC)
Director: Associate Professor Sia Siew Kien
Website: s3ap0005:6400/Research/ResearchCentres/IMARC/Pages/Overview.aspx

Mission
IMARC’s vision is to create and disseminate knowledge for effective IT management through innovative cross-disciplinary research and interactions with leaders in academia, business and government.

Research Activities
IMARC has been engaged in joint research with many organisations and collaborates with researchers world-wide on publications. The major research themes are listed below:
- Managing Complex IT Projects
- Cultural Intelligence and the IT Workforce
- Knowledge and Innovation Management
- Global Enterprises and IT Management
- Social Media and Information Goods

Managing Complex IT Projects
This research stream focuses on the studying of complex IT projects. The various research projects tend to be multi-year, multi-million, enterprise wide, involve diverse stakeholders, and several vendors. For many of these studies, we were able to collect longitudinal data as the project unfolded, and to observe the challenges faced and solutions tried. The broad research question pursued was how complex IT projects are managed. Key issues explored are the management of multiple stakeholders, project control, vendor transition, global-local tensions, and the challenges of enterprise integration.


Cultural Intelligence and the IT Workforce
This stream of research examines issues at the boundaries where the IT work environment interacts directly with the IT professional. In particular, the global use of IT has brought about a blurring of geographical boundaries, and IT professionals today must increasingly work in global IT workteams to deliver seamless IT services to organizations. To be effective, IT professionals need new capabilities to work effectively with clients, users, vendors, and other IT professionals from different cultures. This research stream focuses on the role of cultural intelligence for IT professionals, and its implications on work practices and performance. This complements our existing research on enduring issues such as (1) retention of IT talent; (2) socialization and integration of IT professionals into the organization and the IT profession; (3) development of IT careers; (4) managing professional obsolescence in the workforce, and (5) compensation, reward and incentive systems for IT professionals.


Global Enterprises and IT Management

As businesses reconfigure their value chains and scale up their global expansions, they have to cope with a myriad of complex IT management challenges. This research examines how enterprises realign their global IT strategies to achieve scale, responsiveness, and innovation. Anchored in the organization design literature of MNC structures and IT structure-governance, we seek to unravel the challenges in dynamically structuring and governing global IT organizations to balance the inherent global-local tensions. Working in collaboration, we conducted field interviews with CIOs and senior executives of global or regional enterprises with established Asian presence, e.g., P&G, Microsoft, Intel, Siemens, DBS Bank, OCBC Bank, and Neptune Oriental Line. More field studies will be conducted next year as we expand the studies outside Singapore.


Social Media and Information Goods

Popular social media sites are highly valued economically, with widespread economic activities surrounding these technology providers. These research projects examine the dimensions of social media technologies and examine how different types of social media affect the conversion of information into business value. We also examine how information propagates through the use of social media technologies, i.e., the nature of information dissemination social media, the speed and timing of information propagation, the routes through which information is disseminated, and the differences in the propagation of positive versus negative information. A closely related topic is the provision of digital information goods and services. Given their unique properties, we investigate issues of pricing, bundling, versioning, sales strategy as well as consumption patterns of these digital information goods and services.


S. Rajaratnam School of International Studies (RSIS)

Centre for Multilateralism Studies (CMS)
Head: Associate Professor Tan See Seng
Website: www.rsis.edu.sg/cms/

Vision
To be an international knowledge hub for multilateral cooperation and regional integration by contributing to international academic and public discourses on regional architecture and order in the Asia Pacific.

Mission
• To conduct scholarly and policy research on multilateral and regional issues.
• To facilitate policy dialogue and academic debate on regional cooperation and integration.
• To enhance the capacity of current and future leaders, officials, professionals, and students through executive and graduate education.
• To network and collaborate with other academic and research institutions.

Research Activities
In meeting its objectives, the Centre works through the following scope of activities:
• Annual conferences and workshops
• Research Fellow programme
• Curriculum development
• Capacity building
• Policy-relevant research outputs

CMS is committed to generate a regular stream of high impact scholarly and policy-oriented research as well as to disseminate them through myriad formats, media and outlets, which are targeted at policymakers, think-tanks and academic audiences.

Research Focus
The Centre’s research agenda includes international and global forms as well as expressions of cooperative multilateralism:
• Economic Multilateralism
  Research areas include trade, monetary, and financial integration in ASEAN, ASEAN+3, South Asia, and Central Asia; evolving linkages between various Asian sub-regions and with countries/sub-regions outside the region (such as the Asia Pacific Economic Cooperation, APEC and Trans-Pacific Partnership, TPP); and developments in the global economic architecture (including the Group of Twenty, G20) to ensure complementarity between global and regional initiatives.

• Diplomatic and Security Multilateralism
  Research areas include intergovernmental and non-official arrangements such as the ASEAN Regional Forum (ARF), ASEAN+3, East Asia Summit (EAS), Shanghai Cooperation Organisation (SCO), Six-Party Talks, the Council for Security Cooperation in the Asia Pacific (CSCAP), etc. Initiatives in defence diplomacy include the ASEAN Defence Ministers’ Meeting (ADMM) and ADMM Plus, the Shangri-La Dialogue, and alliances.
Centre of Excellence for National Security (CENS)
Head: Associate Professor Kumar Ramakrishna
Website: www.rsis.edu.sg/cens/

Vision
To be an international leader in the multi-disciplinary study of the concept of resilience, and in the policy-relevant application of such research in order to promote homeland/national security.

Mission
To produce rigorous policy-relevant analysis of a range of national security issues and increase the intellectual capital invested in strategising national security.

Research Activities
As a research unit of RSIS, CENS works closely with not just other RSIS research programmes, but also national security agencies such as the National Security Coordination Secretariat within the Prime Minister's Office. It aspires to be an international research leader in the multi-disciplinary study of the concept of resilience in all its aspects, and in the policy-relevant application of such research in order to promote security within and beyond Singapore.

To this end, CENS conducts research in three main domains:

- **Radicalisation Studies**
  The multi-disciplinary study of the indicators and causes of violent radicalisation, the promotion of community immunity to extremist ideas and best practices in individual rehabilitation.

- **Social Resilience**
  The inter-disciplinary study of the various constitutive elements of social resilience such as multiculturalism, citizenship, immigration and class. The core focus of this programme is understanding how globalised, multicultural societies can withstand and overcome security crises such as diseases and terrorist strikes.

- **Homeland Defence**
  A broad domain researching key nodes of the national security ecosystem. Areas of particular interest include the study of strategic and crisis communication, cyber security and public attitudes to national security issues.

Centre for Non-Traditional Security (NTS) Studies
Head: Associate Professor Mely Caballero-Anthony
Website: www.rsis.edu.sg/nts/

Vision
The Centre for NTS Studies aims to mainstream and advance the field of NTS studies in regional and international security discourse to complement traditional approaches to security that emphasises sovereignty, political and military independence, and defence. NTS issues are challenges to the survival and well-being of peoples and states that arise from non-military sources, such as climate change, resource scarcity, infectious diseases, natural disasters, food shortages and transnational crime. These dangers are transnational in scope, defying unilateral remedies and requiring comprehensive – political, economic and social – responses, as well as the humanitarian use of military force.

Mission
The Centre for NTS Studies conducts research and produces policy-relevant analyses aimed at furthering awareness and building capacity to address NTS issues and challenges in the Asia Pacific region and beyond.

Research Activities
To fulfil this mission, the Centre for NTS Studies aims to:

- Advance the understanding of NTS issues and challenges in the Asia Pacific by highlighting gaps in knowledge and policy, and identifying best practices among state and non-state actors in responding to these challenges.

- Provide a platform for scholars and policymakers within and outside Asia to discuss and analyse NTS issues in the region.

- Network with institutions and organisations worldwide to exchange information, insights and experiences in the area of NTS.

- Engage policymakers on the importance of NTS in guiding political responses to NTS issues and challenges in the Asia Pacific region and beyond.

- Contribute to building the institutional capacity of governments, and regional and international organisations to respond to NTS challenges.

The Centre's research activities focus on the following key programmes:

1. **Internal and Cross-Border Conflict**
   - Dynamics of Internal Conflicts
   - Multi-level and Multilateral Approaches to Internal Conflict
   - Responsibility to Protect (RtoP) in Asia
   - Peace-building

2. **Climate Change, Environmental Security and Natural Disasters**
   - Mitigation and Adaptation Policy Studies
   - Politics and Diplomacy of Climate Change

3. **Energy and Human Security**
   - Security and Safety of Energy Infrastructure
   - Stability of Energy Markets
   - Energy Sustainability
   - Nuclear Energy and Security

4. **Food Security**
   - Regional Cooperation
   - Food Security Indicators
   - Food Production and Human Security

5. **Health and Human Security**
   - Health and Human Security
   - Global Health Governance
   - Pandemic Preparedness and Global Response Networks
Policy Relevant Publications
The Centre for NTS Studies produces a range of output such as research reports, books, monographs, policy briefs and conference proceedings.

Training
Based in RSIS, which has an excellent record of post-graduate teaching, an international faculty, and an extensive network of policy institutes worldwide, the Centre is well-placed to develop robust research capabilities, conduct training courses and facilitate advanced education on NTS. These are aimed at, but not limited to, academics, analysts, policymakers and non-governmental organisations (NGOs).

Networking and Outreach
The Centre serves as a networking hub for researchers, policy analysts, policymakers, NGOs and media from across Asia and farther afield interested in NTS issues and challenges.

The Centre for NTS Studies is also the Secretariat of the Consortium of Non-Traditional Security Studies in Asia (NTS-Asia), which brings together 20 research institutes and think tanks from across Asia, and strives to develop the process of networking, consolidate existing research on NTS-related issues, and mainstream NTS studies in Asia.

International Centre for Political Violence and Terrorism Research (ICPVTR)
Head: Professor Rohan Gunaratna
Website: www.pvtr.org/index.htm

Vision
To integrate academic theory with practical knowledge, which is essential for a complete and comprehensive understanding of threats from politically motivated violence and terrorism.

Mission
To conduct research, training, and outreach programmes aimed at reducing the threat of politically motivated violence and at mitigating its effects on the international system.

Core Objectives
ICPVTR conducts several core research projects with the following aims:

- To conduct sustained research and analyses on terrorist, guerrilla, militia, and extremist political groups and their support bases. To this end, the Centre collects and analyses literature seeking to politicise, radicalise and mobilise the public into supporting extremism and participating in violence.
- To identify the strengths and weaknesses of international, state, and societal responses in managing the threat of political violence.
- To provide high quality instruction and training for officials and future leaders engaged in combating terrorism and other forms of political violence.
- To advise governments and inform societies affected by political violence on how best to manage the current and evolving threat.

Core Projects

- **Database**
  The ICPVTR Terrorism Database – Global Pathfinder – is a one-stop repository for information on current and emerging terrorist threats. This integrated database contains comprehensive profiles of terrorist groups, key terrorist personalities, terrorist and counter-terrorist incidents as well as terrorist training camps. The Centre has also established a database for extremist publications of security interest. Known as Viper, this database aims to be the first of its kind to identify and analyse extremist publications.

- **Capacity Building**
  In addition to teaching courses at the Master’s level, ICPVTR threat specialists conduct various levels of specialised courses for local and foreign law enforcement personnel from the military and police forces. The ICPVTR capacity building programme is geared towards providing world-class education and training for serving and future leaders in counter-terrorism.

- **Strategic Counter-Terrorism Projects**
  ICPVTR’s strategic counter-terrorism projects include ideological, legislative, educational, financial, media, informatics and developmental initiatives. These strategic projects seek to create an environment hostile to terrorist groups and their supporters. ICPVTR seeks to build a norm and an ethic against politically motivated violence, especially terrorism.

Temasek Foundation Centre for Trade & Negotiations (TFCTN)
Head: Dr Deborah Elms
Website: www.tfctn.org.sg

Mission
To aid development by increasing knowledge of trade negotiations and building the capacity of government and business leaders in the Asia Pacific region to better participate in economic globalisation.

Research Activities
TFCTN is leading the Trans-Pacific Partnership (TPP) Research Network. The TPP Research Network is intended to provide a better base of knowledge for officials. The Network members are interdisciplinary, and selected from across a wide range of countries. Each is an expert in relevant topics for research.

The Network has two primary roles: to examine past FTA practices for relevant lessons and to project forward to key elements of an evolving TPP FTA. The specific areas of research will evolve over time, as the TPP moves from early negotiations through completion with the nine original members and on to a likely expansion with the addition of new members.

Network participants will undertake research, disseminate information and facilitate discussion on TPP-related issues. An annual conference will provide an opportunity for academics and scholars to discuss their research and to identify areas for regional collaboration. Researchers will also prepare regular policy briefings for dissemination to the TPP policy community.

Other areas of research that TFCTN embarks on include international political economy, trade disputes, political psychology, conflict resolution, trade nexus climate change, American foreign and security policies.

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Counter-Terrorism Security
ICPVTR's Counter-terrorism Security projects seek to develop a coherent picture of the threats faced by critical industries and infrastructures, and key industries and services including the energy, transportation and hospitality sectors.

Research Activities
- Produce analyses, threat assessments and projections in relation to terrorism, extremism and political violence.
- Produce policy briefs.
- Profile terrorist and extremists groups, important individuals, significant attacks and religious and educational institutions linked to extremism.
- Study and produce reports on high profile terrorist attacks.
- Conduct field research on topics related to terrorism, political violence and extremism.
- Monitor, translate and analyse various extremist websites in Arabic, English, and other Southeast Asian languages.
- Maintain database of videos, terrorist manuals, and websites downloaded from the Internet and from terrorism investigations and court proceedings.
- Research on the developments in the ideology, propaganda, tactics, postings of operational and tactical manuals, and terrorist group activities.
- Conduct the Counter-Terrorism Leadership Programme for professionals from law enforcement, intelligence, military and security industries.
- Conduct the Terrorism Analysis Training Course, an annual course for law enforcement, intelligence and other government officials.
- Organise conferences and workshops on relevant topics.
- Develop courses/curriculum for various agencies on topics related to terrorism and political violence.
- Collaborate with the public and private sectors to develop best practices in countering terrorism and extremism.

The Learning Sciences Laboratory
Head: Assoc Prof Manu Kapur
Website: lsl.nie.edu.sg

Research Activities
The Learning Sciences Laboratory aims to empower learners, in schools and beyond, through design research centred on enabling tools and participatory cultures. As the first such laboratory in Asia, LSL uses interdisciplinary approaches aimed at impacting educational theory and practice.

Centre for International Comparative Studies
Head: Prof Berinderjeet Kaur
Website: www.nie.edu.sg/research-centres/centre-international-comparative-studies

Research Activities
The Centre for International Comparative Studies is a joint collaboration between NIE and the International Study Centre at the Lynch School of Education, Boston College. CICS spearheads comparative research based on data from the TIMSS and PIRLS studies.

Centre for Arts Research in Education
Head: Asst Prof Lum Chee Hoo
Website: www.unesco-care.nie.edu.sg

Research Activities
The Centre for Arts Research in Education is a UNESCO Observatory based in NIE. CARE facilitates research that promotes education in and through the arts. It also seeks to foster a strong collaborative network between NIE and UNESCO, and with researchers in the Asia-Pacific region.

National Institute of Education
Centre for Research in Pedagogy and Practice (CRPP)
Head: Assoc Prof Kerry Lee
Website: www.nie.edu.sg/research-centres/centre-research-pedagogy-practice-crpp

Research Activities
The Centre for Research in Pedagogy and Practice studies students' learning and motivation and teachers' professional development across all grades and subjects. CRPP’s research aims to help Singaporean students and teachers address the challenges of the 21st century.

The Learning Sciences Laboratory
Head: Assoc Prof Manu Kapur
Website: lsl.nie.edu.sg

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Research Activities
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Centre for Scaling, Translation and Commercialization (STAC)
Head: Prof Looi Chee Kit

Research Activities
The Centre for Scaling, Translation and Commercialization is devoted to the scholarship of the processes of translation and scaling in education. The research scope includes the design, adoption, adaptation and dissemination of educational interventions in diverse situations leading to evidence-based bridging between research and practice.

Motivation in Educational Research Laboratory (MERL)
Head: Prof John Wang

Research Activities
The Motivation in Educational Research Laboratory was set up to promote research pertaining to motivational issues in education and examine ways to translate theory into classroom practice. It also serves to provide a platform for practitioners and researchers to discuss issues and research related to education, and to translate theories into knowledge for evidenced-based practice in education.
NTU Libraries

The strength of our Libraries is in the wide range and depth of electronic resources available, the high number of workstations, our responsive and friendly library staff and the in demand instructional classes and outreach activities we regularly organise.

Resources

NTU Libraries hold a range of library materials catering to various learning needs and preferences. The print collection can be searched using the Library Catalogue (http://opac.ntu.edu.sg). Students and academic staff can borrow up to 20 and 40 items, respectively, at any one time. Access the Libraries’ rich electronic resources on any computer on campus (www.ntu.edu.sg/library/databases). The full text of student theses, examination papers and other publications from NTU staff and students is also available in the Digital Repository. – DR-NTU - http://www.ntu.edu.sg/library/collections/Pages/DRNTU.aspx. DR-NTU aims to showcase to the world research articles published by our faculty.

Services

Our librarians assist users to access library resources and tools, and conduct classes on how to do literature reviews, find, evaluate and use information effectively and understand the scholarly communication environment. All our librarians specialise in various subject disciplines and can help users resolve information seeking problems in their course areas. They also organise regular get-togethers with users to obtain feedback.

Facilities

7 well-equipped libraries on campus provide conducive spaces for learning and study with over 700 workstations and network printing facilities.

Lee Wee Nam Library

Location : Blk NS3 Level 3

This is our flagship library building, named in order to recognise a generous donation by the family of the late Mr Lee Wee Nam. LWN Library houses the Engineering and Science collections and the Library administration. This well photographed building has reading space to cater for both group discussion as well as individual quiet reading. The window seats, in particular at Level 5, overlook the green campus surroundings and have an excellent view of Jurong West and even parts of the Straits of Johor. Level 2 boasts a state of the art learning commons with technology focused on supporting group learning activities.

Art, Design & Media Library

Location : ART-01-03

ADM Library is located within the School of Art, Design & Media and is specifically designed to reflect the creative and artistic nature of its environment. It houses a growing collection of resources in the visual arts, architecture, drawing, design, illustration, painting and photography and a strong collection of audio-visual materials. Interesting areas in the Library include a mini cinema, a group viewing area that can play 3D blu-ray movies, flexible seating space and a large, black glass wall for doodling.

Asian Communication Resource Centre

Location : WKWSCI-01-18

ACRC is located in the Wee Kim Wee School of Communication & Information and incorporates materials from the former Asian Media Information and Communication Centre (AMIC) Documentation Unit and the SCI Resource Centre. The collection comprises resources on advertising, broadcasting, communication studies, information studies, journalism, knowledge management, library science, media law and ethics, amongst others.

Business Library

Location: N2-B2b-07

This Library houses the core business collection comprising of books and journals in the field of accounting, banking, business law, entrepreneurship, finance, hospitality management, international business, management, marketing and strategy. It also holds the main audio-visual collection comprising music CDs as well as VCD and DVD titles in all subject areas and genres. A cinema room and individual workstations are provided for the listening and viewing pleasure of these audio-visual materials. This Library also has a Business Lounge, with access to subscribed databases, and a Boardroom. Technology assisted group learning areas, language learning facilities and resources on specialist career research materials are provided in the Learning Commons area on Level B3.
Chinese Library  
Location: S4-B3c

The interim Chinese Library houses resources in the Chinese language on Chinese literature and history, philosophy and religion, linguistics, politics, economics, sociology and management science. It is a small but welcoming area popular with users wishing to read Chinese language materials.

Humanities and Social Sciences Library  
Location: S4-B3c

This interim library provides a growing collection relating to psychology, sociology, history, linguistics, literature, philosophy and public administration. To meet the diverse needs of users, the library has facilities for group learning and quiet study. Facing a gentle green slope, it also offers a conducive setting for reflection and leisure reading. Shaded outdoor seating is also provided.

Wang Gungwu Library  
Location: CHC-02

In 2003, Professor Wang Gungwu made a generous book donation to the Resource Centre at the Chinese Heritage Centre. The Resource Centre was renamed Wang Gungwu Library in recognition of this significant contribution to research on Chinese overseas and for Professor Wang's generous donation. WGWL focuses on collecting materials related to Chinese overseas.

For general enquiries and feedback, please email library@ntu.edu.sg.

For queries on specific resources, contact one of the subject librarians listed in http://www.ntu.edu.sg/library/about/staffdirectory/Pages/subjects.aspx

Centre for IT Services

The Centre for IT Services (CITS) manages the campus-wide IT infrastructure to facilitate access to all campus IT resources, and coordinates the deployment of all campus e-services and IT technical support.

Every matriculated student is provided with a computer account to facilitate convenient access to online services such as course registration, examination matters, e-learning and e-billing. With the university's high-speed campus-wide wired and wireless computer networks, our students enjoy:
- Free global Internet, national and campus network access
- Campus-wide computing mobility via wireless network
- High-speed network access via network points in every student hostel room
- Convenient access to all campus high-performance computing facilities
- Remote connection to the NTU campus network via Internet service providers
- Free wireless access to NTU online resources at other Institutes of Higher Learning

Student learning is further facilitated and enriched by:
- A lifelong free personal email box with large storage space
- Convenient one-stop access to online services and resources via Intranet portal iNTU
- 24/7 access to online learning materials, discussion groups and library resources
- Access to e-services and information on mobile devices
- Live video web casts of interesting seminars and events
- Free subscription to mailing lists and e-newsletters on campus events
- Free e-collaboration services
- Free web-accessible storage for personal use or sharing
- Free use of laptop-friendly learning hub and collaborative spaces on campus
- Interest-free loan and special discounts for purchase of personal computers

Find out more at CITS website: http://www.ntu.edu.sg/cits
Centre for Excellence in Learning and Teaching

The Centre for Excellence in Learning and Teaching aims to advance the quality of educational development to significantly enhance student learning and professional teaching in the community. Its vision is to be known as a provider of choice with a national and international reputation for leadership in advancing the development of higher learning and blended education.

An overview of the Centre's Services and Resources is as follows:

**Learning Space Resource Management**
- Services to enhance education and virtual learning and teaching

**Design and Media Services**
- Services (audio-video, graphics, multimedia and photography, etc) to enhance the corporate image of departments and schools, and also support faculty in teaching, research and publication

**Learning Technologies**
- Services to promote quality in university online education
- Manage NTU's eLearning Management System 'edveNTUre'

**Online Course Management and Delivery**
- Design and development of web-based teaching materials for online teaching
- User consultation on effective courseware design
- Creation of interactive assessment and evaluation tools
- Training for academic staff on the use of e-learning services

**Courseware Design**
- Services include design and development of course materials for teaching; consultation and planning for faculty development and training in pedagogy/andragogy.

**edUtorium Programmes**
- Professional development for staff, faculty and students.

Language and Communication Centre

If language and communication are the tools essential for learning, then the Language and Communication Centre is where these tools are fashioned and made ready for use. The Centre, which is part of the School of Humanities and Social Sciences, designs courses to help NTU students sharpen these tools for learning. Our courses combine theory with hands-on practice and group work, to allow for a lively exchange of ideas. Students learn to communicate ideas not only through writing but also through speaking in a variety of educational and professional settings during their years in university.

An overview of our courses is as follows:

**GER-Core**
- Writing courses that help students craft their text and master the art of writing in their disciplines
- Communication skills courses that help students communicate effectively in different contexts, including the workplace

**Foundation**
- Language courses that help students cope with the demands of using English at tertiary level
Smoke Free Campus

The NTU Yunnan Garden Campus is a smoke-free campus. This is to create a cleaner, safer and healthier environment for the NTU community and protect students, faculty and staff members, and the public from the harmful effects of second-hand smoke.

All faculty, staff members and students are encouraged to play a role in keeping NTU clean and smoke-free. Under the Smoking (Prohibition in Certain Places) Act, an individual who is caught smoking in a prohibited place is liable on conviction to a fine of $200. Individuals who repeatedly flout regulations will be referred to the National Environment Agency (NEA) for appropriate action which can include a fine of up to $1,000.

Medical and Counselling Services

NTU Student Counselling Centre

The Student Counselling Centre (SCC) offers a supportive and conducive environment for any student with personal issues or challenges to seek help and guidance from a professional counsellor. Its team of registered psychologist, counsellors and case coordinator are experienced in helping students from various backgrounds and cultures, and with a wide range of issues.

SCC organises talks regularly to promote mental health awareness and wellness among NTU students and staff. Mental health professionals are invited as speakers to share their knowledge and experiences. It also conducts workshops such as Stress Management for students to help them cope with the demands of their academic studies. The centre provides self-help resources such as brochures on personal effectiveness, mental health, study techniques and relationships. They are available online or at the resource racks of the counselling centre.

As part of the Peer Helping Programme, the counsellors provide training for a group of student volunteers known as “confidants” to identify and befriend fellow students with emotional issues. They are also equipped with mental health resources and knowledge on how to refer students in a crisis to a counsellor or doctor.

Medical Centre

The Medical Centre on campus is operated by a private medical group Gethin-Jones Medical Practice Pte Ltd, which is owned by Fullerton Healthcare Group Pte Ltd. More information is available at http://www.ntu.edu.sg/Students/Undergraduate/StudentServices/HealthAndCounselling/Pages/MedicalCentres.aspx

Medical Scheme

Besides operating the clinic on campus, Gethin-Jones Medical Practice Pte Ltd is also contracted to administer the Medical Scheme for full-time undergraduates and NIE trainee teachers. Those covered under the Medical Scheme are entitled to prepaid outpatient treatment and standard medicine at the Centre, as well as limited medical coverage for admissible specialist outpatient and hospitalisation expenses at public restructured hospitals.

Campus Dining

Canteens

NTU is a haven for foodies looking for delectable yet reasonably priced food. There are eleven canteens serving a variety of Chinese, Western, Malay, Indian, and Japanese and Korean fare. Besides the heavily-patronized food court located at Block N2.1 and Canteen B at the South Spine, canteens can also be found in Halls of Residence 1, 2, 4, 5, 9, 11, 13, 14 and 16. Hot and cold beverages, fruits and popular local desserts add to the wide array of dishes. For those looking for healthy beverages using natural ingredients such as soya bean and fruits, such special flavoured drinks stalls can also be spotted at Canteen B.

Canteens in the Halls of Residence are open daily from 7 am to 9 pm. The food court and Canteen B are open from 7am to 9 pm from Mondays to Fridays. They stay open till 3pm on Saturdays. Fast food die-hards can choose from McDonald’s, Subway, Canadian Pizza and Old Chang Kee, all of which are conveniently located at Block N2.1.

Cafes and Restaurants

For an outdoor dining experience, all students need to do is make their way to the Café Al-Fresco at the International Student Centre or Café by the Quad. Both offer Asian and Western set meals with the latter also offering a wide selection of cakes and pastries to tempt the taste buds.

Coffee connoisseurs can turn to Caffe Express, a café located outside the Nanyang Auditorium for your favourite cup of coffee.
Another spot you may want to visit is Vanner at Level 1 Nanyang Auditorium, which also provides you with a selection of cakes, sandwiches, snacks and western meals.

You can also visit Pitchstop at Innovation Centre for pizza, pastries and beer after a hard day at work.

Adding to the campus food scene is the Palette, which serves Western meals.

For more formal settings, Executive Café at Block N2.1 is the place to be. The restaurant menu features local specialties, seasonal fare and favorite Chinese dishes. Operating hours at Executive Café are from 10 am to 10 pm, Mondays to Sundays.

**Campus Media**

**ChannelNTU**
The ChannelNTU system is driven by the Scala digital signage solution. With this new publishing solution, the content creator can seamlessly combine text, graphic, sound and video into broadcast-quality multimedia on the computer. The new system allows users to author and schedule professional media in an attention-grabbing environment for virtually any type of display application. It now gives users more creative control with the files they have already produced with other industry-standard applications. When the content is created, it can be readily distributed to the multiple plasma screens around campus.

The publication of new content can be triggered automatically at set schedules, with the built-in FTP server. The intelligent file transfer also allows different screens on the campus to show different contents. Multiple designers can work on a project simultaneously, and the administrator can perform Remote Player administration of files, synchronise clocks, reboot machines, etc. The administrator can monitor the status of all players through the software.

**Nanyang Chronicle**
The Nanyang Chronicle is a student-run campus newspaper, published by the Wee Kim Wee School of Communication and Information, once every three weeks. The Chronicle provides campus news and information as well as being the voice of the campus population. The paper also provides practical training for undergraduates who are keen to work in the field of journalism after graduation.

**NTU Tribune**
The NTU Tribune, a publication of the NTU Students’ Union, is disseminated free to all students on a monthly basis during term time. Besides covering exciting events held by student organisations, the publication highlights issues of interest to students, such as academic and welfare matters, professional advice, and even sports, fashion and music. One can also learn about the views and opinions of students on relevant issues, which are collected through surveys and interviews.

**Housing**

**Residential life on campus**
Hall living, which builds a sense of camaraderie and belonging, is an integral part of the educational experience. All freshmen are especially encouraged to stay in the Halls where they can mingle and interact with one another by taking part in sports, social functions, cultural activities, entrepreneurial activities and other leisure pursuits.

NTU has 16 halls of residence that can accommodate some 9,200 students. Students can choose either single or double rooms as well as either air-conditioned or non-air-conditioned rooms. On average, 12 percent of the rooms are single rooms. The size of hall rooms range from 8.75 sqm to 21.45 sqm. The current monthly rates for single and double rooms are $270 – $315 and $195 - $230 respectively and are subject to revision.

All halls are co-ed, with male and female residents housed on separate floors or in separate wings. The halls come with facilities and amenities such as lounges, television rooms, air-conditioned reading rooms, kitchenettes equipped with cooking utensils, laundry rooms with washing machines and computer rooms with PC terminals.

Each hall is served by a group of five academic or administrative staff members who are appointed by the NTU President to carry out the important responsibilities of mentoring the students, promoting the quality of residential life and, in collaboration with the student bodies in the halls (known as the Junior Common Room Committees), forging a Hall and NTU identity.

**Off-campus Accommodation**
Please visit our website for information on HDB flats and private residences that are available for rental. (http://www.ntu.edu.sg/hso/Off-Campus/Pages/default.aspx)

Rental rates range from $350 to $1,300 per month for a room and $2,200 to $3,500 per month for an apartment, depending on factors such as the size and type of apartment, furniture or furnishings provided and proximity to facilities.

When looking for off-campus accommodation, consider factors such as proximity to the University. Jurong West, Boon Lay and Jurong East are near campus. Proximity to direct bus services is another consideration, and it is important that you choose to live near a direct bus route to the University. Direct SBS bus services 179 and 199 ply the route between the Boon Lay Bus Interchange and NTU from 6am to 12.20am daily.

Other considerations may include proximity to shopping centres, shops, coffee shops, restaurants and supermarkets.

By and large, Singapore is a safe city, but everyone should still take precautions for his or her own security.

After having decided on your ideal accommodation, make direct contact with the house owners to inspect the premises and discuss rental terms. Remember to take into consideration other costs which may not be included in the rental such as utility and telephone bills.

Last but not least, do pay careful attention to the terms and conditions of the agreement, in particular the tenure and security deposits, before signing any documents.
A Rich and Vibrant Student Life

Students’ Union and other student organisations
More than 100 student organisations are available for students to explore diverse interests and create their own unique NTU story. The Students’ Union represents the interests of all full-time undergraduates, while 13 academic constituent clubs and 16 Junior Common Room Committees cater to the specific interests of students in the various Schools and residents at the Halls of Residence respectively. There are also three non-academic constituent clubs (Cultural Activities Club, Sports Club and Welfare Services Club) and 76 other interest groups catering to hobbies such as board games, fishing, food appreciation, current affairs and investing.

Some notable events on the student activities calendar include:
- Students’ Union: International Culture and Travel Fair, Union Welcome Week
- Welfare Services Club: Camp Outreach (an expedition for hearing impaired youth and volunteers), Project Identity (a public showcase of the talents of persons with intellectual disability)
- Cultural Activities Club: Nanyang Arts Festival (a month-long series of concerts and performing arts workshops), Impresario (a nationwide talent search competition)
- Sports Club: Vertical Marathon (Singapore’s version of the Empire State Building Run-up), Surf and Sweat (competitive and leisure sports events open to the public held at the beach)

Student Activities Centre and Global Lounge
Located at the North Spine near amenities such as the bank, convenience store and food court, the Student Activities Centre (SAC) and the Global Lounge are campus hotspots for students to chill out with friends over freshly brewed coffee or engage in project discussions with professors and classmates.

Planned for students by students, the one-stop centre is open daily from 7am to 2 am to meet both learning and recreational needs. Facilities such as a study zone, meeting rooms, computer terminals and a game zone are well within reach. One can even catch news and shows from all around the world on the wide screens available. Whether it is studying or relaxing, the SAC and the Global Lounge offer it in both style and comfort.

Nanyang House
The Nanyang House, one of the few places where one can admire unblocked views of the sprawling Yunnan Garden campus, offers a spread of facilities for students to carry out and participate in activities such as training, workshops and get-together. Generations of students have thronged the dance studio and music rooms to practise their routines and instruments; the air rifle shooting range and billiard room to train their precision; and the seminar and function rooms to hold cozy gatherings.

Sports and Recreation
An active sporting calendar and ample recreational opportunities provided by the Sports and Recreation Centre ensure a complete learning experience for our students as participation in competitive sports and recreation activities forms an integral part of University education.

Competitive sports
The serious athlete may vie to represent NTU in any of the over 20 sports competed at the Singapore Universities Games (SUniG), the Institute-Varsity-Polytechnic (IVP) Games, local leagues and tournaments. They may also strive towards representing Singapore and the University in Regional and International Games like the World University Games, World University Championships, ASEAN University Games and Asian University Championships.

Sports Exchanges
Besides competitions, student athletes may also bring their sport to a higher level through sports exchanges and invitational competitions overseas.

Re’kre-at NTU
The objectives of this programme are to offer opportunities for students to learn and participate actively in sports and recreational activities according to their interest and ability.

Students are encouraged to pick up new skills and knowledge, take part in regular group exercise sessions, learn martial arts and pick up new sports at a social level under this 5-week programme. A nominal sum is payable for certain programmes.

Pretty Tuff
Pretty Tuff is a programme geared towards encouraging female students at NTU to exercise. Participants pay a nominal sum of membership fee each semester to join the 5-week exercise programmes that include courses such as belly dancing, pilates, yoga, kick boxing, etc. All courses are conducted by professional instructors.

Healthy lifestyle
Members of the university can look forward to a host of health and fitness events, quizzes and talks, as well as health and fitness assessments which are organized by the Healthy Lifestyle Unit.

Facilities
The Sports and Recreation Centre administers the use of a comprehensive range of sports facilities, loan of equipment and provides first aid assistance. Indoor facilities include: three Multi-Purpose Sports Halls, four Activity Rooms, two Fitness Gyms and four Squash Courts. Outdoor facilities include: one Archery Range, one Cricket Training Net, one 8-lane 400m Running Track, one Football Field with an estimated gallery seating capacity of 1000pax, three Multi-Purpose Fields, three Basketball Courts, one Street Soccer Court, three Multi-Purpose Courts, two Sepak Takraw Courts, six Tennis Courts (one with practice wall), one 50m 8-lane Swimming Pool, one Diving Pool, one Wading Pool and, lastly one Futsal Court and one Volleyball Court beside Hall of Residence 2.
**Student Support Services**

**Student’s Pass**
All international students are required to hold a valid Student’s Pass issued by the Immigration and Checkpoints Authority (ICA). Before departing their home country for Singapore, they are required to apply for this pass (Form 16) using the Student’s Pass On-Line Application and Registration (SOLAR) system at the ICA website: http://www.ica.gov.sg. The SOLAR application number and other details needed by applicants to log in to the SOLAR system will be sent to them respectively.

Those who require a visa to enter Singapore are required to submit Form 16 in their hometown before departing for Singapore. When successful in their application, they will receive from NTU the In-Principle Approval Letter for a Student’s Pass cum the single-journey entry visa to enter Singapore.

The Student Affairs Office main office administers Student’s Pass applications by undergraduates.

- [http://www.ntu.edu.sg/Students/Undergraduate/StudentServices/Immigration/Pages/default.aspx](http://www.ntu.edu.sg/Students/Undergraduate/StudentServices/Immigration/Pages/default.aspx)

Student’s Pass matters for graduate and exchange/ non-graduating students are handled by the International Student Centre:

- [http://www.ntu.edu.sg/isc/LivinginSingapore/immigration/Pages/StudentsPass.aspx](http://www.ntu.edu.sg/isc/LivinginSingapore/immigration/Pages/StudentsPass.aspx)

**Group Personal Accident Insurance Scheme**
The Group Personal Accident Insurance Scheme is applicable to full-time and part-time undergraduates as well as NIE students, providing personal accident insurance coverage of up to $3,000 per accident (out of this $3,000, a cap of $1,000 is applied on outpatient expenses). NIE students are advised to contact their Student Services Centre for any enquiry on the scheme.

**Group Hospitalisation and Surgical Insurance**
Group Hospitalisation and Surgical Insurance (GHSI) is compulsory for all full-time international students, including Singapore permanent residents.

Falling ill and being hospitalised in Singapore can be a financial drain on international students. Not only are international students not entitled to the medical subsidies that Singapore citizens enjoy, hospitals also typically require a deposit of the entire estimated bill size upon admission. For eligible students on the GHSI, the underwriter of GHSI will prepare a Letter of Guarantee, which the student can present to the hospital in lieu of the cash deposit, subject to terms and conditions of the insurance scheme. Details of this insurance scheme, including the annual limit, coverage, and exclusion can be found at [http://www.ntughsi.com.sg](http://www.ntughsi.com.sg)

**Employment schemes**
Full-time matriculated international students may seek prior endorsement from the University to work part-time during their studies.

Scholarship recipients must obtain the approval of their scholarship sponsors if they wish to work part-time. Details of the terms and conditions for part-time employment can be found at [http://www.ntu.edu.sg/Students/Undergraduate/StudentServices/StudentJobs/Pages/default.aspx](http://www.ntu.edu.sg/Students/Undergraduate/StudentServices/StudentJobs/Pages/default.aspx)

Exchange students are not allowed to work part-time unless they are on the Work Experience Programme.

**Transport services**
Public bus services 179, 179A and 199 (SBS Transit) take students to and from NTU and the Boon Lay Bus Interchange. Students staying on campus can either walk to class or take the fare-free NTU shuttle buses.

**International Student Centre Services and Information**
The International Student Centre (ISC) and the Student Affairs Office offer a full range of services and programmes to foster student success, global perspectives, intercultural awareness and international goodwill. We assist international students with:

- Pre-arrival information
- Application for a student’s pass
- Enquiries on immigration
- Insurance
- Pastoral care
- Help during a crisis
- Enquiries on part-time employment

**Events and Activities**
The centre promotes cross-cultural understanding and interaction. All students at NTU are welcome to attend ISC’s events and activities, which include:

- Orientation
- Campus tours
- Coffee sessions
- Community service work
- Cultural tours and outings
- Festive open house
- Host family scheme
- Luncheons
- Pre-graduation seminars
- Growth, Embracement & Learn Programme
CONTACT ISC
Need assistance? Contact ISC today. Students are welcome to speak with a staff member during office hours, call or send us an email.

International Student Centre
Student Affairs Office
Nanyang Technological University
International House
36 Nanyang Avenue #02-02
Singapore 639801

Tel: (65) 6790 6823
Fax: (65) 6793 4558
Email: isc@ntu.edu.sg

Office Hours
Monday to Thursday: 8:30am to 5:45pm
Friday: 8:30am to 5:15pm
Closed on weekends and public holidays

For more information, please visit www.ntu.edu.sg/isc or email ISC (isc@ntu.edu.sg).

CareerHub@CAO
CareerHub@CAO, a unit under Career & Attachment Office (CAO), is the University’s very own Career Centre. It caters specifically to NTU students and alumni. CareerHub@CAO strives to develop NTU students’ ability to make informed career decisions throughout their life and support them in achieving success and satisfaction in their careers. CareerHub@CAO is the focal point that connects NTU students, alumni and employers through a variety of services and events:

- **Career Coaching and Advising**
  Career coaches are available to help guide and advise students on their career interests and preferences.

- **Career Assessment Tools**
  Career coaches help students identify suitable career options and their desired career paths using suitable career tools such as CareerLeader-College and the Harrison Career Suitability Profiling Tool.

- **Mentor-Link**
  Students can connect with alumni in various industries to gain insiders’ perspectives and advice on their career queries.

- **Career Resource Centre**
  Students may visit the Career Resource Centre to access the latest career books and videos as well as a collection of company profiles and recruitment brochures.

- **Career Skills Preparation Workshops and Industry Talks**
  Workshops and talks are organised on a regular basis to enhance students’ career skills and industry knowledge. Topics for career talks include resume writing, interview skills, networking, grooming, business etiquette, career management, wine appreciation, etc. Industry players are also invited down to conduct talks on their particular industry, the outlook of the industry, career paths available, skills requirements and more.

- **Recruitment Drives**
  CareerHub@CAO has a number of services in place to provide graduating students the opportunities to be noticed and hired by employers. To attract prospective employers to campus and create opportunities for graduating students to network and interact with potential employers, CareerHub@CAO holds regular activities including:
  - Networking events
  - Recruitment talks
  - Career Fair
  - iFair
  - Campus Interviews

Graduating students can also post their profiles and apply jobs on NTU Talent Site. Students seeking part-time, vacation and full-time job opportunities can access the job portal: http://ntu.jobscentral.com.sg/.
Conduct and Discipline

Academic Integrity

The University is committed to maintaining integrity and honesty in all academic activities of the University community. Academic integrity is described as the avoidance of plagiarism and academic fraud. All members of the NTU community, including non-graduating students, are responsible for upholding the values of academic integrity in all academic undertakings.

By avoiding plagiarism and academic fraud, students demonstrate a greater level of sophistication in their work to their professors. Properly citing references, quoting correctly, and using secondary material in a scholarly way, makes visible how much extra work they have done, and it also shows their ability to evaluate evidence and to use evidence to support their work. Simply cutting and pasting, or copying from another source, without any referencing or quotation marks, makes it look as if students have not used any other sources.

Academic work at university is about building new knowledge on already existing knowledge, and students, by clearly showing that they have used other sources in their work to build on, are demonstrating how well they have learnt good academic practice.

The principles of academic integrity are shared by students and faculty alike. They apply just as much to faculty undertaking research, as to students undertaking a degree programme.

What Students Can Do to Learn More

1. Read the Academic Integrity website
(http://academicintegrity.ntu.edu.sg). Through this website, students can find more details about what academic integrity refers to, and how to practise and maintain it.

2. Do the Academic Integrity Module
Students are required to complete the Academic Integrity Online Module which includes reading the information provided online and doing an online quiz.

3. Use Turnitin
Turnitin is a “text-matching” software. Students can submit their assignments to Turnitin if their lecturers have created it as a Turnitin assignment and it will show them exactly where their work matches that of other students and where it matches published work. From this, professors can see whether they have made proper acknowledgement of the work of others. Turnitin is a useful tool for students to learn and to help them maintain academic integrity.

Academic Integrity at NTU

NTU takes academic integrity seriously. Academic misconduct is regarded as a very serious offence by the University. It is considered as an instance of violation of the NTU Honour Code which could warrant disciplinary actions ranging from failing the assignment, failing the course, suspension and to expulsion from the University.

Plagiarism

NTU Honour Code currently defines ‘plagiarism’ as ‘to use or pass off as one’s own, writings or ideas of another, without acknowledging or crediting the source from which the ideas are taken’. This includes:
• The use of words, images, diagrams, graphs or ideas derived from books, journals, magazines, visual media, and the internet without proper acknowledgement;
• Copying of work from the internet or any other sources and presenting as one’s own; and
• Submitting the same piece of work for different courses or to different journals and publications.

Academic Fraud

Academic fraud is a form of academic dishonesty involving cheating, lying and stealing. This includes:
• Cheating - Bringing or having access to unauthorised books or materials during an examination or assessment, or in any work to be used by the lecturer, tutor, instructor or examiner as a basis of grading.
• Collusion - Copying the work of another student, having another person write one’s assignments, or allowing another student to borrow one’s work.
Exceptions
However the permission of the owner is not required:
1. Where the work is copied for self-study or research, that is, only 1 article in a periodical publication is copied or not more than 10% is copied of a published work which consists of 10 pages or more or not more than 1 chapter is copied of a work which is divided into chapters.
2. Where the work is in electronic form and not more than 10% of the total number of bytes in that edition is copied or 10% of the total number of words in that edition or of the contents of that edition is copied.
3. Where a computer program is reproduced is made on behalf of the owner as a back-up copy of the original computer program.
4. Where an audio visual work (such as sound recording, cinematograph film, sound broadcast, television broadcast or cable programme) is copied for research or private study, subject to certain qualifications specified in the Copyright Act.
5. Where a film or recording of television or sound broadcast or cable programmes is copied for private and domestic use. It should not be seen or heard in public.
6. Where a literary, dramatic, musical or artistic work is copied for criticism or review, and for the reporting of current events, and sufficient acknowledgment of the work is made.
7. Where a work is copied after the copyright in the work ceases.

What Are The Consequences Of Copyright Infringement?
In Singapore, copyright is protected mainly by the Copyright Act (Cap. 63).
A person who publishes, reproduces or communicates a copyright work without the permission of the Owner infringes his copyright. It is also an infringement to authorise others to infringe copyright, such as requesting a photocopying shop to make a copy of the book.
The person who infringes copyright may be sued by the owner for monetary compensation such as profits made from the infringement. The owner may also obtain a court order to prevent further infringement.

Facilitating Academic Dishonesty
This includes allowing another student to copy an assignment that is supposed to be done individually, allowing another student to copy answers during an examination/assessment and taking an examination/assessment or doing an assignment for another student.

Copyright and You
What is Copyright?
When a person expresses himself by creating a literary, dramatic, musical or artistic work, he has copyright in the work. Such work include books, periodicals, magazines, compilations of information, photographs, diagrams, dances, scripts for plays, computer programs, drawings, sculpture, musical scores, lyrics, sound recordings, cinematographic films, television broadcasts and cable programmes.
The law protects the creator's expression manifested through the work but not the information contained in the work. For example, where 2 persons present the same statistics in different ways, the law will allow each of them to publish their presentation and prevent others from publishing the same presentation. Others may use the same statistics to make different presentations.

Who Owns Copyright and What Rights Does the Owner Have?
The creator of the work will own the copyright in it and so the law gives him the exclusive right to publish, reproduce, communicate and benefit from the work in other ways. Other persons cannot do so without the permission of the copyright owner.
The copyright owner may permit others to publish, reproduce or communicate the work through agreements like licences. The owner may set conditions for such permission such as charging a fee.

• Falsification of Data – Fabrication or alteration of data to mislead such as changing data to get better experiment results.
• False Citation – Citing a source that was never utilised or attributing work to a source from which the referenced material was not obtained.
Where the infringement is intentional and the infringement is significant or gives the infringer a commercial benefit, the infringer may be fined in court up to $20,000 and/or jailed for not more than 6 months. Second or subsequent offences may attract the maximum fine of $50,000 and the longest imprisonment term of 3 years. An example of a significant infringement is the massive regular downloading of songs or movies using peer-to-peer networks.

A person who is found with 5 or more infringing copies of any work is presumed to be in possession of them for sale and may be fined $10,000/- for each infringing article or $100,000/- whichever is lower. He may also be jailed for not longer than 5 years. In both cases, the infringing copies or anything used to make the infringing copies may be destroyed or surrendered to the copyright owner.

**Conclusion**
The University takes a serious view of any infringement of copyright by students and a contravention of the provisions of the Copyright Act is deemed to be a breach of the University’s rules and regulations, which could result in disciplinary action.

The University advises all students to respect the copyright of all copyright owners’ works and encourages the purchase of original textbooks, CDs, DVDs and/or other copyrighted materials that are required for your courses of study. The cost of these materials is insignificant compared to the penalties for copyright infringement.

**Honour Code**
Note: At the time of publication, the University was in the process of reviewing the Honour Code. The updated code will be posted at http://www.ntu.edu.sg/sao/Pages/HonourCode.aspx.

**Disciplinary Processes**
Every student is subject to the University’s discipline regulation from the time of admission as a candidate for any program of the University until he completes the program or withdraws from it. A student in breach of the Statutes or Regulations of the University, or who has been convicted of a crime, or whose conduct is prejudicial to the good name of the University or whose conduct is unworthy of a student of the University, may be required to appear before the Board of Discipline.

The Board of Discipline may, if it finds a student guilty of a disciplinary offence, do one or more of the following things:

i) expel or suspend the student from the University or deprive him of his status as a matriculated or registered student;

ii) deprive the student of a pass in the whole or part of any examination; and

iii) impose a fine not exceeding $10,000

A student whom the Board has imposed a penalty as outlined below may submit an appeal to the Appeal Committee within 14 days from the date of the decision of the Board:

i. expelled from the University; or

ii. suspended or excluded from the University or any course or subject; or

iii. deprived of status as a matriculated or registered student for more than 14 days; or

iv. excluded from any examination; or

v. fined more than $5,000; or

vi. deprived of a pass in the whole or part of any examination.
# Undergraduate Academic Calendar 2012 - 13

<table>
<thead>
<tr>
<th>Academic Year 2012-13</th>
<th>From</th>
<th>To</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semester 1</td>
<td>06-Aug-12</td>
<td>07-Dec-12</td>
<td>18 weeks</td>
</tr>
<tr>
<td>Orientation Week</td>
<td>06-Aug-12</td>
<td>10-Aug-12</td>
<td>1 week (No classes)</td>
</tr>
<tr>
<td>Teaching Weeks</td>
<td>13-Aug-12</td>
<td>28-Sep-12</td>
<td>7 weeks (Teaching Week 1 to 7)</td>
</tr>
<tr>
<td>Recess Week</td>
<td>01-Oct-12</td>
<td>05-Oct-12</td>
<td>1 week</td>
</tr>
<tr>
<td>Teaching Weeks</td>
<td>08-Oct-12</td>
<td>16-Nov-12</td>
<td>6 weeks (Teaching Week 8 to 13)</td>
</tr>
<tr>
<td>Revision and Examination</td>
<td>19-Nov-12</td>
<td>07-Dec-12</td>
<td>3 weeks</td>
</tr>
<tr>
<td>Semester 1 Vacation</td>
<td>10-Dec-12</td>
<td>11-Jan-13</td>
<td>5 weeks</td>
</tr>
<tr>
<td>Semester 2</td>
<td>14-Jan-13</td>
<td>10-May-13</td>
<td>17 weeks</td>
</tr>
<tr>
<td>Teaching Weeks</td>
<td>14-Jan-13</td>
<td>01-Mar-13</td>
<td>7 weeks (Teaching Week 1 to 7)</td>
</tr>
<tr>
<td>Recess Week</td>
<td>04-Mar-13</td>
<td>08-Mar-13</td>
<td>1 week</td>
</tr>
<tr>
<td>Teaching Weeks</td>
<td>11-Mar-13</td>
<td>19-Apr-13</td>
<td>6 weeks (Teaching Week 8 to 13)</td>
</tr>
<tr>
<td>Revision and Examinations</td>
<td>22-Apr-13</td>
<td>10-May-13</td>
<td>3 weeks</td>
</tr>
<tr>
<td>Semester 2 Vacation</td>
<td>13-May-13</td>
<td>02-Aug-13</td>
<td>12 weeks</td>
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<tr>
<td>Special Term I</td>
<td>13-May-13</td>
<td>21-Jun-13</td>
<td>6 weeks</td>
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<tr>
<td>Teaching Weeks</td>
<td>13-May-13</td>
<td>14-Jun-13</td>
<td>5 weeks (Teaching Week 1 to 5)</td>
</tr>
<tr>
<td>Revision &amp; Examination</td>
<td>17-Jun-13</td>
<td>21-Jun-13</td>
<td>1 week</td>
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<tr>
<td>Special Term II</td>
<td>24-Jun-13</td>
<td>02-Aug-13</td>
<td>6 weeks</td>
</tr>
<tr>
<td>Teaching Weeks</td>
<td>24-Jun-13</td>
<td>26-Jul-13</td>
<td>5 weeks (Teaching Week 1 to 5)</td>
</tr>
<tr>
<td>Revision &amp; Examination</td>
<td>29-Jul-13</td>
<td>02-Aug-13</td>
<td>1 week</td>
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## Events

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
<th>Duration</th>
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</thead>
<tbody>
<tr>
<td>Convocation 2012</td>
<td>25 Jul to 2 Aug 12</td>
<td></td>
</tr>
<tr>
<td>Qualifying English Test</td>
<td>6 Aug 12</td>
<td></td>
</tr>
<tr>
<td>Freshmen Welcome Ceremony</td>
<td>7, 8 &amp; 10 Aug 12</td>
<td></td>
</tr>
<tr>
<td>Union Day/Academic Council Meeting</td>
<td>30 Aug 12</td>
<td>No classes from 1030 to 1430 hours</td>
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## Attachment & Internship Programmes

<table>
<thead>
<tr>
<th>Programme</th>
<th>From</th>
<th>To</th>
<th>Duration</th>
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</thead>
<tbody>
<tr>
<td>Engineering Year 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial Attachment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Semester 1</td>
<td>09-Jul-12</td>
<td>08-Dec-12</td>
<td>22 weeks</td>
</tr>
<tr>
<td>Semester 2</td>
<td>14-Jan-13</td>
<td>15-Jun-13</td>
<td>22 weeks</td>
</tr>
<tr>
<td>Enhanced Industrial Attachment</td>
<td>14-Jan-13</td>
<td>10-Aug-13</td>
<td>30 weeks</td>
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<td>International Research Attachment</td>
<td>14-Jan-13</td>
<td>10-Aug-13</td>
<td>30 weeks</td>
</tr>
<tr>
<td>Industrial Orientation</td>
<td>20-May-13</td>
<td>27-Jul-13</td>
<td>10 weeks</td>
</tr>
<tr>
<td>Sport Science &amp; Management Year 4</td>
<td></td>
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<tr>
<td>SSM Internship</td>
<td>02-Jul-12</td>
<td>01-Dec-12</td>
<td>22 weeks</td>
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<tr>
<td>Art, Design &amp; Media Year 3</td>
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<tr>
<td>ADM Internship</td>
<td>13-May-13</td>
<td>20-Jul-13</td>
<td>10 weeks</td>
</tr>
<tr>
<td>Academic Year 2012-13</td>
<td>From</td>
<td>To</td>
<td>Duration</td>
</tr>
<tr>
<td>-----------------------</td>
<td>------------</td>
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<tr>
<td>Communication Studies Year 3</td>
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<tr>
<td>Professional Internship</td>
<td>07-Jan-13</td>
<td>08-Jun-13</td>
<td>22 weeks</td>
</tr>
<tr>
<td>Accountancy / Business Year 2</td>
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<td>Accountancy and Business Year 2</td>
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<tr>
<td>Business and Computer Science Year 3</td>
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<tr>
<td>Professional Attachment</td>
<td>13-May-13</td>
<td>20-Jul-13</td>
<td>10 weeks</td>
</tr>
<tr>
<td>Chinese / Economics / English / Linguistic &amp; Multilingual Studies / Psychology / Sociology Year 3</td>
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<td>HSS Professional Attachment</td>
<td>13-May-13</td>
<td>20-Jul-13</td>
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<td>Maritime Studies Year 3</td>
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<tr>
<td>Industrial Immersion</td>
<td>13-May-13</td>
<td>20-Jul-13</td>
<td>10 weeks</td>
</tr>
<tr>
<td>School of Physical &amp; Mathematical Sciences</td>
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<tr>
<td>Semester 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial Internship (CBC and PAP)</td>
<td>09-Jul-12</td>
<td>08-Dec-12</td>
<td>22 weeks</td>
</tr>
<tr>
<td>Semester 2</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Industrial Internship (CBC and PAP)</td>
<td>14-Jan-13</td>
<td>15-Jun-13</td>
<td>22 weeks</td>
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<tr>
<td>Special Term</td>
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<tr>
<td>Industrial Internship (PAP)</td>
<td>13-May-13</td>
<td>20-Jul-13</td>
<td>10 weeks</td>
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<tr>
<td>Industrial Internship (MAS)</td>
<td>13-May-13</td>
<td>03-Aug-13</td>
<td>12 weeks</td>
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<td>School of Biological Sciences</td>
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<tr>
<td>Semester 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial Internship</td>
<td>14-Jan-13</td>
<td>15-Jun-13</td>
<td>22 weeks</td>
</tr>
</tbody>
</table>

All dates are subject to change at the discretion of the university.

Note: Where a public holiday falls on a Saturday, the public holiday will be substituted and observed by the University on the following Monday and there will be no classes in each instance.

For attachment and internship programmes, please note that different companies may have different practices for substituting a public holiday that falls on a Saturday and some companies may not be on a 5-day work week. Please refer to the start date of the attachment programme as provided by the Career & Attachment Office.

Notice to All Undergraduate NSmen

Ministry of Defence (MINDEF) has advised that all undergraduate NSmen are liable to be called up for In-Camp Training (ICT). It has made a standing arrangement with the universities that undergraduate NSmen would be called up for In-Camp Training (ICT) only during specific parts of the university vacations. During these periods, the university will not conduct any compulsory academic programme. MINDEF will not grant deferment on the ground of academic commitments. The call-up periods are indicated in the table below:

<table>
<thead>
<tr>
<th>Year of Study</th>
<th>ICT Call-Up Period and Duration</th>
<th>Award Details &amp; Quantum</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>10 Dec 12 – 6 Jan 13</td>
<td>10 Jun to 4 Aug 2013</td>
</tr>
<tr>
<td>2nd</td>
<td></td>
<td>24 Jun to 4 Aug 2013</td>
</tr>
<tr>
<td>3rd</td>
<td></td>
<td>24 Jun to 4 Aug 2013</td>
</tr>
</tbody>
</table>

Attachment programmes may overlap with the call-up period. NSmen students called up during their attachment can apply for leave and extend their attachment to make up for the period missed.

### Graduate Academic Calendar 2012-13***

<table>
<thead>
<tr>
<th>Semester 1</th>
<th>06 August 2012 - 13 January 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Half</td>
<td>06 August 2012 - 30 September 2012</td>
</tr>
<tr>
<td>Second Half</td>
<td>01 October 2012 - 13 January 2013</td>
</tr>
<tr>
<td>Revision &amp; Examination</td>
<td>19 November 2012 - 07 December 2012</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester 2</th>
<th>14 January 2013 - 04 August 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Half</td>
<td>14 January 2013 - 31 March 2013</td>
</tr>
<tr>
<td>Second Half</td>
<td>1 April 2013 - 04 August 2013</td>
</tr>
<tr>
<td>Revision &amp; Examination</td>
<td>22 April 2013 - 10 May 2013</td>
</tr>
</tbody>
</table>

*** For students under the following coursework programmes, please click on the individual programme for its academic calendar at [http://www.ntu.edu.sg/Students/Graduate/AcademicServices/Pages/default.aspx](http://www.ntu.edu.sg/Students/Graduate/AcademicServices/Pages/default.aspx).

Note: Where a public holiday falls on a Saturday, the public holiday will be substituted and observed by the University on the following Monday and there will be no classes in each instance.
Launched on 13 May 2010, the new interactive Campus Map enables you to search for a place, find buildings and landmarks in NTU as well as get directions to places easily. You may also print the map or send a friend an email with information on a location or direction.

Google street view and internal shuttle bus routes are also integrated in the Campus Map.

http://maps.ntu.edu.sg/maps
Notes