

**BACHELOR OF ENGINEERING (ENVIRONMENTAL ENGINEERING) DEGREE  
SCHOOL OF CIVIL AND ENVIRONMENTAL ENGINEERING  
NANYANG TECHNOLOGICAL UNIVERSITY**

**FREQUENTLY ASKED QUESTIONS**

**Q1 Why should I choose a career in Environmental Engineering?**

Environmental Engineering is concerned with the application of science and engineering principles to improve the management and protect the quality of our precious environmental resources.

Today's environmental problems are highly challenging and multidisciplinary in scope, and the Degree of Bachelor of Engineering (Environmental Engineering) will provide students with a good foundation to tackle these problems. The Environmental Engineering profession draws upon many disciplines, including Civil, Chemical, Mechanical, and Geotechnical Engineering, as well as Chemistry, Microbiology, Hydraulics, Atmospheric Sciences and Ecology. Environmental Engineers must understand how chemicals move across boundaries of air, water and soil, and how environmental factors can influence a chemical's transport, fate, potential risk and treatment. Environment Engineers assess levels of environmental contamination, design and operate treatment processes and emission control facilities to meet regulatory requirements, devise pollution control strategies, formulate environmental policy goals and provide technical expertise in the setting up of environmental quality standards.

**Q2 How relevant is Environmental Engineering to Singapore and the region?**

Paradoxically, while rapid urbanization and economic development have led to the widespread destruction of virgin forests and the pollution of rivers and lakes, it is the countries with clean and well-managed environments that will continue to attract valuable investments to fuel economic growth. Sustainable economic development dictates that environmental concerns must be properly addressed. The Asian Environmental Engineering market alone (excluding Japan) is worth at least \$37 billion a year and has the potential to triple to \$105 billion by 2010. There is a strong push to develop Singapore into a major regional environmental engineering hub that can add value to the economy through the creation of new businesses, products, services, capabilities and jobs. Witness the recent influx of water-related companies into the Singapore Stock Exchange.

**Q3 What are the employment prospects in Environmental Engineering?**

With their practical and broad-based training, our Environmental Engineering graduates will enjoy employment opportunities with government ministries, public sector agencies, universities and research institutes, as well as industry players, environmental consultancies and service providers in growth areas such as water and wastewater reclamation, membrane technologies, desalination, waste reclamation and resource recovery, clean energy, environmental biotechnology and environmental remediation. Our Environmental Engineering graduates will be able to leverage on NTU's extensive network of key environmental players, both in Singapore and internationally. These include Stanford University; Massachusetts Institute of Technology; Cambridge University; Imperial College; Shanghai Jiaotong University; National Taiwan University; University of Hong Kong; University of Tokyo; Korea Advanced Institute of Science and Technology; University of New South Wales; Ministry of the Environment; National Environment Agency; Public

Utilities Board; Economic Development Board; Maritime and Port Authority of Singapore; Agency for Science, Technology and Research; Singapore Land Authority; SPRING Singapore, SembCorp Utilities, NatSteel Limited, Hyflux; Sinomem; Dayen, Keppel Corporation; JTC Corporation, CPG Corporation, Chartered Semiconductor Manufacturing and ST Assembly Test Services. These companies and institutions are potential employers of our graduates.

**Q4. Are Environmental Engineering graduates able to gain employment in petrochemicals, pharmaceuticals or electronics companies?**

Yes. Many of these companies employ environmental engineers. Electronics companies, for example, require ultra-pure water for their chip manufacturing. In addition, most manufacturing concerns will generate waste products which have to be dealt with in an environmentally sound manner.

**Q5 Why is NTU the preferred place to pursue an Environmental Engineering degree?**

NTU's Bachelor of Engineering (Environmental Engineering) degree programme is a four-year course designed to equip students with the requisite knowledge, skills and capabilities in a wide variety of Environmental Engineering topics. NTU is the best place for a comprehensive, multi-disciplinary, professionally-oriented learning experience to prepare students for a challenging career in Environmental Engineering. Students will receive a broad-based and flexible education, and nurture critical skills, inventiveness, entrepreneurship, inter-personal and teamwork competencies, and the ability to cope with uncertainties – traits necessary for success in the new economy.

There are many reasons why you should pursue an Environmental Engineering degree in NTU. Some of these reasons are as follows:

- You will receive an unparalleled educational experience from a top-class Environmental Engineering faculty. Many faculty members come with extensive industry experience, having served with key environmental players in government and public sector agencies as well as with leading environmental firms and consultancies. NTU professors are also entrepreneurial, and have spun off environmental technology companies based on academic R&D.
- You will learn new insights from NTU's proven track record of accomplishments in a wide variety of multidisciplinary environmental research projects, from fundamental research at the molecular and microbial level to investigations of large-scale infrastructure problems. NTU professors are currently managing more than 40 projects with a total value in excess of \$20 million. In the environmental arena, NTU professors have a prolific research publication rate in international journals, averaging more than four scientific papers (published or accepted for publication) per faculty per year.
- You will benefit from the excellent teaching and research infrastructure, including industry-leading IT, wireless and broadband facilities, state-of-the-art research laboratories.
- You will take advantage of undergraduate opportunities to participate in cutting-edge research and development in emerging niche areas of Environmental Engineering,

including the multi-million dollar Clean Water Programme (with Stanford University [ranked number one in environmental engineering by US News and World Report] and Public Utilities Board) to investigate new aquifer-based water reclamation technologies, the BioGranulation Programme to invent proprietary high-performance biological treatment technologies (this project won the A\*STAR National Technology Award in September 2003), the Membrane Programme to develop novel systems for enhanced water purification, and the Resource Recovery Programme to create a host of innovative and cost-effective technologies to convert wastes into useful products.

- You will leverage on NTU's extensive network of strong linkages with internationally renowned institutions, principal government and public sector organizations and private sector leaders, including Stanford University; Massachusetts Institute of Technology; Cambridge University; Imperial College; Shanghai Jiaotong University; National Taiwan University; University of Hong Kong; University of Tokyo; Korea Advanced Institute of Science and Technology; University of New South Wales; Ministry of the Environment; National Environment Agency; Public Utilities Board; Economic Development Board; Maritime and Port Authority of Singapore; Agency for Science, Technology and Research; Singapore Land Authority; SPRING Singapore, SembCorp Utilities, NatSteel Limited, Hyflux; Sinomem; Dayen, Keppel Corporation; JTC Corporation, CPG Corporation, Chartered Semiconductor Manufacturing and ST Assembly Test Services.
- You will have the inside track to pursue postgraduate studies (MSc, MEng and PhD degrees in Civil and/or Environmental Engineering in NTU; or MSc and PhD degrees from the Singapore Stanford Partnership in Environmental Engineering).

**Q6. What facilities will I be able to use?**

NTU has state-of-the-art facilities and resources to provide a world-class learning and research experience in Environmental Engineering.

The Environment Laboratory and the EERC (Environmental Engineering Research Centre) Laboratory in NTU's Research TechnoPlaza together occupy more than 1,500 square meters and house the latest analytical instruments for detailed physical, chemical and biological analysis of environmental samples. There are temperature rooms for controlled wastewater treatment experiments involving laboratory-scale bioreactors. A walk-in refrigerator caters for the storage and preservation of chemical reagents and environmental samples. Students will have the opportunity to work on a vast array of sophisticated instruments, including electro-kinetic analyzer, flow injection analyzer with ion chromatograph, GCMS, graphite furnace atomic absorption spectrophotometer, high performance liquid chromatograph, inductively coupled plasma emission spectrometer, scanning electron microscope, total organic carbon analyzer, zeta potential & laser-based particle size analyzers, confocal laser scanning microscope, FTIR spectrophotometer with TGA, and DNA capillary electrophoresis sequencer.

The Hydraulics Laboratory has a floor area of 2,300 square meters and is equipped with a variety of advanced apparatus for investigations in environmental hydraulics. The equipment includes tilting re-circulating flumes, pumps and turbines, a surge tower, state-of-the-art laser-based flow visualization apparatus, rainfall-runoff simulators, flow measurement

instruments and a laser imaging system that can operate synchronously under computer control for investigating the mixing behavior of effluent discharges in a non-invasive manner.

An Experimental Station with a floor area of 4,000 square meters contains several outdoor wave flumes and basins and supports large-scale research into sediment processes, oil spill modeling, contaminant transport and other environmental modeling studies.

In addition to analytical instrumentation and related hardware, CEE is also equipped with advanced computing and network services for intensive numerical simulations in environmental hydraulics and pollutant fate and transport studies. Computer facilities are also available for rigorous phylogenetic analyses of bacterial DNA sequences and three-dimensional visualizations of biofilms and granules in environmental engineering systems.

**Q7. What courses can I expect to take?**

The professional part of the curriculum include subjects such as Fluid Mechanics, Environmental Chemistry, Environmental Processes, Environmental Microbiology, Hydraulics, Hydrology, Water Supply Engineering, Wastewater Engineering, Solid Waste Engineering, Geo-Environmental Engineering, Air Pollution Engineering, Coastal Engineering and Sediment Transport. Students will also be exposed to subjects on Entrepreneurship, Communication Skills, Law, Economics and a number of general and prescribed electives based on their individual interests.

**Q8. How does NTU's Environmental Engineering programme compare with programmes offered elsewhere?**

The NTU programme is infrastructure-oriented, while other programmes may be narrowly focused on science and chemical engineering. NTU's Environmental Engineering graduates will be well positioned to take advantage of the many market opportunities in the region, which deal mainly with environmental infrastructures.

The NTU programme has a substantial hands-on laboratory/project component and a compulsory Industrial Attachment (IA) program. In NTU, students have the opportunity to embark on many practical-oriented courses and also to enjoy a meaningful professional attachment experience in a private or public organisation locally or overseas during their course of study. This practical training helps our students to transit into the working world easily and positions them to contribute to their employers as soon as they commence work. In other universities, the IA component may be optional and students who miss IA will miss the benefits of practical training.

The NTU program provides a more balanced mix of engineering skills and in-depth knowledge to tackle a variety of environmental problems, which can be highly challenging and multidisciplinary in scope. Because water is an important part of the environment, there is a strong emphasis on water-related subjects, including subjects dealing with water flows, such as Hydraulics and Hydrology. Another unique aspect of the NTU program is that it provides students with a working foundation in Structural Design, as this know-how will come in useful when dealing with issues relating to Environmental Engineering infrastructures.

**Q9. How different is Environmental Engineering from Civil Engineering?**

Compared to the Civil Engineering degree program, the new Environmental Engineering degree program offers a significantly greater concentration of Environmental Engineering courses to provide our students with a balanced mix of skills and in-depth knowledge to tackle a variety of environmental problems, many of which can be highly challenging and multidisciplinary in scope. For example, Year 2 and Year 3 courses covered in Environmental Engineering that are not covered in Civil Engineering include Environmental Chemistry, Environmental Processes, Environmental Microbiology, Hydrology, Hydraulics, Geo-Environmental Engineering, Water Supply Engineering, Wastewater Engineering and Solid Waste Engineering.

**Q10. Environmental Engineering appears to share some similarities with Chemical Engineering. Can a Chemical Engineer take on the job of an Environmental Engineer?**

Chemical Engineering is concerned largely with chemical manufacturing activities, while Environmental Engineering is concerned with the application of science and engineering to improve the management and protect the quality of our precious environmental resources. Some Chemical Engineers may be employed in an environment-related area, but there are many environmental jobs for which students will be better equipped by pursuing an Environmental Engineering course.

**Q11. What are the admission requirements?**

The general requirements are given in the NTU website <http://www.ntu.edu.sg/OAD/home/>. Applicants with suitably qualified engineering diplomas from local Polytechnics can also apply for direct entry into the second year of the degree programme.

**Q12. Where can I find more information on the programme?**

Additional information is also available in the School's website at [www.ntu.edu.sg/cee](http://www.ntu.edu.sg/cee) and in the Office of Admissions website at <http://www.ntu.edu.sg/OAD/home/>.

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