

## 2.1.2 Description of courses

### Bachelor of Sciences with Honours degree in Biological Sciences

#### Year 1

##### **BS101 Introductory Biology**

AUs: 3, Prerequisites: NIL, Semester 1

This course gives an introduction to biology and emphasises the relationship between diverse life forms through the common properties of basic molecules. It encompasses such topics as the properties of water and simple organic molecules, the origin of life, the properties of macromolecules, molecular evolution, the organisation of a cell, bioenergetics, the origin of species, genes and heredity, diversity of life forms, bacteria vs eukaryotes, unicellular vs multicellular organisms, animals vs plants, viruses, reproduction and the origin of sex, symbiosis, the food chain, the origin of death, methods of investigation and biotechnology.

##### **BS102 Biophysical Chemistry**

AUs: 3, Prerequisites: NIL, Semester 1

Biophysical Chemistry deals with the physical principles that govern biochemical reactions, structure and the assembly of biological macromolecules, as well as the physical methods used to characterise biological systems and molecules. It will cover quantum theory; chemical bonding and intermolecular interactions; basic principles of molecular spectroscopy methods; basic principles of thermodynamics with applications to energetics of biochemical reactions and association behaviour of biological macromolecules; and chemical kinetics with applications to the principles of enzyme reactions.

##### **BS103 Organic Chemistry**

AUs: 3, Prerequisites: NIL, Semester 1

This course provides an introduction to organic chemistry, and covers atomic and molecular orbitals, hybridisation, covalent bonding, stereochemistry, alkanes, alkenes, cycloalkanes, substitution reactions (SN1 and SN2), elimination reactions (E1 and E2), conjugation and aromaticity, substitution reactions of aromatic compounds, radical reactions, chemistry of alcohols, glycols, ethers and thiols, carbonyl compounds, simple addition reactions, oxidation and reduction, Grignard reagents, aldol condensations, carboxylic acids and derivatives, and amines.

##### **BS104 Biochemistry I – Biomolecules**

AUs: 3, Prerequisites: Non-Final Year Student (for GER-PE Students), Semester 1

This course gives insights into the structure and properties of nucleic acids, amino-acids, proteins, carbohydrates, lipids and their higher order structures. It covers the chemical nature and primary structure of nucleic acids, secondary and tertiary structures of nucleic acids, proteins as polymers of amino acids, the three-dimensional structure of proteins, carbohydrates and lipids.

##### **BS811 Laboratory I**

AUs: 1, Prerequisites: NIL, Semester 1

This course is a clustering of laboratory-based experiments and exercises for courses taught in the first semester of Year 1.

##### **BS106 Biochemistry II – Metabolism**

AUs: 3, Prerequisites: Non-Final Year Student (For GER-PE Students), Semester 2

This course deals with the basic principles, pathways and regulation of metabolism required to understand modern biological sciences. It gives an introduction to enzymes and enzyme catalysis, carbohydrate metabolism, citric acid cycle, oxidative phosphorylation, photosynthesis, lipid metabolism, amino acid metabolism and nucleotide metabolism.

##### **BS107 Principles of Genetics**

AUs: 3, Prerequisites: (1) GCE 'A' level Biology (2) Non-Final Year Student (For GER-PE Students), Semester 2

This course deals with the basic principles of modern genetics, with a strong focus on molecular rather than classical genetics. It covers mendelian genetics, DNA structure, replication, transcription, regulation of gene expression in pro- and eukaryotes, recombination, genes and development, genome mapping, linkage analysis, and basic human genetics.

**BS108 Molecular Biology**

AUs: 3, Prerequisites: (1) GCE 'A' level Biology (2) Non-Final Year Student (For GER-PE Students), Semester 2

This course deals with the basic concepts of molecular biology and provides an introduction to molecular biology, RNA transcription and posttranscriptional processing, protein folding and quality control, molecular oncogenesis, the molecular biology of viruses, and the molecular biology of model organisms.

**BS109 Basic Cell Biology**

AUs: 3, Prerequisites: (1) GCE 'A' level Biology (2) Non-Final Year Student (For GER-PE Students), Semester 2

This course deals with the internal structures and organelles of a cell and their functions in maintaining a living cell, and covers topics such as membrane proteins, protein targeting, secretion, endocytosis, cytoskeleton and the cell cycle.

**BS812 Laboratory II**

AUs: 2, Prerequisites: NIL, Semester 2

This course is a clustering of laboratory-based experiments and exercises for courses taught in the second semester of Year 1.

**Year 2**

**BS201 Physiology**

AUs: 3, Prerequisites: NIL, Semester 1

This course provides an overview of human biology from cells to systems, an understanding of the basic concepts of physiology, and an introduction to the world of scientific inquiry. Lectures cover mainstream topics in human physiology including the nervous system, the endocrine system, the circulatory system, the respiratory system, the digestive system, the urinary system, the skeletal and muscular system and the reproductive system. Emphasis is given to the concept of homeostasis and how the body systems work together to maintain a dynamic steady state within the internal environment.

**BS202 Microbiology**

AUs: 3, Prerequisites: NIL, Semester 1

This course gives a general introduction to microbiology with a special focus on the impact microorganisms have in our life. It gives an introduction to microbiology, microbial metabolism, microbial molecular biology and genetics, diversity of microbe, ecology and symbiosis, microbial diseases and their control, immunity to microorganisms, and an industrial application of microbiology.

**BS203 Advanced Cell Biology**

AUs: 3, Prerequisites: NIL, Semester 1

This course further advances the learning of basic cell biology taught in Year 1 by covering in-depth the mechanisms of cellular development, cell signaling and cell-environmental interaction. Lectures cover stem cell biology, cell receptor and signaling biology, extracellular matrix biology, and apoptosis.

**BS204 Experimental Molecular and Cell Biology**

AUs: 2, Prerequisites: NIL, Semester 1

This course gives a comprehensive overview of the methodologies and techniques in molecular and cell biology research.

The course starts with an introduction to standard molecular tools and techniques such as restriction endonucleases, vectors, cloning, PCR, sequencing, mutagenesis, and libraries, followed by the applications of radio- and non-radiolabeled tracers. Students will also learn different protein expression systems, protein purification and detection methods, protein nucleic acids/protein interaction analyses and the application of cell and tissue cultures. They will participate actively in quizzes, which will be held after a series of lectures.

**BS205 Biostatistics**

AUs: 2, Prerequisites: NIL, Semester 1

This course gives an overview of the importance of biostatistics in the scientific design of experiments and in the objective collection, processing, analysis, interpretation and communication of scientific investigations in the life sciences.

It covers descriptive statistics, data summary using statistical indices and diagrams, probability and probability distributions, confidence intervals, hypothesis-testing, basic tests of significance involving means,

proportions, measurement of relationships between variables using correlation and regression and non-parametric methods.

**BS821 Laboratory III**

AUs: 2, Prerequisites: NIL, Semester 1

This course is a clustering of laboratory-based experiments and exercises for courses taught in the first semester of Year 2.

**BS206 Principles and Methods of Biophysics**

AUs: 3, Prerequisites: NIL, Semester 2

This course provides an overview of the physical principles underlining common experimental methods used in biology, and is aimed at understanding the organisation and function of biological systems, with some emphasis on biological membranes. Lectures cover the basics and applications of various spectroscopies, e.g. UV-visible spectroscopy, electron paramagnetic resonance, infrared and Raman spectroscopy, circular dichroism, fluorescence spectroscopy, FRET, lasers, optical microscopies, and techniques specific for ion channel research, liposomes and membranes. Such applications lead to a multidisciplinary description of the elements present in the cell and particularly in the membrane environment.

**BS207 Immunology**

AUs: 3, Prerequisites: NIL, Semester 2

Immunology deals with the principles of how our body defends itself against pathogenic microorganisms, and covers the history and lay wisdom of immunology; innate vs adaptive immunity; cells of the immune system: gene rearrangement of lymphocytes, B lymphocytes; cytotoxic T lymphocytes and helper T lymphocytes; neutrophils, macrophages, natural killer cells, dendritic cells; molecules of the immune system: the antibodies, complement proteins, cytokines; activation of B and T cells; signal transduction; trafficking of leukocytes; immunological memory; autoimmunity; tolerance; vaccines; and applied immunology.

**BS208 Virology**

AUs: 3, Prerequisites: NIL, Semester 2

This course gives an overview of the molecular biology of viruses, their involvement in human diseases and current antiviral R & D, and provides an introduction to viruses, molecular biology of viral replication and infection, virus-cell interactions, human virology and viral diseases, and vaccines and anti-virals.

**BS209 Advanced Biochemistry**

AUs: 3, Prerequisites: NIL, Semester 2

This course deals with the study of various biochemical topics, particularly enzymology, at a more advanced level. Lectures cover mechanistic enzymology, the regulation of metabolic pathways, advanced enzyme kinetics, bioinorganic chemistry, cofactors and coenzymes, and radical-mediated reactions.

**BS210 Bioinformatics**

AUs: 2, Prerequisites: NIL, Semester 2

This course emphasises the different tools, techniques and skills in selecting the method or software best-suited for routine problems in bioinformatics. It covers basic computational skills, the analysis of DNA and protein sequences such as the search for similar segments, pairwise and multiple sequence alignment, and commonly repeated motifs; the analysis for phylogenetic inference; computational ORF finding and gene finding; secondary and tertiary protein structure prediction; genome-wide EST analysis; microarray data processing and data analysis; gene expression profile analysis; and methods of comparative genomic analysis.

**BS822 Laboratory IV**

AUs: 2, Prerequisites: NIL, Semester 2

This course is a clustering of laboratory-based experiments and exercises for courses taught in the second semester of Year 2.

**Year 3**

**BS301 Neurobiology**

AUs: 3, Prerequisites: NIL, Semester 1

This course gives an understanding of neurobiology at the cellular and molecular levels, although organ and systems level neurobiology will also be considered. It provides an overview of neuroscience, particularly the areas of neuroanatomy, neurophysiology, evolutionary and developmental neurobiology.

**BS302 Research Seminars**

AUs: 3, Prerequisites: NIL, Semester 1

This course enhances learning and improves presentation and public speaking skills. Student activities encompass oral presentations, the analysis of papers from scientific journals on topics of interest, and the organization of student seminars and symposia.

**BS303 Principles and Methods of Structural Biology**

AUs: 3, Prerequisites: NIL, Semester 2

This course deals with molecular interactions which define the primary, secondary and tertiary structure of proteins and nucleic acids as well as the relationship between the structure and function of biopolymers and glycosylated structures. Lectures cover basic aspects of, and practical techniques used in analysing and understanding the structure/ function relationships of proteins and nucleic acids and how these techniques are actively used to give structural insight into biological functions.

**BS305 Plant Biology**

AUs: 3, Prerequisites: NIL, Semester 1

This course introduces plant biology and the principles that underlie plant form and function. It covers plant structure and function, growth and development, evolution and diversity. Topics such as global warming, acid rain, genetic engineering, organic farming, ornamental plants and medical plants will also be introduced.

**BS831 Laboratory V**

AUs: 2, Prerequisites: NIL, Semester 1

This course is a clustering of laboratory-based experiments and exercises for courses taught in the first semester of Year 3.

**BS306 Developmental Biology**

AUs: 3, Prerequisites: NIL, Semester 1

Developmental Biology gives an understanding of how development occurs and is regulated in embryos of several species of animals, primarily those with well-characterised genetics, as well as the experimental strategies and tools used by developmental biologists. It investigates developmental processes using well-studied organisms such as mice, zebra fishes, insects and nematodes.

**BS307 Computational Biology and Modelling**

AUs: 3, Prerequisites: NIL, Semester 2

This course deals with modern computational modelling techniques in the study of biological systems and problems in life sciences such as drug design. The course covers force fields for biomolecules, molecular mechanics, molecular dynamics and Monte Carlo simulation methods; applications, including conformational analyses, homology modelling, docking and computer-aided drug design; and several computer-based laboratory practicals using modern modelling softwares to illustrate concepts and methods.

**BS308 Cancer Biology**

AUs: 3, Prerequisites: NIL, Semester 1

This course gives an overall framework of current knowledge and future advances in cancer biology and explores cellular and molecular mechanisms underlying cancer development. It gives an introduction to cancer biology including epidemiology, pathology, diagnosis and staging and the basis for various therapeutic strategies, molecular mechanisms in cancer biology including signal transduction and cell cycle regulation and frontiers in cancer research.

**BS309 Human Genetics**

AUs: 3, Prerequisites: NIL, Semester 1

Human Genetics deals with the application of basic life sciences to the understanding and diagnosis of human genetic diseases, and covers the molecular basis underlying various human genetic diseases, the different approaches adopted for such investigations, and conventional and gene therapy treatment strategies.

**BS310 Pharmacology**

AUs: 3 Prerequisites: NIL Semester 2

Pharmacology equips students with the principles and methods of the experimental approach to solving problems in the life sciences. It covers experimental design, laboratory techniques in experimental inquiry, instrumentation techniques and handling, data acquisition and analysis, and experimental and scientific report writing.

**BS832 Laboratory VI**

AUs: 1, Prerequisites: NIL, Semester 2

This course is a clustering of laboratory-based experiments and exercises for courses taught in the second semester of Year 3

**BS412 Drug Discovery and Development Biotechnology**

AUs: 3, Prerequisites: BS103 and BS304, Semester 2

This course deals with the principles and technologies involved in the transition from basic biological research to the development of novel drugs. It covers the strategies and processes involved in drug discovery and development, screening, molecular modelling, the emerging role of combinatorial chemistry, peptide-based drug design, components of biotechnology, novel delivery systems, high throughput assays and the impact of molecular biology on drug discovery.

**BS311 Current topics in stem cell Biology and Developmental Biology**

AUs: 3, Prerequisites: BS306, Semester 2

This prescribed elective covers the new and cutting-edge research on stem cell developmental biology. It provides the factual basis for the critical assessment of the consequences of recent and future developments in this promising research area that currently polarises the public opinion.

**BS312 Protein Folding and Biomolecular NMR**

AUs: 3, Prerequisites: NIL, Semester 2

This prescribed elective is focused on various aspects of protein folding and misfoldings (mechanisms, kinetics, thermodynamics, chaperons mediated folding: experiments and theory), protein design and topics related to applications of Nuclear Magnetic Resonance Spectroscopy to study structures, dynamics and interactions of biomolecules.

**BS313 Functional Genomics and Proteomics**

AUs: 3, Prerequisites: NIL, Semester 2

This course cultivates an understanding of contemporary methods in genomic and proteomic analysis with an emphasis on proteomic technologies and the application of proteomics to biomedical research. The course covers both mass spectrometry and protein microarray based technologies. It introduces the theory and practice of mass spectrometry for genotyping, gene expression analysis, protein identification and post-translational modification characterisations. Protein expression analysis using different quantitative proteomics methods will be exposed to applications in biomedical research such as disease association studies, cancer research, stem cell, regenerative medicine, infective disease, pharmacology and drug discovery.

**BMS101 Basics of TCM**

AUs: 6, Prerequisites: GCE 'O' level Chinese, Semester 2

This course imparts knowledge of human physiological and pathological pathways, and the different basic principles used in disease prevention in Traditional Chinese Medicine (TCM). Covered in this course are theories of Yin-Yang, Five Elements, Zang-Fu and Collateral Meridians, as well as the physiological/pathological/preventive properties of *qi*, blood, body fluid and other related facts.

**BS901 Research exercise**

AUs: 4, Prerequisites: NIL (offered as GER-PE to SBS students only), Inter-semester session

This General Elective for selected students involves a short research project during the inter-semester break and is not a requirement for the completion of the course.

**Year 4**

**BS404 Current topics in Biochemistry**

AUs: 3, Prerequisites: BS209, Semester 1

This prescribed elective offers students the opportunity to explore Biochemistry in more depth and intensity and requires students to read, present and discuss relevant research papers.

**BS405 Current topics in Neurobiology**

AUs: 3, Prerequisites: BS301, Semester 1

This prescribed elective offers students the opportunity to explore Neurobiology in more depth and intensity and requires students to read, present and discuss relevant research papers.

**BS406 Current topics in Cell Biology**

AUs: 3, Prerequisites: BS203, Semester 1

This prescribed elective offers students the opportunity to explore Cell Biology in more depth and intensity and requires students to read, present and discuss relevant research papers.

**BS407 Current topics in Genetics**

AUs: 3, Prerequisites: BS304, Semester 1

**Learning objectives:** This prescribed elective offers students the opportunity to explore Genetics in more depth and intensity and requires students to read, present and discuss relevant research papers.

**BS408 Current topics in Immunology**

AUs: 3 Prerequisites: BS207 Semester 1

This prescribed elective offers students the opportunity to explore Immunology and Immunotechnology in more depth and intensity, and requires students to read, present and discuss relevant research papers.

**BS409 Current topics in Structural Biology**

AUs: 3, Prerequisites: BS303, Semester 1 This prescribed elective offers students the opportunity to explore Structural Biology in more depth and intensity and requires students to read, present and discuss relevant research papers.

**BS411 Current topics in Virology / Microbiology**

AUs: 3, Prerequisites: BS202 and BS208, Semester 1

This prescribed elective offers students the opportunity to explore Virology and Microbiology in more depth and intensity and requires students to read, present and discuss relevant research papers.

**BS413 Immunomics**

AUs: 3, Prerequisites: BS107, BS207 and BS210, Semester 1

Molecular biology, computers and information technologies have transformed immunology research and it is now difficult to pursue cutting-edge immunology research without the use of computational tools and access to databases. Immunomics is a new field that combines traditional immunology with immuno-informatics, systems biology, high through-put genomics and proteomics, all of which enables immunology research at the systems level. Students will be introduced to immunomics using original research papers and reviews. They will enjoy exposure to theory, hands-on computer lab data-driven research, hypothesis formulation and systems (biology) level thinking applied to disease relevant topics in immunology.

**BMS203 TCM Diagnostics**

AUs: 6, Prerequisites: BMS101, Semester 1

This course introduces the four basic TCM diagnostic methods used widely to differentiate and treat illnesses and diseases, and hence bridges theoretical knowledge and actual clinical practice. The course will cover observational diagnosis, the analysis of clinical manifestations using the eight principal syndromes, methods of differential diagnosis and applied skills in clinical case studies.

**BS421 Final Year Project**

AUs: 17, Prerequisites: NIL, Semester 2

This project gives students first-hand exposure to Life Sciences research. The project is conducted either in the school, or at hospitals or local or overseas institutes. Students undertaking such projects overseas may be required to commence their projects at the start of the inter-semester session.

**Double Degree in Biomedical Sciences and Traditional Chinese Medicine**

**Year 1**

**BS101 Introductory Biology**

AUs: 3, Prerequisites: NIL, Semester 1

This course gives an introduction to biology and emphasises the relationship between diverse life forms through the common properties of basic molecules. It encompasses such topics as the properties of water and simple organic molecules, the origin of life, the properties of macromolecules, molecular evolution, the organisation of a cell, bioenergetics, the origin of species, genes and heredity, diversity of life forms, bacteria vs eukaryotes, unicellular vs multicellular organisms, animals vs plants, viruses, reproduction and the origin of sex, symbiosis, the food chain, the origin of death, methods of investigation and biotechnology.

### **BS103 Organic Chemistry**

AUs: 3, Prerequisites: NIL, Semester 1

This course provides an introduction to organic chemistry, and covers atomic and molecular orbitals, hybridisation, covalent bonding, stereochemistry, alkanes, alkenes, cycloalkanes, substitution reactions (SN1 and SN2), elimination reactions (E1 and E2), conjugation and aromaticity, substitution reactions of aromatic compounds, radical reactions, chemistry of alcohols, glycols, ethers and thiols, carbonyl compounds, simple addition reactions, oxidation and reduction, Grignard reagents, aldol condensations, carboxylic acids and derivatives, and amines.

### **BS104 Biochemistry I – Biomolecules**

AUs: 3, Prerequisites: NIL, Semester 1

This course gives insights into the structure and properties of nucleic acids, amino-acids, proteins, carbohydrates, lipids and their higher order structures. It covers the chemical nature and primary structure of nucleic acids, secondary and tertiary structures of nucleic acids, proteins as polymers of amino acids, the three-dimensional structure of proteins, carbohydrates and lipids.

### **BS205 Biostatistics**

AUs: 2, Prerequisites: NIL, Semester 1

This course gives an overview of the importance of biostatistics in the scientific design of experiments and in the objective collection, processing, analysis, interpretation and communication of scientific investigations in the life sciences.

It covers descriptive statistics, data summary using statistical indices and diagrams, probability and probability distributions, confidence intervals, hypothesis-testing, basic tests of significance involving means, proportions, measurement of relationships between variables using correlation and regression and non-parametrics methods.

### **BMS811 Laboratory I**

AUs: 1, Prerequisites: NIL, Semester 1

This course is a clustering of laboratory-based experiments and exercises for courses taught in the first semester of Year 1.

### **BS107 Principles of Genetics**

AUs: 3, Prerequisites: (1) GCE 'A' level Biology (2) Non-Final Year Student (For GER-PE Students), Semester 2

This course deals with the basic principles of modern genetics, with a strong focus on molecular rather than classical genetics. It covers mendelian genetics, DNA structure, replication, transcription, regulation of gene expression in pro- and eukaryotes, recombination, genes and development, genome mapping, linkage analysis, and basic human genetics.

### **BS108 Molecular Biology**

AUs: 3, Prerequisites: (1) GCE 'A' level Biology (2) Non-Final Year Student (For GER-PE Students), Semester 2

This course deals with the basic concepts of molecular biology and provides an introduction to molecular biology, RNA transcription and posttranscriptional processing, protein folding and quality control, molecular oncogenesis, the molecular biology of viruses, and the molecular biology of model organisms.

### **BS109 Basic Cell Biology**

AUs: 3, Prerequisites: (1) GCE 'A' level Biology (2) Non-Final Year Student (For GER-PE Students), Semester 2

This course deals with the internal structures and organelles of a cell and their functions in maintaining a living cell, and covers topics such as membrane proteins, protein targeting, secretion, endocytosis, cytoskeleton and the cell cycle.

### **BMS101 Basics of TCM 中医基础理论**

AUs: 6, Prerequisites: NIL, Semester 2

This course imparts knowledge of human physiological and pathological pathways, and the different basic principles used in disease prevention in Traditional Chinese Medicine (TCM). Covered in this course are theories of Yin-Yang, Five Elements, Zang-Fu and Collateral Meridians, as well as the physiological/pathological/preventive properties of *qi*, blood, body fluid and other related facts.

**BMS102 TCM in Ancient Chinese 医古文**

AUs: 6, Prerequisites: NIL, Semester 2

This course helps students master the reading of ancient classics thereby promoting a better understanding of ancient TCM literature. Lectures cover different archaeological textual genres, formats, and language use, as well as an appreciation of classic examples drawn from renowned Chinese physicians, medical scholars, medical theses and case histories.

**BMS812 Laboratory II**

AUs: 1, Prerequisites: NIL, Semester 2

This course is a clustering of laboratory-based experiments and exercises for courses taught in the second semester of Year 1. .

**Year 2**

**BS201 Physiology**

AUs: 3, Prerequisites: NIL, Semester 1

This course provides an overview of human biology from cells to systems, an understanding of the basic concepts of physiology, and an introduction to the world of scientific inquiry. Lectures cover mainstream topics in human physiology including the nervous system, the endocrine system, the circulatory system, the respiratory system, the digestive system, the urinary system, the skeletal and muscular system and the reproductive system. Emphasis is given to the concept of homeostasis and how the body systems work together to maintain a dynamic steady state within the internal environment.

**BS202 Microbiology**

AUs: 3, Prerequisites: NIL, Semester 1

This course gives a general introduction to microbiology with a special focus on the impact microorganisms have in our life. It gives an introduction to microbiology, microbial metabolism, microbial molecular biology and genetics, diversity of microbe, ecology and symbiosis, microbial diseases and their control, immunity to microorganisms, and an industrial application of microbiology.

**BMS201 Anatomy**

AUs: 3, Prerequisites: NIL, Semester 1

This course deals with the structural organisation of human cells, tissues, organ, and body and covers histology, gross anatomy, embryology, and the development of human body morphology under normal and diseased states.

**BMS202 Emperor's Canon of Internal Medicine 内经学**

AUs: 6, Prerequisites: BMS101 and BMS102, Semester 1

This course studies the evolution of TCM, and the basic theoretical framework, principles and applications used in TCM internal medicine. It covers systematic treatments using theories of Yin-Yang and Five elements, viscera status, meridians, physiological and pathological symptoms, diagnostic methods, principles and clinical applications used in TCM internal medicine.

**BMS203 TCM Diagnostics 中医诊断学**

AUs: 6, Prerequisites: BMS101, Semester 1

This course introduces the four basic TCM diagnostic methods used widely to differentiate and treat illnesses and diseases, and hence bridges theoretical knowledge and actual clinical practice. The course will cover observational diagnosis, the analysis of clinical manifestations using the eight principal syndromes, methods of differential diagnosis and applied skills in clinical case studies.

**BMS821 Laboratory III**

AUs: 2, Prerequisites: NIL, Semester 1

This course is a clustering of laboratory-based experiments and exercises for courses taught in the first semester of Year 2.

**BS207 Immunology**

AUs: 3, Prerequisites: NIL, Semester 2

Immunology deals with the principles of how our body defends itself against pathogenic microorganisms, and covers the history and lay wisdom of immunology; innate vs adaptive immunity; cells of the immune system: gene rearrangement of lymphocytes, B lymphocytes; cytotoxic T lymphocytes and helper T lymphocytes; neutrophils, macrophages, natural killer cells, dendritic cells; molecules of the immune system:



the antibodies, complement proteins, cytokines; activation of B and T cells; signal transduction; trafficking of leukocytes; immunological memory; autoimmunity; tolerance; vaccines; and applied immunology.

#### **BS208 Virology**

AUs: 3, Prerequisites: NIL, Semester 2

This course gives an overview of the molecular biology of viruses, their involvement in human diseases and current antiviral R & D, and provides an introduction to viruses, molecular biology of viral replication and infection, virus-cell interactions, human virology and viral diseases, and vaccines and anti-virals.

#### **BMS204 Pathology**

AUs: 3, Prerequisites: NIL, offered in Semester 1 of Year 3 This course emphasises human pathology and the mechanisms in disease progression. It covers basic pathologic processes, including degenerative processes, cell death, inflammation and repair, immuno-pathologies, carcinogenesis, and the body's response to hormonal and growth factors changes.

#### **BMS205 Chinese Materia Medica 中药学**

AUs: 6, Prerequisites: BMS101, Semester 2

This course introduces the different unique properties of Chinese herbs and medicines, and their application in clinical practice, according to the nature of diseases or illnesses. It covers a wide range of Chinese medicines, according to their sources, processing procedures, medicinal properties, pharmacological functions, channel tropisms, clinical dosages, administrative precautions, toxicities and other related factors.

#### **BMS206 Treatise on Exogenous Febrile Diseases 伤寒论**

AUs: 6, Prerequisites: BMS201, BMS202 and BMS203, Semester 2

This course introduces the principles and concepts of "Treatise" and an explication of its core theme to provide a clearer guideline on clinical practice. It covers the principles of clinical treatment, according to differential diagnosis and herbal combinations within Chinese prescriptions and their related uses.

#### **BMS822 Laboratory IV**

AUs: 2, Prerequisites: NIL, Semester 2

This course is a clustering of laboratory-based experiments and exercises for courses taught in the second semester of Year 2.

#### **BMS823 TCM internship I 课间见习 I**

AUs: 3, Prerequisites: NIL, Semester 2

This course imparts actual general diagnosis procedures in TCM practice and integrates the knowledge previously taught in Basics of TCM and Diagnostics of TCM.

### **Year 3**

#### **BS305 Plant Biology**

AUs: 3, Prerequisites: NIL, Semester 1

This course introduces plant biology and the principles that underlie plant form and function. It covers plant structure and function, growth and development, evolution and diversity. Topics such as global warming, acid rain, genetic engineering, organic farming, ornamental plants and medical plants will also be introduced.

#### **BMS301 Medicinal Chemistry 药物化学**

AUs: 5, Prerequisites: NIL, offered in Semester 2 of Year 2

This course introduces various classes of medicinal compounds with particular emphasis on their related biological activity and mechanism of action. It covers principles of medicinal chemistry integrated with those of organic chemistry; structures of compounds in relation to drug activities and biological principles; sources and the identification of known active drugs; plant parts used for medicinal purposes; and the fundamentals of chemical and biological sciences with applications to selected diseases.

#### **BMS302 TCM Formulary 方剂学**

AUs: 8, Prerequisites: BMS101, BMS202 and BMS203, Semester 1

This course introduces the compilation of Chinese herbs and medicines in the formation of effective clinical prescriptions. It covers common Chinese prescriptions, the compositions of each medicinal component in classic prescriptions; the medicinal roles played by these components as doublets or as groups, efficacy and clinical dosage.

**BMS831 TCM internship II 课间见习 II**

AUs: 3, Prerequisites: NIL, Semester 1

This course is a clustering of laboratory-based experiments and exercises for courses taught in the first semester of Year 3.

**BMS303 Synopsis of the Golden Chamber 金匱要略**

AUs: 6, Prerequisites: BMS101, BMS202 and BMS203, Semester 2

This course introduces the general exposition of the TCM medical paradigm, with reference to the viscera status, the nature of diseases and illnesses, the principles of diagnosis, and the methods used in treatments and related prescriptions. The course covers the basic theories, principles and concepts of TCM internal medicine, with reference to the Yellow Emperor's Canon of Internal Medicine and Treatise on Exogenous Febrile Diseases.

**BMS304 Selected literature in TCM 各家学说**

AUs: 6, Prerequisites: BMS201 and BMS302, Semester 2

This course covers the history of TCM development, drawing accounts from philosophies, medical excellence, and clinical experience established by ancient Chinese physicians.

**BMS305 Seasonal Febrile Diseases 温病学**

AUs: NIL, Prerequisites: NIL, Semester: 2

This course studies the evolution of various febrile diseases and their importance in each historic phase. It covers the ancient literature of renowned physicians, particularly Wu Ju Tong (Analysis of Epidemic Febrile Diseases), Ye Tian Shi (Treatise on Seasonal Febrile Diseases) and Xue Sheng Bai (Explanation of Damp-Heat Diseases).

**BMS832 TCM internship III 课间见习 III**

AUs: 3, Prerequisites: NIL, Semester 2

This course imparts general diagnosis procedures in TCM practice and integrates the knowledge previously taught in the Synopsis of the Golden Chamber and the Treatise on Exogenous Febrile Diseases, together with principles in treatments, based on different climatic, seasonal and geographic conditions, and patients' medical conditions.

**BMS310 Final Year Project**

AUs: 16, Prerequisites: NIL May-July, vacation only

This project gives students first-hand exposure to biomedical sciences research projects. The project is to be completed at the School, hospitals, or local or overseas institutes before the start of the fourth year of study at the Beijing University of Chinese Medicine in August.

**Year 4**

**BMS411 Basis of Diagnostics 诊断学基础**

AUs: TBA, Prerequisites: BS104, BS201, BS202 and BMS204, Semester 1 and 2

**Learning objectives:** This course covers the different diagnostic methods (e.g., observational symptoms, routine check-ups and laboratory diagnosis) and equipment (e.g., X-ray, electrocardiogram and ultrasound) used in Western Medicine.

**BMS412 Internal Medicine of TCM 中医内科学**

AUs: TBA, Prerequisites: BMS101, BMS203, BMS302 and BMS204, Semester 1 and 2

This course develops a basic understanding of theoretical and practical TCM internal medicine. It covers differential diagnosis and prescriptions for common diseases under TCM internal medicine.

**BMS413 Acupuncture and Moxibustion 针灸学**

AUs: TBA, Prerequisites: BMS101, BMS203 and BMS302, Semester 1 and 2

This course concentrates on the basic components and organisation of acupoints, meridians and treatments applied to related diseases/illnesses. Lectures and practical sessions cover the classification of acupoints, the methods of locating these critical points on the body, the overall circulation of the different channels, as well as techniques of acupuncture and moxibustion and their clinical applications.

**BMS414 Orthopaedics, Traumatology of TCM 中医骨伤学**

AUs: TBA, Prerequisites: BMS203, Semester 1 and 2

This course introduces the different methods of diagnosis and treatment in traumatic and orthopaedic conditions. Lectures and practical sessions cover causes, diagnosis and treatments applied to bone fractures, dislocations and soft tissue injuries.

**BMS415 Preventive Medicine 预防医学理论**

AUs: TBA, Prerequisites: NIL, Semester 1 and 2

This course delivers the principles and knowledge of preventing diseases and illnesses as applied in clinical TCM practice. It covers the basic principles and knowledge of work hygiene, profession-related ailments, nutrition, food hygiene and epidemiology.

**BMS416 Modern Internal Medicine 西医内科学**

AUs: TBA, Prerequisites: BS104, BS201, BS202, BMS204 and BMS411, Semester 1 and 2

This course develops a basic understanding of theoretical and practical Western internal medicine and covers differential diagnosis and prescriptions applied to common diseases under Western internal medicine.

**BMS417 Gynaecology of TCM 中医妇科学**

AUs: TBA, Prerequisites: BMS203, BMS411 and BM412, Semester 1 and 2

This course develops a basic understanding of TCM and gynaecology. It covers clinical guiding principles previously mastered in the Basics of TCM, Diagnostics of TCM and TCM Formulary, as well as the treatment gynaecological disorders (menstrual, pregnancy-related and haemorrhagic).

**BMS418 External Medicine of TCM 中医外科学**

AUs: TBA, Prerequisites: BMS203, BMS411 and BM412, Semester 1 and 2

This course studies the link between common internal diseases and their observational symptoms. It covers disease formation and development and systematic and localised treatments for the prevention of external ailments.

**BMS419 Paediatrics of TCM 中医儿科学**

AUs: TBA, Prerequisites: BMS203, BMS411 and BM412, Semester 1 and 2

This course studies the phases of growth, development and disease prevention in children. It covers differential diagnosis and treatment of common communicable and other related diseases in children.

**BMS420 Dermatology of TCM 中医皮肤病学**

AUs: TBA, Prerequisites: BMS203, BMS411 and BMS412, Semester 1 and 2

This course covers the structure, physiological and pathological properties of the human skin, as well as the treatments for common skin diseases.

**Year 5**

**BMS501 Clinical Internship of TCM Internal Medicine 中医内科学实习**

AUs: TBA, Prerequisites: BMS101, BMS203, BMS204, BMS302 and BMS412, Semester 1 and 2

This course covers differential diagnosis and prescriptions applied to commonly encountered diseases under internal TCM.

**BMS502 Acupuncture 针灸科实习**

AUs: TBA, Prerequisites: BMS101, BMS203, BMS204, BMS302 and BMS413, Semester 1 and 2 This course covers techniques of acupuncture and moxibustion and their clinical applications, such as acupuncture needling, cupping and therapy-finishing massages.

**BMS503 Gynaecology of TCM 中医妇科实习**

AUs: TBA, Prerequisites: BMS101, BMS203, BMS204, BMS302, BMS412 and BMS417, Semester 1 and 2

This course furthers TCM clinical practice in gynaecology. It covers clinical guiding principles previously mastered in the Basics of TCM, Diagnostics of TCM and TCM Formulary, as well as the treatment of gynaecological disorders (menstrual, pregnancy-related and haemorrhagic).

**BMS504 Paediatrics of TCM 中医儿科实习**

AUs: TBA, Prerequisites: BMS101, BMS203, BMS204, BMS302, BMS412 and BMS419, Semester 1 and 2  
This course studies the phases of growth, development and disease prevention in children. It covers differential diagnosis and treatment of common communicable and other related diseases in children.

**BMS505 External Medicine of TCM 中医外科实习**

AUs: TBA, Prerequisites: BMS101, BMS203, BMS204, BMS302 and BMS412, Semester 1 and 2  
This course covers the structure, physiological and pathological properties of the human skin, as well as the treatments for common skin diseases.