

## **REGULATIONS FOR THE DEGREE OF MASTER OF MEDICAL SCIENCES (MMedSc)**

*These regulations apply to candidates admitted to the Master of Medical Sciences in the academic year 2022-23 and thereafter.*

*(See also General Regulations and Regulations for Taught Postgraduate Curricula)*

### **M.18 Definition**

The degree of Master of Medical Sciences (MMedSc) is a postgraduate degree awarded for the satisfactory completion of the curriculum of one academic year for full-time study or two academic years for part-time study in the Li Ka Shing Faculty of Medicine.

Any publication based on work approved for a higher degree should contain a reference to the effect that the work was submitted to the University of Hong Kong for the award of the degree.

### **M.19 Admission requirements**

To be eligible for admission to the curriculum leading to the degree of Master of Medical Sciences, a candidate shall:

- (a) comply with the General Regulations;
- (b) comply with the Regulations for Taught Postgraduate Curricula;
- (c) hold a Bachelor's degree with honours or the degrees of MBBS of this University, or another qualification of equivalent standard from this University or from another University or comparable institution accepted for this purpose; and
- (d) satisfy the examiners in a qualifying examination if required.

Advanced standing of up to 12 credit units may be granted to a candidate who has successfully completed equivalent course(s) subject to approval by the Faculty Board. Candidates seeking advanced standing should submit a written application to the Faculty Office before commencement of the study. Such course(s) should be completed no more than 5 years prior to the candidate's commencement of the Master of Medical Sciences.

### **M.20 Qualifying examination**

- (a) A qualifying examination may be set to test the candidate's formal academic ability or his /her ability to follow the courses of study prescribed. It shall consist of one or more written papers or their equivalent and may include a project report; and
- (b) A candidate who is required to satisfy the examiners in a qualifying examination shall not be permitted to register until he/she has satisfied the examiners in the examination.

### **M.21 Award of degree**

To be eligible for the award of the degree of Master of Medical Sciences a candidate shall

- (a) comply with the General Regulations;
- (b) comply with the Regulations for Taught Postgraduate Curricula; and
- (c) complete the curriculum and satisfy the examiners in accordance with the regulations set out below.

### **M.22 Period of study**

The curriculum shall normally extend over one academic year of full-time study or two academic years of part-time study. Candidates shall not be permitted to extend their study beyond the maximum period

of registration of two academic years of their full-time study or four academic years of their part-time study.

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### **M.23 Completion of curriculum**

To complete the curriculum, a candidate shall

- (a) satisfy the requirements prescribed in TPG6 of the Regulations for Taught Postgraduate Curricula;
- (b) take no less than 69 credit units in the manner specified in these regulations and the syllabus, and follow the instructions in the syllabus prescribed for the Courses and complete satisfactorily all required written, practical and/or clinical work;
- (c) satisfy the examiners in the Courses by continuous assessments and/or by written examinations; and
- (d) complete and present a satisfactory dissertation on an approved research project.

The examiners may also prescribe an oral examination.

Candidates who fail to fulfil the requirements within the prescribed maximum period of registration shall be recommended for discontinuation under the provision of General Regulation G12, except that candidates, who are unable because of illness or circumstances beyond their control to complete the requirements within the prescribed maximum period of registration, may apply for permission to extend their period of studies.

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### **M.24 Title of dissertation**

The title of the dissertation shall be submitted for approval before the end of the second semester of the final academic year, and the dissertation shall be presented not later than the end of the final academic year. The candidate shall submit a statement that the dissertation represents his/her own work (or in the case of conjoint work, a statement countersigned by his/her co-worker, which shows his/her share of the work) undertaken after registration as a candidate for the degree. The examiners may also prescribe an oral or a written examination on the subject of the dissertation.

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### **M.25 Examinations**

- (a) A candidate who has failed to satisfy the examiners in the written paper but has presented a satisfactory dissertation and has satisfactorily completed the prescribed written and practical work may be permitted to undertake a further period of study in the Course of failure and to be re-examined by a specified date not less than one month after the publication of results.
  - (b) A candidate who has presented an unsatisfactory dissertation but has satisfied the examiners in the written paper and has satisfactorily completed the prescribed written and practical work, may be permitted to revise the dissertation and to re-present it within a specified period of not more than four months after receipt of a notice that it is unsatisfactory.
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### **M.26 Discontinuation of studies**

A candidate

- (a) who has failed to satisfy the examiners in the written paper and has presented an unsatisfactory dissertation; or
- (b) who has failed to satisfy the examiners in a second attempt in the written paper or his/her dissertation

shall be recommended for discontinuation of studies under the provisions of General Regulation G12.

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### **M.27 Grading system**

Individual Courses (i.e. Core Course, Specialised Field of Study and Dissertation) shall be graded according to the grading system of “Pass” or “Fail”.

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**M.28 Examination results**

At the conclusion of the examinations a pass list shall be published. A candidate who has shown exceptional merit in all examinations may be awarded a mark of distinction which shall be recorded in the candidate's transcript.

## SYLLABUS FOR THE DEGREE OF MASTER OF MEDICAL SCIENCES (MMedSc)

The Master of Medical Sciences curriculum consists of 12 credit units of Core Courses, 18 credit units of Specialised Courses in the chosen Specialised Field of Study and 39 credit units of capstone experience (dissertation), making a minimum of 69 credit units of teaching and prescribed work.

The mode of assessment for Core and Specialised Courses comprises continuous assessments and examinations. Candidates are also required to submit a dissertation on a selected project in the chosen Specialised Field of Study to the satisfaction of the examiner(s).

### A. INDUCTION COURSES

**All candidates will be required to attend the Induction Courses of 10 hours:**

MMSC6001 *Dissertation Writing* (7.5 hours)

#### Aim(s)

- ♦ To raise students' awareness of essential aspects of academic writing that contribute to the overall communicative success of a dissertation.
- ♦ To enable students to approach their writing with confidence and apply skills at key stages of their research process.

#### Contents

- ♦ Citing research
- ♦ Communicative success in reporting research
- ♦ Features of scientific research language
- ♦ Publication styles
- ♦ Reviewing the literature
- ♦ Structure of dissertations: The IMRaD formula
- ♦ The discussion section: Making claims
- ♦ The introduction: Stating the research gap
- ♦ Writer's stance

MMSC6002 *Clinical Trials and Biostatistics* (2.5 hours)

#### Aim(s)

- ♦ To make students recognize the importance of clinical trials and understand clinical trial design.
- ♦ To equip students with basic statistical knowledge to analyze clinical trial data and interpret analysis result.

#### Contents

- ♦ Types of Clinical Trials
- ♦ Clinical Trial Design
- ♦ Clinical Trial Phases
- ♦ Protocol Development
- ♦ Basic statistical analysis methods and reporting

## B. RESEARCH ETHICS

All candidates will be required to pass the web-based learning course on Epigeum Research Integrity Programme developed by Oxford University Press.

### MMSC6003 *Research Ethics*

#### Aim(s)

- To raise students' awareness on the importance of research integrity, accountability and research ethics.

#### Contents

- The course covers principles and practices related to research integrity in the science field:
  - values of research integrity
  - principles of responsible research conduct
  - application to your own research

## C. CORE COURSES

Candidates will be required to take 12 credit units (i.e. **four** Core Courses of 3 credit units each) from the following Core Courses. **At least one Course** should be selected **from either of the two main sections, viz. Research Methods and Biological Systems.**

### I. RESEARCH METHODS

#### CMED7100 *Introduction to Biostatistics*

#### Aim(s)

- ♦ To introduce the students to biostatistical methods and the underlying principles, as well as practical guidelines of "how to do it" and "how to interpret it" as the role they can play in decision making for public health majors.
- ♦ To introduce the students to descriptive and inferential statistical techniques, with emphasis on selection of appropriate methods and tools for various applications, and proper interpretation of results.
- ♦ To introduce SPSS, a commonly used software package for statistical analyses.

#### Contents

- ♦ Exploratory data analysis
- ♦ Regression and correlation
- ♦ Probability
- ♦ Statistical inference
- ♦ Hypothesis tests
- ♦ Designing studies
- ♦ Applied regression
- ♦ Analysis of survival data
- ♦ Statistics in practice

#### CMED7200 *Introduction to Epidemiology*

#### Aim(s)

- ♦ To identify, define and calculate measures of illness and their association with health determinants, including risks, rates and prevalence.
- ♦ To describe and differentiate common epidemiological study designs, and discuss their strengths and limitations.

- ♦ To discuss approaches to the identification of causes of illness and the implications for control efforts.

### **Contents**

The Course consists of four sections:

- Approaches to measuring the occurrence and distribution of illness in populations
  - ♦ Measures of occurrence
  - ♦ Measures of effect and association
- Design, interpretation and critical appraisal of epidemiologic studies
  - ♦ Randomized trials
  - ♦ Cohort studies
  - ♦ Case-referent studies
  - ♦ Other types of study designs
- Design, interpretation and critical appraisal of epidemiologic studies
  - ♦ Directed acyclic graphs (DAGs) and causal inference
  - ♦ Bias, confounding and interaction
- Epidemiology in practice
  - ♦ Conducting and reporting epidemiological studies
  - ♦ Using appropriate epidemiological evidence in public health practice and medical research

### **PATH6100 *Laboratory Methods and Instrumentation***

#### **Aim(s)**

- ♦ To provide students with the basic understanding of the principles and latest developments in the practical applications of a broad range of techniques commonly employed in medical research projects.

#### **Contents**

- ♦ Animal models for research
- ♦ Basic concepts in automated DNA sequencing and genotyping
- ♦ Basic concepts in conventional and molecular cytogenetics
- ♦ Cancer stem cells: methods and protocols
- ♦ Epigenetics and methylation analysis
- ♦ Mass spectrometry and its applications in biological studies
- ♦ Mutation detection technologies
- ♦ Principle and applications of flow cytometry
- ♦ Protein analysis methods
- ♦ Tissue processing and immunohistochemistry

### **PATH6500 *Practical Course in Laboratory Methods***

*(Prerequisite: PATH6100 Laboratory Methods and Instrumentation)*

#### **Aim(s)**

- ♦ To provide practical experience for laboratory methods commonly employed in medical research projects.
- ♦ To provide training in experimental design and biological sample processing.
- ♦ To develop observational and record keeping skills.

#### **Contents**

Tissue processing and immunohistochemistry:

- ♦ Tissue embedding
- ♦ Microtome sectioning of paraffin block and cryostat sectioning of frozen block
- ♦ H&E staining, immunohistochemistry (IHC)
- ♦ Histological analysis

Tissue culture:

- ♦ Basic tissue culture techniques
- ♦ Cell growth assays (Tryphan blue staining, cell counting, MTS assay)
- ♦ Colony formation assay
- ♦ Flow cytometric analysis

Preparation of clinical samples for molecular diagnosis:

- ♦ Extraction methods for genomic DNA and RNA
- ♦ Extraction methods for protein
- ♦ Reverse transcription of mRNA
- ♦ Electrophoresis (agarose gel, SDS-PAGE)

Molecular detection of gene expression, mutation, and DNA methylation analysis:

- ♦ PCR / quantitative PCR
- ♦ DNA sequencing
- ♦ Genotyping

### **SBMS7100 *Practical Bioinformatics***

*(Candidates choosing this Core Course should have molecular biology background.)*

#### **Aim(s)**

- ♦ To provide students with the basic understanding of the principles and latest developments/tools in bioinformatics.

#### **Contents**

- ♦ Biological databases
- ♦ Gene prediction
- ♦ Information retrieval: entrez and SRS
- ♦ Introduction - Essential concepts on gene structure and sequence, protein structure and function
- ♦ Multiple sequence alignment
- ♦ Pair-wise sequence alignment I: dot plots
- ♦ Pair-wise sequence alignment II: dynamic programming
- ♦ Phylogenetic prediction
- ♦ Sequence database searches: BLAST, FASTA
- ♦ Substitution matrices

### **SURG6910 *Laboratory Animal Handling and Surgical Techniques***

#### **Aim(s)**

- ♦ To introduce the various approaches in the generation and applications of various animal models for medical research.
- ♦ To introduce the safety/ethics legislation in the use of animal for medical research.
- ♦ To introduce surgical techniques for small and big animals.

#### **Contents**

- ♦ Animal models for human diseases
- ♦ Animal surgical techniques: demonstration of laparoscopic surgery
- ♦ Audio-visual instruction on animal handling techniques
- ♦ Cancer models
- ♦ Common laboratory animal species in the Laboratory Animal Unit
- ♦ Drug/radiation induced animal disease models
- ♦ Ethics in using laboratory animals
- ♦ Genetically modified (GM) animal disease models
- ♦ Transplantation immunology
- ♦ Transplantation models

- ♦ University and Government regulations governing the use of animals for experimental purposes

## II. BIOLOGICAL SYSTEMS

### MEDI6500 *Cell Metabolism*

#### Aim(s)

- ♦ To introduce key catabolic and anabolic pathways in cellular metabolism.
- ♦ To introduce latest concept on metabolic regulation and integration in mammals.
- ♦ To introduce and discuss application of proteomics and metabolomics in metabolic research.
- ♦ To introduce metabolic adaptations to nutritional and environmental changes.
- ♦ To enunciate the metabolic basis of human diseases.

#### Contents

- ♦ Application of proteomics and metabolomics in metabolic research
- ♦ Cellular machinery for energy metabolism
- ♦ Control of cellular metabolism by circadian clock
- ♦ Hormonal integration of metabolism in mammals
- ♦ Major catabolic and anabolic pathways in cellular metabolism
- ♦ Metabolic adaptations to fasting/starvation and environmental changes
- ♦ Metabolic basis of major human diseases
- ♦ Metabolic regulation by posttranslational modifications

### PAED7100 *Principles to Genetic Counselling*

#### Aim(s)

- ♦ To understand the basis of human genetics and genetic disorders.
- ♦ To provide an overview of the roles and duties of a genetic counsellor in genetic assessment and result disclosure.
- ♦ To develop basic clinical skills to conduct interviews, present relevant genetic information to patients and families, and facilitate informed decision.
- ♦ To recognize the ethical, legal and policy issues related to genetic testing and genomic development.
- ♦ To understand the basis of human genetics and genetic disorders.

#### Contents

- ♦ Introduction to human genetics and inheritance Cellular machinery for energy metabolism
- ♦ Genetic assessment and informed consent
- ♦ Result disclosure and counselling theories
- ♦ Genetic testing and genomic technology
- ♦ Ethics, law and policy in genetics
- ♦ Case discussion and role play on the above topics

### PATH6300 *General Cytopathology*

#### Aim(s)

- ♦ To equip students to meet the increased demand on the service of clinical cytology in Hong Kong.

#### Contents

- ♦ Clinical relevance of cytology consultation reports: implications on management
- ♦ Collection of cell samples and laboratory processing of cytology specimens
- ♦ Ethical and legal aspects of clinical cytopathology
- ♦ How to diagnose malignancy in gynaecological cytology specimens



- ♦ How to diagnose malignancy in non-gynaecological exfoliated cytology and fine needle aspiration specimens
- ♦ Organisation of a cytopathology laboratory
- ♦ Practical workshop on fine needle aspiration cytopathology
- ♦ Practical workshop on gynaecological cytopathology
- ♦ Practical workshop on non-gynaecological exfoliated cytopathology
- ♦ Quality assurance programme and laboratory accreditation
- ♦ Recent advances in cytopathology

### **PATH6600 *Fundamentals of Common Human Diseases***

*(not for students with Medical/Dental background)*

#### **Aim(s)**

- ♦ To introduce the epidemiology, pathophysiology, clinical and pathological features of common diseases in Hong Kong To demonstrate representative cases and illustrate the approach to diagnosis of various diseases, and illustrate the role of pathology practice in clinical medicine.

#### **Contents**

Epidemiology, pathophysiology, clinical and pathological features of common human diseases involving major body systems, with selected topics such as cardiovascular, reproductive and urinary, central nervous system, hepatobiliary, gastrointestinal, and haematolymphoid systems. The lecture-based teaching will be supplemented by case presentations where appropriate. Approaches to problems on toxicology will also be covered. The course will provide science students with an overview of the role of pathology in clinical practice, and topics could also be beneficial to their research work.

- ♦ Introduction to pathology and immunology
- ♦ Global burden of disease
- ♦ Common cancers in Hong Kong
- ♦ Cardiovascular diseases and case illustration
- ♦ Common diseases of the gastrointestinal tract
- ♦ Common respiratory diseases: clinical patterns and basic pathology
- ♦ Common diseases of female genital tract and Pathology of the male genital tract
- ♦ Common breast diseases and case illustration
- ♦ Common vascular central nervous system diseases and dementia
- ♦ Common urinary diseases and case illustration
- ♦ Anaemia – What, Why and How? Case illustration on anaemia
- ♦ Toxicology in clinical practice

### **PATH6700 *Recent Advances in Cancer Biology***

#### **Aim(s)**

- ♦ To introduce emerging concepts in cancer biology.
- ♦ To introduce cutting edge topics in cancer research.

#### **Contents**

- ♦ Genetic aspects of cancer heterogeneity
- ♦ Cancer metastasis
- ♦ Cancer epigenetics
- ♦ RNA splicing in cancer
- ♦ Cancer stem cells
- ♦ Cancer metabolism
- ♦ Tumor microenvironment
- ♦ Cancer immunology
- ♦ Mouse models in cancer research
- ♦ Surgical pathology in management and prognostication of common human cancers

## PHAR6100 *Principles of Drug Action*

### Aim(s)

- ♦ To provide general and broad knowledge about drug distribution and actions in human body and how drugs produce therapeutic effects in the body.
- ♦ To introduce pharmacokinetic properties of drugs and drug-receptor interactions.
- ♦ To explain the mechanisms underlying the tolerance, dependence and resistance to drugs.
- ♦ To discuss the adverse drug actions, drug interactions and drug allergy.

### Contents

- ♦ Adverse effects of drugs
- ♦ Dose-response relationships
- ♦ Drug allergy and resistance
- ♦ Drug interaction
- ♦ Drug pharmacokinetics
- ♦ Drug-receptor interaction
- ♦ Pharmacogenetics and pharmacogenomics

## PHAR7300 *Therapeutic Antibodies*

### Aim(s)

- ♦ To provide an overview of monoclonal antibody-based therapeutics.
- ♦ To study the pharmacokinetics and pharmacodynamics of therapeutic antibodies.
- ♦ To introduce different technologies for therapeutic antibody engineering.
- ♦ To review the contemporary development of therapeutic antibodies in cardiovascular, metabolic and cancer diseases.

### Contents

- ♦ Monoclonal antibody-based therapeutics – Medical History and Current Status
- ♦ Pharmacokinetics and pharmacodynamics of therapeutic antibodies
- ♦ Engineering and production of therapeutic antibodies
- ♦ Application and development of therapeutic antibodies in different types of diseases

## SBMS7200 *Genes and Gene Functions in Diseases*

### Aim(s)

- ♦ To provide fundamental knowledge of gene and gene function in normal/abnormal human body.

### Contents

- ♦ Complex genetic diseases
- ♦ Reverse genetics and cloning of human disease genes: the cystic fibrosis gene
- ♦ Molecular basis of genetic disease
- ♦ Molecular mechanisms of aging
- ♦ Gene therapy: bioethics of molecular medicine
- ♦ Oncogenes and tumour suppressor genes
- ♦ Protein dysfunction and disease
- ♦ Next generation sequencing
- ♦ Epigenomics analysis
- ♦ Introduction to protein structure and function
- ♦ Protein post-translational modifications
- ♦ Gene Function analysis: model organism and transgenic animals

## SBMS7500 *Advanced Cell Biology* -

### Aim(s)

- ♦ To provide students with a general knowledge of cell biology.
- ♦ To introduce the regulation of cell functions by signalling pathways.
- ♦ To introduce students with recent advances and applications in cell biology..

### Contents

- ♦ Essential components of the cell
- ♦ Cell cycle and cell divisions
- ♦ Cell survival and apoptosis
- ♦ Calcium signals in cellular communication
- ♦ Hedgehog signalling in development
- ♦ Cellular stress response
- ♦ Cell-cell interaction
- ♦ iPSC-derived neural stem cell
- ♦ Glial cell biology
- ♦ Intracellular transport in neuron
- ♦ Neuronal and glial cell migration
- ♦ Cell disorders

## SBMS7600 *Integrative Perspectives of Body Functions*

### Aim(s)

- ♦ To provide the students with the current knowledge on the mechanisms of human body functions with an integrative perspective.
- ♦ To introduce to the students state-of-the-art research approaches to the study of human body functions.

### Contents

- ♦ Homeostatic regulation of body functions: circadian and temporal regulation
- ♦ Metabolic and hormonal control: oxygen and glucose
- ♦ Motor control: movement, coordination and behavior
- ♦ Neuropsychological functions: cognition and emotion

## **D. SPECIALISED FIELD OF STUDY**

In addition, each candidate will be required to choose one Specialised Field of Study.

A total of 18 credit units should be selected in the chosen Specialised Field of Study.

## **SCHOOL OF BIOMEDICAL SCIENCES**

### SBMS7700 *Current Topics in Biomedical Sciences*

#### Aim(s)

- ♦ To enable students to gain basic knowledge in cell biology, physiology, cancer biology and brain function under normal and disease conditions.
- ♦ To provide training in choosing the current innovative research topics.
- ♦ To provide guidance in critical thinking in analysing the scientific papers and gain insight into the importance and contribution to the field of studies.
- ♦ To guide them to discuss and write scientific essays highlighting the strength and weakness of the major hypothesis, results and interpretations.
- ♦ To guide them how to prepare poster presentation.
- ♦ To develop scientific writing and poster presentation skills.

#### Requirements

- ♦ Candidates are required to choose one of the following blocks (either A, B, or C). Each block carries 18 credits and contains three components with 6 credits each.
- ♦ Students are required to write 3 literature reviews (~2000 words per review) on 3 different topics under A1, B1 or C1 (6 credits).
- ♦ Students are required to write 3 technology reviews (~2000 words per review) which mainly focus on describing the principle of the technology and their applications in the relevant research area under A2, B2 or C2 (6 credits).
- ♦ Students are required to submit 2 posters for presentation on two different topics under A3, B3 or C3 to summarize recent advances in the relevant area (6 credits).
- ♦ They may consult their supervisor or the relevant topic supervisors on reviews writing and preparing for the posters presentation.

### Contents

Course Code	Courses	Credit Units
SBMS7701	<b>Block A1:</b> Molecular Neuroscience (Developmental Neurobiology) <ul style="list-style-type: none"> <li>• Molecular/cellular physiology and brain function</li> <li>• Molecular control of neurogenesis</li> <li>• Development of glial cells</li> </ul>	6
SBMS7704	<b>Block A2:</b> Molecular Neuroscience (Technological advances in understanding neurological disorders) <ul style="list-style-type: none"> <li>• Mechanisms of neurological disorders</li> <li>• Animal models of neurodegenerative disorder</li> <li>• Preventive and regenerative medicine in nervous system</li> </ul>	6
SBMS7705	<b>Block A3:</b> Molecular Neuroscience (Frontiers in neuroscience) <ul style="list-style-type: none"> <li>• Current topics in neuroimmunology</li> <li>• Synaptic plasticity in learning and memory</li> <li>• Molecular regulation of synapse development</li> </ul>	6
SBMS7702	<b>Block B1:</b> Cell Biology (Molecular regulation of cell adhesion, migration and proliferation) <ul style="list-style-type: none"> <li>• Cell adhesion</li> <li>• Cell migration</li> <li>• Centrosome biogenesis</li> </ul>	6
SBMS7706	<b>Block B2:</b> Cell Biology (Recent advances in stem cell biology and single cell technology) <ul style="list-style-type: none"> <li>• Pluripotent embryonic stem cell</li> <li>• Cellular reprogramming</li> <li>• Single cell technology</li> </ul>	6
SBMS7707	<b>Block B3:</b> Cell Biology (T-cell immunity and RNA therapeutics) <ul style="list-style-type: none"> <li>• T cell immunity</li> <li>• RNA-targeting Cas proteins</li> <li>• RNA therapeutics</li> </ul>	6
SBMS7703	<b>Block C1:</b> Cancer Biology (Carcinogenesis) <ul style="list-style-type: none"> <li>• Cancer metastasis</li> <li>• Cancer stem cells</li> <li>• Pathogenesis of nasopharyngeal carcinoma</li> <li>•</li> </ul>	6
SBMS7708	<b>Block C2:</b> Cancer Biology (Technological advances in cancer treatment) <ul style="list-style-type: none"> <li>• Artificial intelligence in oncology</li> <li>• Pre-clinical cancer models for drug screening</li> <li>• Stem cell engineering for cancer immunology</li> </ul>	6
SBMS7709	<b>Block C3:</b> Cancer Biology (Frontiers in cancer science) <ul style="list-style-type: none"> <li>• Genome instability and human diseases</li> <li>• Cancer genomics</li> </ul>	6

	• Microbiome and cancer	
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SBMS7800 *Molecular Biology and Bioinformatics for Biomedical Sciences*

Aim(s)

- ♦ To introduce laboratory techniques of biochemistry and molecular biology.
- ♦ To enable students to carry out research independently using the skills acquired in the research project.
- ♦ To provide training to students to work as a team with other scientists and gain insight into the field of research.
- ♦ To provide training to students so that they can critically analyse scientific papers and design experiments to verify scientific theories.

Contents

Candidates are required to take 18 credit units from three of the four courses listed below.

Course Code	Courses	Credit Units
SBMS7801	<b>Advanced biochemistry:</b> Signal transduction, biomodulators, enzyme kinetics, catalytic mechanisms, protein chemistry, post-translational modification of proteins	6
SBMS7802	<b>Biomedical sciences seminar:</b> Present and attend seminars, criticise, think, write and talk about biochemical sciences, organise mini-conferences, technical reviews, research proposals, communication skills, personal and career development	6
SBMS7803	<b>Molecular biology of the gene:</b> Eukaryotic gene regulation, control of gene expression, transcription factors, DNA-protein interaction	6
SBMS7804	<b>Practical bioinformatics:</b> <i>(Advice to Applications: candidates choosing this Specialised Course should have molecular biology background.)</i> Gene identification Information searching and retrieval: Entrez and SRS Internet resources: DNA and protein sequence databases Patterns, Motifs and Profiles analysis Phylogenetic analysis Sequence alignment: multiple sequence alignment Sequence database searching: FASTA, BLAST, Smith-Waterman, algorithm and parameters Simple sequence analysis	6

**DEPARTMENT OF DIAGNOSTIC RADIOLOGY AND CLINICAL ONCOLOGY,  
SCHOOL OF CLINICAL MEDICINE**

DRAD6201 *Clinical Physics in Radiation Oncology and Medical Imaging*

Aim(s)

- ♦ To educate and prepare students for professional and/or research career development in different areas related to medical physics.
- ♦ To provide students with professional knowledge about the clinical physics in oncology and radiology and its medical application.
- ♦ To introduce the rationale and principle of physics in radiotherapy and medical imaging.

Contents

Course Code	Courses	Credit Units
DRAD6202	Advance radiological physics and radiation dosimetry	3
DRAD6203	Brachytherapy physics	3
DRAD6204	Health physics with focuses on radiological protection in medical sectors*	3
DRAD6205	Magnetic resonance imaging – principles and its applications	3
DRAD6206	Molecular imaging and medical cyclotron	3
DRAD6207	Nuclear medicine sciences	3
DRAD6208	Physics in medical imaging	3
DRAD6209	Principles and practice of radiotherapy physics	3
DRAD6210	Quality assurance (QA) in radiation therapy and medical imaging	3
DRAD6211	Foundation in Basic Imaging, Medical Physics and Medical Imaging Artificial Intelligence*	3
DRAD6212	Cardiac computed tomography and cardiac magnetic resonance imaging	3

\* Compulsory courses

## DEPARTMENT OF MEDICINE, SCHOOL OF CLINICAL MEDICINE

### MEDI6600 *Metabolic Medicine*

(Candidates taking this Specialised Field of Study should also take the Core Course MEDI6500 Cell Metabolism as basic knowledge)

#### Aim(s)

- ♦ To help students to develop skills and critical thinking for both basic and clinical research on metabolic diseases.
- ♦ To provide students an updated knowledge in major metabolic diseases, including obesity, diabetes, cardio-metabolic syndrome, cancer and other aging-related disorders.
- ♦ To introduce current and future treatment and prevention of major metabolic disorders.

#### Contents

Course Code	Courses	Credit Units
MEDI6601	Current therapeutic strategies for metabolic diseases <ul style="list-style-type: none"> <li>♦ Current drugs for obesity, diabetes, diabetic complications and lipid disorders</li> <li>♦ Functional food, nutraceuticals and traditional herbals for treatment of metabolic disorders</li> <li>♦ Life style modifications (calorie restriction, exercise and balanced diet etc) in the prevention of metabolic disorders</li> <li>♦ Metabolic disease drug discovery: from bench to bed</li> </ul>	6
MEDI6602	Current topics in energy balance and obesity <ul style="list-style-type: none"> <li>♦ Adipose tissue dysfunction and obesity</li> <li>♦ Brown adipose tissue: a weapon against obesity</li> <li>♦ Control of energy balance by the gut-brain-liver axis</li> <li>♦ Latest concepts on energy intake and energy expenditure</li> <li>♦ Modern technologies for obesity research</li> <li>♦ White adipose tissue as an energy storage organ and secretory gland</li> </ul>	6
MEDI6603	Recent advances in metabolic disorders <ul style="list-style-type: none"> <li>♦ Calcium metabolism and osteoporosis</li> <li>♦ Cancer as a metabolic disease</li> <li>♦ Genetically inherited metabolic disease</li> <li>♦ Lipid abnormality, inflammation and atherosclerotic diseases</li> </ul>	6

	<ul style="list-style-type: none"> <li>♦ Metabolic changes in autoimmune diseases</li> <li>♦ Metabolic derangement in aging</li> <li>♦ Metabolic dysregulation and different types of diabetes</li> <li>♦ Mitochondrial disorders</li> </ul>	
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**DEPARTMENT OF MICROBIOLOGY, SCHOOL OF CLINICAL MEDICINE**

**MICR6100 *Medical Microbiology***

*(Candidates taking this Specialised Field of Study should also take the Core Course SBMS7100 Practical Bioinformatics as basic knowledge)*

**Aim(s)**

- ♦ To improve and sustain a high standard in laboratory practices and management and enhance development in clinical microbiology laboratories in Hong Kong.
- ♦ To enhance training in other laboratory science and provide continuous education for technicians, scientists or other health care workers on medical microbiology and infectious diseases.
- ♦ To provide structured training to enable postgraduates to embark on specialised research, clinical service or teaching for career and personal development.
- ♦ To provide training on current laboratory methods and practices and recent advances related to epidemiology, conventional and molecular diagnostics in medical microbiology and infectious disease, infection control and antimicrobial resistance.
- ♦ To provide practical and research experience in medical microbiology and infectious disease.

**Contents**

Course Code	Courses	Credit Units
MICR6101	Biosafety and handling of infectious waste <ul style="list-style-type: none"> <li>♦ Safety management, good work practices, biosafety levels, laboratory acquired infections, transportation of infectious substances/diagnostic specimens and infectious waste management</li> </ul>	3
MICR6102	Conventional and molecular techniques in detection and typing of microbial agents <ul style="list-style-type: none"> <li>♦ Recent advances in microbial identification techniques and approaches</li> </ul>	3
MICR6103	Emerging antimicrobial resistance and antimicrobial chemotherapy <ul style="list-style-type: none"> <li>♦ New and old antibiotics, mechanism of antimicrobial actions, antibiotic resistance epidemiology, traditional method for detection of resistance and recent advances</li> </ul>	3
MICR6104	Infection control and hospital epidemiology <ul style="list-style-type: none"> <li>♦ Hand hygiene, standard precautions, outbreak investigation, and infection control issues</li> </ul>	3
MICR6105	Laboratory and clinical interphase in infectious diseases <ul style="list-style-type: none"> <li>♦ Specimen priority, specimen rejection criteria, cost containment, quality assurance, quality control and automation in a medical microbiology laboratory</li> </ul>	3
MICR6106	Virological diagnosis of infectious diseases <ul style="list-style-type: none"> <li>♦ Basic methods in virology, clinical applications, rapid tests and biosafety; emerging viral infections: their diagnosis and control</li> </ul>	3

**DEPARTMENT OF OBSTETRICS AND GYNAECOLOGY, SCHOOL OF CLINICAL MEDICINE**

**OBGY6200 *Assisted Reproduction Technology (Laboratory)***

### Aim(s)

- ♦ To introduce the scientific basis of assisted reproductive technology.
- ♦ To introduce the basic skills in handling gametes and embryos.

### Contents

Course Code	Courses	Credit Units
OBGY6201	Embryo culture	3
OBGY6202	Fertilization	3
OBGY6203	Gamete and embryo cryopreservation	3
OBGY6204	Management of assisted reproduction laboratory	3
OBGY6205	Reproductive physiology, assessment and principles of management of patients with subfertility	3
OBGY6206	Semen analysis and assessment of sperm function	3

## **DEPARTMENT OF ORTHOPAEDICS AND TRAUMATOLOGY, SCHOOL OF CLINICAL MEDICINE**

### **OSUR6200 *Advanced Musculoskeletal Research and Practice***

#### Aim(s)

- ♦ Spine Surgery
  - To provide students with an in-depth study on spinal disorders and spine surgery.
- ♦ Joint Replacement Surgery
  - To present up-to-date knowledge, to describe basic science in joint replacement surgery, and to share practical tips in management of arthritic conditions.
  - To provide training and a platform to perform basic or clinical research for students to write up a dissertation or scientific papers.
  - To enhance the practice of the students and improve the standard of care.
- ♦ Advanced Musculoskeletal Imaging
  - To provide training on advanced musculoskeletal imaging for spinal disorders.
- ♦ Orthopaedic Trauma Surgery
  - To provide updated knowledge in basic science and clinical management of fractures and dislocations.
  - To enhance and improve the standard of care in orthopaedic trauma.
  - To provide training and a platform to reform basic or clinical research for dissertations or scientific publications.
- Hand Surgery
  - To provide students an opportunity to study the Hand Surgery of one of the subspecialty of Orthopaedics Surgery.
  - To provide training and a platform to reform basic or clinical research for dissertation or scientific publications.
  - To enhance the clinical care and practice of students who are working in the musculoskeletal field.
- ♦ Orthopaedic Rehabilitation
  - ♦ To present up-to-date knowledge in the organization and practice of orthopaedic rehabilitation
  - ♦ To enhance and improve the standard of care in orthopaedic rehabilitation.
  - ♦ Understand the process of rehabilitation in different orthopaedic sub-specialities

#### Contents

Course Code	Courses	Credit Units
OSUR6201	Spine Surgery: Biomechanics and assessment of patients	6
OSUR6206	Spine Surgery: Intraoperative spinal cord monitoring	6
OSUR6207	Spine Surgery: Laboratory techniques	6
OSUR6202	Joint Replacement Surgery: Applied anatomy, biomechanics and biomaterials	6



OSUR6208	Joint Replacement Surgery: Operative surgery	6
OSUR6209	Joint Replacement Surgery: Outcome measurement	6
OSUR6203	Advanced Musculoskeletal Imaging: Anatomic and kinesiological examination of the spine	6
OSUR6210	Advanced Musculoskeletal Imaging: Micro-CT and paraspinal muscle imaging	6
OSUR6211	Advanced Musculoskeletal Imaging: Spinal cord	6
OSUR6204	Orthopaedic Trauma Surgery: Fracture healing and biomechanics of fixation devices	6
OSUR6212	Orthopaedic Trauma Surgery: Operative surgery	6
OSUR6213	Orthopaedic Trauma Surgery: Outcome assessment	6
OSUR6205	Hand Surgery: Applied anatomy and physiology of the hand, Laboratory techniques with skin flaps	6
OSUR6214	Hand Surgery: Clinical assessment, repair and construction	6
OSUR6215	Orthopaedic Rehabilitation: General Principles	6

## DEPARTMENT OF PATHOLOGY, SCHOOL OF CLINICAL MEDICINE

### PATH6200 *Clinical and Molecular Pathology, Haematopathology, Immunology, and Clinical Cytology*

#### Aim(s)

- ♦ To understand the basic principle and approach to diagnosis of various haematological disorders, including diseases of white cells, red cells and haemostatic system.
- ♦ To understand the basic principle of blood bank serology and clinical transfusion medicine.
- ♦ To introduce an overview of immunology and major topics in recent research advances and current techniques.
- ♦ To provide a solid coverage of basic concepts and techniques in immunology as well as several selected topics on cutting-edge research in the field.
- ♦ To provide students with the knowledge and applications of practical immunology, autoantibodies, immunochemistry and cell function.
- ♦ To discuss the genetic basis of cancer and implications for clinical diagnosis, prognostication and disease monitoring.
- ♦ To introduce the chromosomal abnormalities in tumour cells, methods for detection and their clinical significance.
- ♦ To provide students with in-depth understanding of the role of molecular genetics and genomics in (a) Diagnostic Molecular Pathology and (b) Investigative Molecular Pathology.
- ♦ To equip students to meet the high demand on the service of gynaecological cytology in Hong Kong.
- ♦ To discuss the application of molecular techniques in clinical cytology.
- ♦ To examine the peripheral blood and body fluids in haematology.

#### Contents

*If there are insufficient students enrolling in any one Course, it may not be offered and the coordinator will advise the candidate to choose a related one.*

Course Code	Courses	Credit Units
PATH6201	Blood cell and bone marrow pathology <ul style="list-style-type: none"> <li>♦ Lymphoproliferative neoplasms</li> <li>♦ Myelodysplastic syndromes and acute myeloid leukaemia</li> <li>♦ Myeloproliferative neoplasms</li> <li>♦ Approach to bleeding disorder</li> <li>♦ Red cells disorders: overview and non-malignant disorders</li> <li>♦ The haemopoietic system</li> </ul>	3

	<ul style="list-style-type: none"> <li>♦ White cells disorders: overview and non-malignant disorders</li> <li>♦ Basic blood bank serology and transfusion in clinical practice</li> </ul>	
PATH6202	<p>Current topics and techniques in immunology:</p> <ul style="list-style-type: none"> <li>♦ Innate and adaptive immunity</li> <li>♦ B and T cell development and function</li> <li>♦ T cell subsets and functions</li> <li>♦ T regulatory cells: generation and function</li> <li>♦ Inflammation and cancer</li> <li>♦ Infection and immunity</li> <li>♦ Monoclonal antibody technology and flow cytometry</li> <li>♦ Stem cells and their immunoregulatory function</li> <li>♦ Immunohistochemistry in diagnostic pathology</li> </ul>	3
PATH6203	<p>Gynaecological cytology</p> <ul style="list-style-type: none"> <li>♦ CPC: Colposcopy and cervical pathology</li> <li>♦ Normal anatomy and common pathology of female genital tract</li> <li>♦ Practical on microscopy techniques: Full screening and rapid rescreening of cervical smears</li> <li>♦ Reactive cellular changes and infections in cervical cytology</li> <li>♦ Squamous cell abnormalities in cervical cytology</li> <li>♦ Terminology and reporting system used in gynaecological cytology</li> <li>♦ Application of new laboratory techniques including HPV testing</li> <li>♦ Automation in cervical cytology</li> <li>♦ Diagnostic problems and mimickers in cervical cytology</li> <li>♦ Glandular cell abnormalities in cervical cytology</li> <li>♦ Liquid based cytology</li> <li>♦ Treatment-related changes in cervical cytology</li> <li>♦ Quality assurance and organisation of a gynaecological cytology laboratory</li> </ul>	6
PATH6204	<p>Haematological cytology and ancillary techniques in cytopathology</p> <ul style="list-style-type: none"> <li>♦ Application of immunohistochemistry to cytology</li> <li>♦ Application of in-situ hybridization as ancillary test</li> <li>♦ Application of genetic techniques in clinical cytology</li> <li>♦ Automation in cervical cytology</li> <li>♦ Examination of peripheral blood and body fluids in haematology</li> <li>♦ Molecular detection of human papilloma virus</li> </ul>	3
PATH6205	<p>Molecular and clinical laboratory immunology methods and applications:</p> <ul style="list-style-type: none"> <li>♦ Applications to allergic diseases</li> <li>♦ Applications to autoimmune diseases</li> <li>♦ Applications to immunodeficiency diseases</li> <li>♦ Applications to monoclonal gammopathy</li> <li>♦ Laboratory immunology - molecular, serological and cellular techniques</li> <li>♦ Quality assurance and accreditation issues</li> </ul>	3
PATH6206	<p>Molecular genetics and cytogenetics of cancer:</p> <ul style="list-style-type: none"> <li>♦ Molecular genetics of cancer: Genomic analysis</li> <li>♦ Cancer genomic/genetic analyses for precision treatment</li> <li>♦ Cancer epigenetics</li> <li>♦ Conventional and molecular cytogenetics practice</li> <li>♦</li> <li>♦ Hypoxia and cancerGynaecological tumours and gestational trophoblastic disease</li> <li>♦ Haematological malignancy</li> </ul>	6

	(I) Acute leukaemia (II) Myeloproliferative neoplasms ♦ Liver cancer (I) Molecular basis and characterization of new genes (II) Molecular pathogenesis of liver cancer ♦ Molecular genetics of lung cancer ♦ Nasopharyngeal carcinoma - molecular aspects and relationship to EBV ♦ Paediatric sarcomas and other soft tissue tumours	
PATH6207	Techniques and applications of molecular pathology: ♦ Defects in DNA mismatch repair and colonic cancer ♦ DNA and its impact on human ID ♦ DNA methylation study and its association with cancer ♦ Genetic screening for cancer susceptibility (I) Familial colorectal cancer (II) Breast and ovarian cancer ♦ Molecular detection of genetic alterations in solid tumours ♦ Molecular diagnosis of malignant lymphoma ♦ Molecular haematology (I) Globin disorders (II) Bleeding and thrombotic disorders ♦ Next generation sequencing and its clinical application ♦ Molecular pathology of virus related diseases (I) Epstein Barr virus (II) Human papilloma virus practical approaches to DNA array technology ♦ Role of molecular pathology in the diagnosis of diseases	6

## DEPARTMENT OF PHARMACOLOGY AND PHARMACY

### PHAR6200 *Current Development in Pharmacology, Pharmaceutics and Pharmacoepidemiology*

(Candidates taking this Specialised Field of Study should also take the Core Course PHAR6100 Principles of Drug Action as basic knowledge)

#### Aim(s)

- ♦ To provide a broad overview of the current trends of drug development and the challenges in drug delivery including biologics and nucleic acids. Novel and smart drug delivery systems as well as the development of nanomedicine and the potential nanotoxicity will be discussed.
- ♦ To introduce the concepts of research methodologies and biostatistics that are essential to evidence-based practice, and to equip students with critical appraisal skills to guide evidence-based clinical decision making.
- ♦ To introduce how different regulatory systems coordinate together the maintenance of vascular tone and vascular integrity, the complications due to dysfunction of systemic and pulmonary circulation, and the rationale behind the current and prospective drug treatments for vascular diseases and vascular complications of diabetes, hypertension and dyslipidemia.

#### Contents

Course Code	Courses	Credit Units
PHAR6201	Advanced drug delivery and drug development ♦ Current trends in drug delivery and drug development ♦ Analytical techniques in pharmaceutical analysis ♦ Novel drug delivery systems ♦ Biopharmaceutical manufacture	6
PHAR6202	Evidence based practice	6

	<ul style="list-style-type: none"> <li>♦ Concepts of research methodologies and biostatistics for evidence-based practice</li> <li>♦ Conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients</li> <li>♦ Critical appraisal of current clinical evidence</li> <li>♦ Various study designs and methodologies used to investigate associations between risk factors and/interventions and disease outcomes</li> <li>♦</li> </ul>	
PHAR6203	<p>Vascular biology and therapeutics</p> <ul style="list-style-type: none"> <li>♦ Current knowledge and advanced research findings on the neuronal, hormonal and local control of the vascular system under normal and pathological conditions</li> <li>♦ Functions of the systemic and pulmonary vasculature and the complications due to their dysfunctions</li> <li>♦ Regulatory mechanisms for the maintenance of vascular integrity and tone</li> <li>♦ Management of vascular disorders and the complications of dyslipidemia, hypertension and diabetes, in particular thrombosis and atherosclerosis</li> </ul>	6

## DEPARTMENT OF SURGERY, SCHOOL OF CLINICAL MEDICINE

### SURG7100 *Genetic Counselling*

(Candidates taking this Specialised Field of Study should also take the Core Course PAED7100 Principles to Genetic Counselling as basic knowledge)

#### Aim(s)

- ♦ To have an in-depth study of genetic counselling in prenatal, paediatrics and cancer genetics setting.
- ♦ To effectively communicate genetic information to patients and families and provide psychosocial support.
- ♦ To understand genetics in a personal, familial and societal perspective.

#### Contents

Course Code	Courses	Credit Units
SURG7101	Risk calculation and effective communication in genetic counselling	3
SURG7102	Advancements in genomics	3
SURG7103	Genetics in medicine 1 (Prenatal)	3
SURG7104	Genetics in medicine 2 (Paediatrics)	3
SURG7105	Genetics in medicine 3 (Cancer)	3
SURG7106	Case Studies	3

## D. MMSC7000 DISSERTATION

The dissertation shall comprise a record of substantial experimental or clinical-based research work on the project, or a review of the existing literature on the subject of the project, presented in a form suitable for publication. The dissertation (39 credit units) should be of between 6,000 (minimum) to 10,000 words (maximum) (excluding references), and include two abstracts one in plain language comprehensible to non-specialists and another a scientific abstract of about 200 words each.