PPSK(PS)/AM

Pusat Pengajian Sains Kesihatan
School of Health Sciences
Committed to Health

MASTER OF SCIENCE
BIOMEDICINE
MIXED MODE PROGRAMME 2023/2024

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CANDIDATE PERSONAL INFORMATION

Full Name:

Identification Number / Passport Number:

Current Address:

Permanent Address:

Email Address:

House Telephone Number:

Mobile Telephone Number:

October 2023

School of Health Sciences
Universiti Sains Malaysia

Background of School of Health Sciences

The treatment and prevention of diseases have long been the foundation of conventional thoughts in matters of health. These thoughts have undergone changes, albeit slowly, towards the concept of a more holistic management of health, based not only on the biology of diseases but also incorporating aspects of sociological sciences, behavior and the environment. This concept of health gives cognizance not only to patients but to the healthy individual as well.

Rapid advancement in technology has helped to hasten these changes in concepts, methodologies and the way health services are disbursed. These facts are taken into account during the development of programmes at the School of Health Sciences with the expressed intention of producing graduates who would be able to compete in the job market both locally and at the international level.

With these principles as its foundations, the School of Health Sciences USM was established at the Health Campus in Kelantan on the 1st of November 1999. The School's main objective is to holistically expand the Health Sciences disciplines. Within the ambit of Health Sciences are included areas of specialties like Biomedicine, Dietetics, Nursing, Forensic Science, Medical Radiation, Exercise and Sports Science, Audiology, Speech Pathology, Nutrition and Environmental Health. In the academic session 2007/2008, the School of Health Sciences reintroduced Diploma in Nursing which was previously offered under the School of Medical Sciences. Several other potential health related subjects will also be offered in due course. Thus the establishment of the School of Health Sciences is a direct effort by USM to help fulfil the national requirement for manpower in the areas of health and paramedical disciplines which is currently experiencing a severe shortage of trained personnel.

The 2023/2024 academic session is the twentieth for the School. Since the academic session 2002/2003, twenty batches of students have graduated from various programmes. The School saw another milestone with the introduction of Master of Science (Biomedicine) mixed mode programme in academic session 2014/2015 and Master of Science (Forensic Science) mixed mode programme in academic session 2015/2016.

Philosophy

The School of Health Sciences has a philosophy that values education as the driving force behind the progress and development of mankind. We are committed to producing graduates who are able to pursue their own goals and direction while contributing to the development of an industrialised and civilised Malaysia. To fulfil the above aspiration, the School provides an education that is sustainable, futures-oriented and globally focused.

The School adopts a diverse and comprehensive interdisciplinary wellness-based programme for educational, scientific and human capital development. The curriculum provides the foundation for intellectual inquiry as well as a pragmatic contribution focused on the wellness of individuals and communities. As a consequence, the teaching-learning methods are focused on integrative problem-solving where students are encouraged to make group decisions that have a local emphasis with globalised consequences.

Thus, the School of Health Sciences is committed to the promotion of scholarship that has a foundation in scientific thinking, and professional interdisciplinary education supported by a strong research culture. This will enable our graduates to respond to the challenges of the 21st century with a sense of social consciousness and accountability. Excellence is regarded as the foundation of this noble effort.

Vision of School of Health Sciences

We are committed to be a centre of excellence in health sciences towards the wellness of society through intellectual inquiry, creativity, innovation and dissemination of knowledge.

Mission of School of Health Sciences

To achieve and maintain excellence in Health Sciences by:

- Producing graduates with a high level of intellectual inquiry and professionalism.
- Developing graduates with a strong sense of ethics and commitment to humanity.
- Transforming knowledge into an instrument for sustainable development and wellness of society.

MASTER OF SCIENCE (BIOMEDICINE) MIXED MODE PROGRAMME

Introduction

The Master of Science (Biomedicine) Mixed Mode Programme is offered to produce biomedical scientists to meet the demand of the health industries. Based on our fields of expertise and inputs from key stakeholders, this programme is designed to offer advanced courses in cell biology, pharmacotoxicology and infection diseases. In addition, candidates will be guided to acquire critical thinking skills, good ethical practices and high professionalism in biomedical research. Essentially, the programme aspires to generate competent master of biomedicine graduates who are ready for PhD endeavour. The programme is fully accredited by Malaysian Qualifications Agency (MQA) with Malaysian Qualifications Register (MQR) reference number MQA/SWA11034.

Programme Educational Objectives (PEO)

In line with the mission of School of Health Sciences, the Master of Science (Biomedicine) provides exemplary Biomedicine education with the following programme educational objectives:

PEO1: Nurture intellectual and professional graduates with theoretical knowledge and practical experience

PEO2: Produce responsible graduates with high ethical standards and good communication skills

PEO3: Transforming knowledge in biomedicine for sustainable development and social well-being

Programme Learning Outcomes (PLO)

Upon completion of the programme, graduates should be able to:

PLO1: Apply comprehensive theoretical, conceptual and practical knowledge to practice, evaluate and give opinion in the field of biomedicine

PLO2: Perform higher levels of laboratory procedures and conduct research under minimum supervision in the field of biomedicine

PLO3: Utilize scientific skills, innovative and creative thinking to generate ideas and strategies for problem solving and decision making involving issues related to biomedicine

PLO4: Present biomedicine related information and research findings effectively via oral and written communication

PLO5: Demonstrate social skills and responsibility, team work and sensitivity towards biomedicine related issues in the society

PLO6: Demonstrate high personal values and attitude, ethical and adhering to legal principles and professional practice codes in Biomedicine field

PLO7: Enhance self-development through lifelong learning using information management skills in academic and career development

PLO8: Apply management skills and entreprenurial mindset in daily activities and planning involving the field of Biomedicine

PLO9: Apply effective leadership knowledge and understanding in the effort to contribute to the advancement of Biomedicine field

PLO10: Demonstrate skills in information and communication technology (ICT) to improve practices in medical and research laboratories

PLO11: Demonstrate skills to apply and interpret numerical data, visuals and graphics to present information, research findings and results in Biomedicine field

Programme Structure

The programme is structured to provide fundamental knowledge and skills in biomedical researches, as well as specialised research disciplines based on inclinations of candidates.

This Master of Science (Biomedicine) Mixed Mode Programme will be conducted in one year. Candidates are required to complete 40 credit units. The programme comprises 50% (20 units) taught courses and 50% (20 units) research. The distribution of credit units and division of subjects are listed as follows:

Components	Semester 1		Semester 2		KSCP Semester	
	Course	Unit	Course	Unit	Course	Unit
Taught Courses (20 units)	GTB513 Cell Biology and Genetics	3				
	GTB514 Biochemistry	3				
	GTB515 Pharmacology and Toxicology	3				
	GTB516 Medical Microbiology	3				
	GTB521 Qualitative and Quantitative Research Methods	3				
	GTB522 Research Ethics	2				
	GTB523 Techniques in Biomedicine Laboratory	3				
Research (20 units)			GTB540 Research Project	20		
Total Unit		**20**		**20**		

KSCP: Kursus semasa cuti panjang (courses during long semester break)

Candidature Period and Teaching Approaches

The study duration to complete a full-time Master of Science (Biomedicine) Mixed Mode programme is **one year (minimum period) and 3 years (maximum period)**. The total number of credit units to achieve is 40, consisting of 7 taught courses and 20 units of dissertation. The modes of teaching include face-to-face sessions, lectures, practical sessions, tutorials, seminars, assignments, case studies, dissertation and projects.

Minimum Admission Requirements

The minimum admission requirements for the Master of Science (Biomedicine) Mixed Mode programme are as follows:

i. Bachelor of Science (Biomedicine, Applied Science, Health Science, Medicine or other related and recognized degrees) with CGPA ≥ 2.75 **OR**

ii. Bachelor degree as in section (i) with CGPA 2.50 - 2.74 AND research experience OR working experience in related field for at least one (1) year OR two (2) academic publications in the field applied for OR obtained at least a B in major courses OR at least a B+ in final year research project **OR**

iii. Bachelor degree as in section (i) with CGPA 2.00 – 2.49 AND research experience OR working experience in related field for at least five (5) years AND two (2) academic publications in the field applied for OR obtained at least a B+ in major courses OR at least an A- in final year research project.

iv. A foreign student has to produce a copy of English proficiency result. The minimum English language requirement are as follows:

- A minimum score of 35 in Internet-based TOEFL (Test of English as a Foreign Language) ; OR
- A minimum score of 5.0 in IELTS (International English Language Testing System); or
- A minimum score of 154 in Cambridge English Advance (CAE); or
- A minimum score of 154 in Cambridge Proficiency Advance (CPE); or
- A minimum score of 36 in Pearson Test of English (PTE); or
- English is the candidate's mother tongue or National Language; or
- The candidate graduated from an Institution of Higher Learning in which the medium of instruction at Bachelor and Master level is English; or
- English courses offered by British Council (The level of qualification and the relevant courses are to be identified by the University Postgraduate Studies Council); or
- English courses from selected Malaysian public/private University or institution (The level of qualification and the relevant courses are to be identified by the University Postgraduate Studies Council)

Application

Admission application form is available at the official website of Institute of Postgraduate Studies, Universiti Sains Malaysia (www.ips.usm.my). The final decision is subjected to the consideration of the University.

For further enquires related to the programme, please contact Office of Postgraduate Studies at 09-7677525 or 09-7677522, or Coordinator, Master of Science (Biomedicine) Mixed mode programme (Associate Professor Dr. See Too Wei Cun) at 09-7677537 or stweicun@usm.my.

Registration and Payment of Fees

Payment of fees by successful candidate has to be completed after course registration through campus online system (campusonline.usm.my). The total tuition fee is subjected to the total registered credit units for that semester.

Payment of fees can be completed at Bursary, in the form of cash or bank draft. The fee paid cannot be refund if the student withdraws from the course or fails or terminated from the course.

Candidature Period

Minimum candidature period is one year and the maximum period is 3 years. After the completion of maximum candidature period, the candidate can apply to extend the study by a written application to the Dean, School of Health Sciences through the programme coordinator for the consideration of the University.

Evaluation, Marking and Examination

Students of the Master of Science (Biomedicine) mixed mode programme will be evaluated based on the evaluation system practised in USM, that is via examination, coursework and research project.

Examination will be held at the end of every semester. Students have to sit for the examination of the courses that they have registered. Students have to settle all due fees and fulfill the standing requirements for lectures/tutorial/practical and other requirements before being allowed to sit for the examination of courses they registered. Course evaluation will be determined based on continuous assessments of coursework components and the final examinations. Coursework evaluation includes participation during tutorials, tests, projects and assignments.

(a) Duration of Examination

Evaluated Courses	Examination Duration
2 units	1 hour for coursework of more than 40%
2 units	2 hours for coursework of 40% and below
3 units or more	2 hours for coursework of more than 40%
3 units or more	3 hours for coursework of 40% and below

(b) Barring from Examination

Students will be barred from sitting the final examination if they do not satisfy the course requirements, such as absence from lectures and tutorials, and have not completed/fulfilled the required components of coursework. Students will also be barred from sitting the final examination if they do not settle the academic fees.

Courses that are barred will be graded as 'X'.

(c) Grade Point Average System

Student academic achievement for registered course will be graded as follows:

Alphabetical Grade	Grade Points	Marks
A	4.00	80-100
A-	3.67	70-79
B+	3.33	64-69
B	3.00	58-63
B-	2.67	52-57
C+	2.33	46-51
C	2.00	40-45
C-	1.67	36-39
D+	1.33	32-35
D	1.00	28-31
D-	0.67	25-27
F	0.00	0-26

Student achievement in each semester is calculated based on **Grade Point Average (GPA)** obtained from all courses registered in the semester. GPA is the indicator to determine the academic performance of students in any semester.

CGPA is the **Cumulative Grade Point Average** accumulated by a student from one semester to another during the years of study.

Example of calculation of GPA and CGPA:

	Course	Unit	Grade Point (GP)	Grade (G)	Total GP
Semester I	ABC XX1	4	3.00	B	12.00
	ABC XX2	4	2.33	C+	9.32
	BCD XX3	3	1.67	C-	5.01
	CDE XX4	4	2.00	C	8.00
	EFG XX5	3	1.33	D+	3.99
	EFG XX6	2	2.67	B-	5.34
	Total	20			43.66

GPA = 43.66/20 = 2.18

	Course	Unit	Grade Point (GP)	Grade (G)	Total GP
Semester II	ABC XX7	3	1.00	D	3.00
	ABB XX8	4	2.33	C+	9.32
	BBC XX9	4	2.00	C	8.00
	BCB X10	4	2.67	B-	10.68
	XYZ XX1	3	3.33	B+	9.99
		18			40.99

GPA = 40.99/18 = 2.28

CGPA = Total accumulated GP/ Total accumulated units
= (43.66 + 40.99) / (20 + 18)
= 84.65/38
= 2.23

In the above example, the CGPA is calculated as the total grade points accumulated for all the registered courses and divided by the total number of the registered units.

Graduation Criteria

Candidate must fulfil the following criteria to graduate:

- Pass all courses with a minimum of Grade C+, and
- Pass research project with a minimum of Grade C+, and
- Obtain CGPA 3.0 and above at the end of the study period

Postponement of Study

Candidate is allowed to postpone his/her study by providing reasonable justifications. However, whether the approval of the postponement will be accompanied with or without penalty is under the prerogative of the University.

Termination of Candidature

Candidate can withdraw from the programme by writing to Dean of the School of Health Sciences via Programme Coordinator to be considered by the University.

Candidature shall be terminated by Universiti Sains Malaysia for the following reasons:

- Candidature has already exceeded the maximum allowed period *or*
- Candidate does not fulfil the graduation criteria as previously stated *or*
- Candidate has broken the rules and regulations of the university and disciplinary actions have been taken against him/her
- Candidate has been confirmed to commit crime
- Candidate fails to renew registration as a student for each semester without the approval of the university

Degree Conferment

Candidate is qualified to be conferred a degree in Master of Science (Biomedicine) after successfully completed the study and satisfy all the programme requirements as well as fulfil the graduation criteria as stated by the University.

Interpretation

All information stated in this Guide Book only serves as a guide. Amendments to the Guide Book will be made without notice subjected to the approval or endorsement that will be determined by the University from time to time.

UNIVERSITI SAINS MALAYSIA

ACADEMIC CALENDAR - ACADEMIC SESSION 2022/2023
FOR ALL SCHOOLS (EXCEPT FOR SCHOOL OF MEDICAL SCIENCES AND SCHOOL OF DENTAL SCIENCES)

Main Campus : Registration for New Student (07 - 09 October 2022) / **Orientation Week (10 - 14 October 2022)
Engineering Campus : Registration for New Student (08 October 2022) / **Orientation Week (08 - 14 October 2022)
Health Campus : Registration for New Student (09 October 2022) /Orientation Week (09 - 13 October 2022)**

SEM	WEEK	ACTIVITY	DATE	REMARKS
ONE	1		Monday, 17.10.2022 - Sunday, 23.10.2022	
	2		Monday, 24.10.2022 - Sunday, 30.10.2022	24.10.2022, Monday - Deepavali**
	3		Monday, 31.10.2022 - Sunday, 06.11.2022	
	4	Teaching & Learning (T&L 7 Weeks)	Monday, 07.11.2022 - Sunday, 13.11.2022	11, 12 & 13.11.2022, Friday, Saturday & Sunday - Sultan of Kelantan's Birthday (Kelantan)
	5		Monday, 14.11.2022 - Sunday, 20.11.2022	
	6		Monday, 21.11.2022 - Sunday, 27.11.2022	
	7		Monday, 28.11.2022 - Sunday, 04.12.2022	
	8	Mid Semester Break (1 Week)	Monday, 05.12.2022 - Sunday, 11.12.2022	
	9		Monday, 12.11.2022 - Sunday, 18.12.2022	
	10		Monday, 19.12.2022 - Sunday, 25.12.2022	25.12.2022, Sunday - Christmas
	11	Teaching & Learning (T&L 7 Weeks)	Monday, 26.12.2022 - Sunday, 01.01.2023	26.12.2022, Monday - Christmas 01 & 02.01.2023, Sunday & Monday - New Year of 2023
	12		Monday, 02.01.2023 - Sunday, 08.01.2023	
	13		Monday, 09.01.2023 - Sunday, 15.01.2023	
	14		Monday, 16.01.2023 - Sunday, 22.01.2023	22.01.2023, Sunday - Chinese New Year
	15		Monday, 23.01.2023 - Sunday, 29.01.2023	23 & 24.01.2023, Monday & Tuesday - Chinese New Year
	16	Revision Week (1 Week)	Monday, 30.01.2023 - Sunday, 05.02.2023	04.02.2023, Saturday - Thaipusam**
	17		Monday, 06.02.2023 - Sunday, 12.02.2023	
	18	Examination (3 Weeks)	Monday, 13.02.2023 - Sunday, 19.02.2023	
	19		Monday, 20.02.2023 - Sunday, 26.02.2023	
	20		Monday, 27.02.2023 - Sunday, 05.03.2023	
	21	Mid Semester Break / Industrial Training (4 Weeks)	Monday, 06.03.2023 - Sunday, 12.03.2023	
	22		Monday, 13.03.2023 - Sunday, 19.03.2023	
	23		Monday, 20.03.2023 - Sunday, 26.03.2023	23.03.2023, Thursday - Ramadhan
TWO	24/1		Monday, 27.03.2023 - Sunday, 02.04.2023	
	25/2		Monday, 03.04.2023 - Sunday, 09.04.2023	08.04.2023, Saturday - Nuzul Al-Quran
	26/3		Monday, 10.04.2023 - Sunday, 16.04.2023	
	27/4	Teaching & Learning (T&L 7 Weeks)	Monday, 17.04.2023 - Sunday, 23.04.2023	22 & 23.04.2023, Saturday & Sunday - Eid-ul fitr**
	28/5		Monday, 24.04.2023 - Sunday, 30.04.2023	24.04.2023, Monday - Eid-ul fitr**
	29/6		Monday, 01.05.2023 - Sunday, 07.05.2023	01.05.2023, Monday - Labour Day 04.05.2023, Thursday - Wesak Day
	30/7		Monday, 08.05.2023 - Sunday, 14.05.2023	
	31/8	Mid Semester Break (1 Week)	Monday, 15.05.2023 - Sunday, 21.05.2023	
	32/9		Monday, 22.05.2023 - Sunday, 28.05.2023	
	33/10		Monday, 29.05.2023 - Sunday, 04.06.2023	30 & 31.05.2023, Tuesday & Wednesday - Pesta Kaamatan (Sabah) 01 & 02.06.2023, Wednesday & Thursday - Hari Gawai (Sarawak)
	34/11	Teaching & Learning (T&L 7 Weeks)	Monday, 05.06.2023 - Sunday, 11.06.2023	05.06.2023, Monday - Agong's Birthday
	35/12		Monday, 12.06.2023 - Sunday, 18.06.2023	
	36/13		Monday, 19.06.2023 - Sunday, 25.06.2023	
	37/14		Monday, 26.06.2023 - Sunday, 02.07.2023	28 & 29.06.2023, Wednesday & Thursday - Eid-ul adha**
	38/15		Monday, 03.07.2023 - Sunday, 09.07.2023	07.07.2023, Friday - Penang Heritage 08.07.2023, Saturday - Penang Governer's Birthday
	39/16	Revision Week (1 Week)	Monday, 10.07.2023 - Sunday, 16.07.2023	
	40/17	***Examination (2 Weeks) / Examination (3 Weeks)	Monday, 17.07.2023 - Sunday, 23.07.2023	19.07.2023, Wednesday - Awal Muharram
	41/18		Monday, 24.07.2023 - Sunday, 30.07.2023	
	42/19		Monday, 31.07.2023 - Sunday, 06.08.2023	
*KSCP / LONG SEMESTER BREAK	43/20		Monday, 07.08.2023 - Sunday, 13.08.2023	
	44/21	Long Semester Break / Industrial Training (10/11 Weeks)	Monday, 14.08.2023 - Sunday, 20.08.2023	
	45/22		Monday, 21.08.2023 - Sunday, 27.08.2023	
	46/23		Monday, 28.08.2023 - Sunday, 03.09.2023	31.08.2023, Wednesday - National Day
	47/24	*T&L / Examination	Monday, 04.09.2023 - Sunday, 10.09.2023	
	48/25		Monday, 11.09.2023 - Sunday, 17.09.2023	16.09.2023, Friday - Malaysia Day
	49/26		Monday, 18.09.2023 - Sunday, 24.09.2023	
	50/27		Monday, 25.09.2023 - Sunday, 01.10.2023	27.09.2023, Wednesday - Prophet Muhammad's Birthday
	51/28		Monday, 02.10.2023 - Sunday, 08.10.2023	
	52/29		Monday, 09.10.2023 - Sunday, 15.10.2023	

**This Academic Calendar is subject to change

UNIVERSITI SAINS MALAYSIA

Timetable for MSc (Biomedicine) by mixed mode
Semester 1, Academic Session 2023/24

This program will be conducted face-to-face/blended learning/online. Face-to-face lectures will be conducted at Bilik Tutorial Siswazah 1, School of Health Sciences, USM

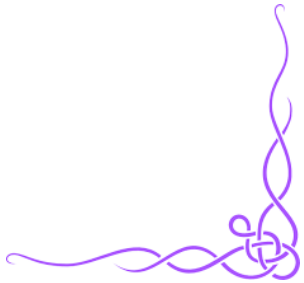
Day/Time	8:00-9:00	9:00-10:00	10:00-11:00	11:00-12:00	12:00-1:00	1:00-2:00	2:00-3:00	3:00-4:00	4:00-5:00
Sunday	GTB514		GTB513				Lab Practicals for GTB513/GTB514/ GTB515/GTB516 (MSA5)		
Monday		GTB514		GTB513			GTB522		
Tuesday	GTB516			GTB515			GTB521		
Wednesday		GTB516	GTB523		GTB515		LKM111 for International Students		
Thursday		Lab Practical for GTB523 Location will be notified later					GTB521		

*Any changes will be notified by the respective course coordinators.

Timetable for Teaching and Learning: Second and KSCP Semesters, 2023/24:

1. Candidate has to register GTB 540/20 before the start of the 2nd semester:

- GTB 540/20 is conducted during second and KSCP semesters
- Candidate has to find his/her supervisor
- Candidate has to present a research proposal
- Candidate is expected to have regular discussions/meeting with his/her supervisor
- Candidate performs research project during Semesters II and KSCP under supervision
- Candidate is expected to complete his/her dissertation and present the report in KSCP Semester



COURSE CONTENT

A. TAUGHT COURSES

GTB 523/3 SEM I	Techniques in Biomedical Laboratories
1	Introduction to the course: (a) Laboratory safety (b) Log book
2	Experimental techniques: (a) *In vivo* experiment (b) *In vitro* experiment (c) *Ex vivo* experiment
3	Sampling and analysis of biological samples: (a) Human samples (b) Animal samples (c) Plant samples
4	Cellular and molecular techniques and applications: (a) Flow cytometry (b) Confocal microscopy (c) Electron microscopy
5	Proteomic techniques and application: (a) Mass spectrometry (b) 2-dimensional gel electrophoresis (c) 2-dimensional liquid chromatography (2D LC)
6	Genomic techniques and application: (a) Microarray (b) Sequencing

GTB 521/3 SEM I	Qualitative and Quantitative Research Methods
1	Overview of research methodology in biomedical research
2	Literature review and critical appraisal
3	Quantitative inquiry: Research design and sampling
4	Quantitative inquiry: Validity and reliability
5	Quantitative inquiry: Experimental control
6	Qualitative inquiry: Research design and sampling
7	Qualitative inquiry: Validity and reliability
8	Qualitative inquiry: Qualitative and quantitative integration
9	Data management and analysis: Computer-based data management
10	Data management and analysis: Univariate and multivariate analysis
11	Data management and analysis: Correlation and regression

12	Dissemination of research: Presentation of research findings
13	Dissemination of research: Writing funding proposal
14	Dissemination of research: Budget preparation

GTB 522/2 SEM I	**Research Ethics**
1	Introduction: Importance of guidelines and ethics in research
2	Research guidelines and ethics involving animal subjects based on 3R (*Replacement, Refinement, Reduction*) principle
3	Research guidelines and ethics involving human subjects
4	(a) Roles of human and animal ethics committees (b) Procedures in application for animal and human ethics (c) Filling human and animal ethical approval forms
5	The function and role of ARASC
6	Authorship and Intellectual property
7	Plagiarism
8	Intellectual properties
9	Conflicts of interest
10	Data management
11	Research misconduct
12	Biosafety and biosecurity

GTB 513/3 SEM I	**Cell Biology and Genetics**
1	Current development in cells and tissues
2	Regulation of cell development and mortality
3	Specialised cell environment – Interactions between cell and environment in controlling cell functions and activities
4	Biology of specific human cells and cancer cells
5	Current development in cancer treatment
6	Biology of stem cells
7	Mendel's principles of inheritance
8	Chromosome inheritance
9	Cytogenetics
10	Gene structure and functions in cell development
11	SCANT

GTB 514/3 SEM I	**Biochemistry**
1	Protein-protein interactions
2	Protein post-translational modifications
3	Expression, purification and analysis of protein biochemistry
4	Bioinformatics in biochemistry
5	Protein engineering and design
6	Signalling molecule and cellular receptor, Intracellular signalling pathway
7	Cell cycle regulations and signalling
8	Mechanism of cell death
9	Cancer cell signalling and Tumour suppressor gene signalling

GTB 515/3 SEM I	**Pharmacology and Toxicology**
1	Introduction: Drug, dose and pharmacodynamics
2	Principles of pharmacokinetics
3	Pharmacodynamic model
4	Pharmacokinetics- pharmacokinetics integration model
5	Ethnopharmacology
6	Pharmaceutical analysis
7	Methods in pharmacognosy
8	Target/non target organ toxicity
9	Molecular toxicology
10	Advanced analysis in toxicology
11	applied toxicology
12	Principles of experimental toxicology and risk assessment
13	Safety assessment for toxicity

GTB 516/3 SEM I		Medical Microbiology
	1	The role of immune system in pathogenesis and the immunopathology mechanism of infectious diseases
	2	Immunopathology and characterization of infectious diseases
	3	Principles of vaccine, current research and guidelines in vaccine production
	4	Challenges in vaccination and immunology therapy
	5	Epidemiology and pathogenesis of bacterial infectious diseases
	6	Diagnosis and chemotherapy of bacterial infectious diseases
	7	Epidemiology and pathogenesis of viral infectious diseases
	8	Diagnosis and chemotherapy of viral infectious diseases
	9	Epidemiology and pathogenesis of parasitic infectious diseases
	10	Diagnosis and chemotherapy of parasitic infectious diseases
	11	Epidemiology and pathogenesis of fungal infectious diseases
	12	Diagnosis and chemotherapy of fungal infectious diseases

B. RESEARCH PROJECT

GTB 540/20 SEM II & KSCP		Research Project
	1	Briefing on research project
	2	Discussions with supervisor(s) (≥ 3 hours per week)
	3	Briefing on presentation of research proposal
	4	Seminar on research proposal
	5	Thesis writing workshop (1 day)
	6	Briefing on presentation of research findings
	7	Presentation of research findings

COURSE COORDINATORS

	Courses	Coordinator
1	GTB 513/3 Cell Biology and Genetics	Dr. Sabreena Safuan (sabreena@usm.my)
2	GTB 514/3 Biochemistry	Assoc. Prof. Dr. Few Ling Ling (fewling@usm.my)
3	GTB 515/3 Pharmacology and Toxicology	Assoc. Prof. Dr. Wan Amir Nizam Wan Ahmad (wanamir@usm.my)
4	GTB 516/3 Medical Microbiology	Dr Noor Izani Noor Noor Jamil (noorizani@usm.my)
5	GTB 521/3 Qualitative and Quantitative Research Methods	Dr. Yvonne Tee Get Bee (yvonnetee@usm.my)
6	GTB 522/2Research Ethics	Assoc. Prof. Dr. Rapeah Suppian (rapeah@usm.my)
7	GTB 523/3 Techniques in Biomedical Laboratories	Dr. Nurhidanatasha Abu Bakar (natashaa@usm.my)
8	GTB 540/20 Research Project	Dr. Wong Weng Kin (wengkinwong@usm.my)

ADMINISTRATION

	Personnel	Email
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Notes