



UTM
UNIVERSITI TEKNOLOGI MALAYSIA

POSTGRADUATE HANDBOOK 2020/2021

School of Biomedical Engineering and Health Sciences

**FACULTY OF ENGINEERING
UNIVERSITI TEKNOLOGI MALAYSIA**

<https://engineering.utm.my/biomedical/>

**School of Biomedical Engineering and
Health Sciences (SBEHS)**

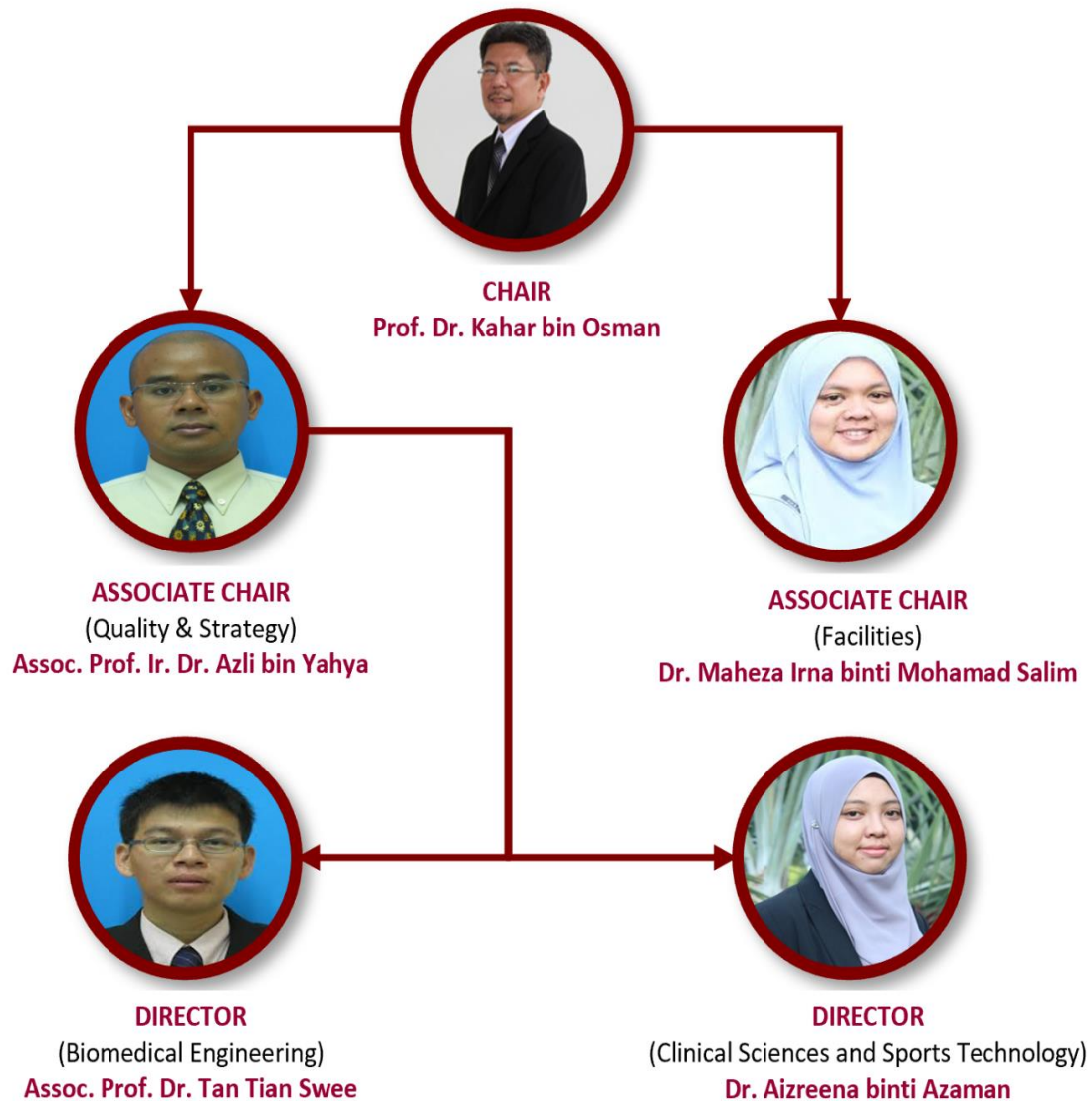
Faculty of Engineering



UTM
UNIVERSITI TEKNOLOGI MALAYSIA

School of
Biomedical Engineering
and Health Science

ORGANIZATIONAL CHART



MANAGEMENT TEAM	
Chair	Prof. Dr. Kahar bin Osman kahar@biomedical.utm.my
Associate Chair (Quality and Strategy)	Assoc. Prof. Ir. Dr. Azli bin Yahya azli@fke.utm.my
Associate Chair (Facilities)	Dr. Maheza Irna binti Mohamad Salim maheza@biomedical.utm.my
Director (Biomedical Engineering)	Assoc. Prof. Ir. Dr. Tan Tian Swee tantswee@biomedical.utm.my
Director (Clinical Sciences and Sports Technology)	Dr. Aizreena binti Azaman aizreena@biomedical.utm.my
ACADEMIC TEAM	
Academic Manager	Dr. Asnida binti Abdul Wahab asnida@biomedical.utm.my
Postgraduate Program Coordinator (Taught Course)	Dr. Siti Ruzita binti Mahmod sruzita@biomedical.utm.my
Postgraduate Program Coordinator (Research)	Dr. Asnida binti Abdul Wahab asnida@biomedical.utm.my
Undergraduate Program Coordinator (Biomedical Engineering)	Ts. Dr. Muhammad Amir bin As'ari Amir-asari@biomedical.utm.my
Undergraduate Program Coordinator (Equine Management)	Dr. Fuziaton bt Baharudin fuziaton@utm.my
Undergraduate Program Coordinator (Biomedical Engineering-SPACE)	Ts. Dr. Mohd Riduan bin Mohamad mohd.riduan@utm.my
ACADEMIC OFFICE	
Administrative Staff (Postgraduate Programmes)	Mrs. Noor Hafizah binti Rahamad hafizahr@utm.my
Administrative Staff (Undergraduate Programmes)	Mrs. Shaeza binti Shazali shaeza@utm.my
	Mrs. Zulbaidah binti Muhamaad idah@fbb.utm.my

INTRODUCTION

Postgraduate Programmes Offered

School of Biomedical Engineering and Health Sciences offers **5 (five) postgraduate programmes** that lead to the award of **postgraduate degrees** including Master of Science, Master of Philosophy and Doctor of Philosophy in the areas of Biomedical Engineering, Rehabilitation Technology & Health Sciences.

Students may register for the programme by choosing one of these modes of which are either **course work** or **research**.

For **full-time** Master and PhD programmes, the normal study durations are 3 - 8 semesters (1.5 - 4 years) and 6 - 12 semesters (3 - 6 years), respectively.

Additional Requirements

Each programme requires the student to take at least one of the **University compulsory courses** from the following options:

- **UHAP 6013** Seminar on Global Development, Economic and Social Issues
- **UICW 6023** Philosophy of Science and Civilization
- **UCSM 1263** IT Project Management
- **FTIR University course Schedule**
 - (<https://sps.utm.my/academic-related-resources/>)

International students are encouraged to take 3 credit hours of university subjects : **UHAZ 6123** - Malaysian Society and Culture

Apart from the above requirements, research students must take a research methodology class (**Compulsory attendance**): **UMBP0010** - Research Methodology. Research Methodology course is also offered as an intensive course during the mid-semester break.

Master Degree Programmes

Programmes	Code	MODE*	Research Field*
Master of Science (Biomedical Engineering)	MMBC	1	A
Master of Philosophy (Biomedical Engineering / Biomedical Engineering-Double Degree)	MMBE	2	A
Master of Philosophy (Rehabilitation Technology)	MMBR	2	B

Doctoral Degree Programmes

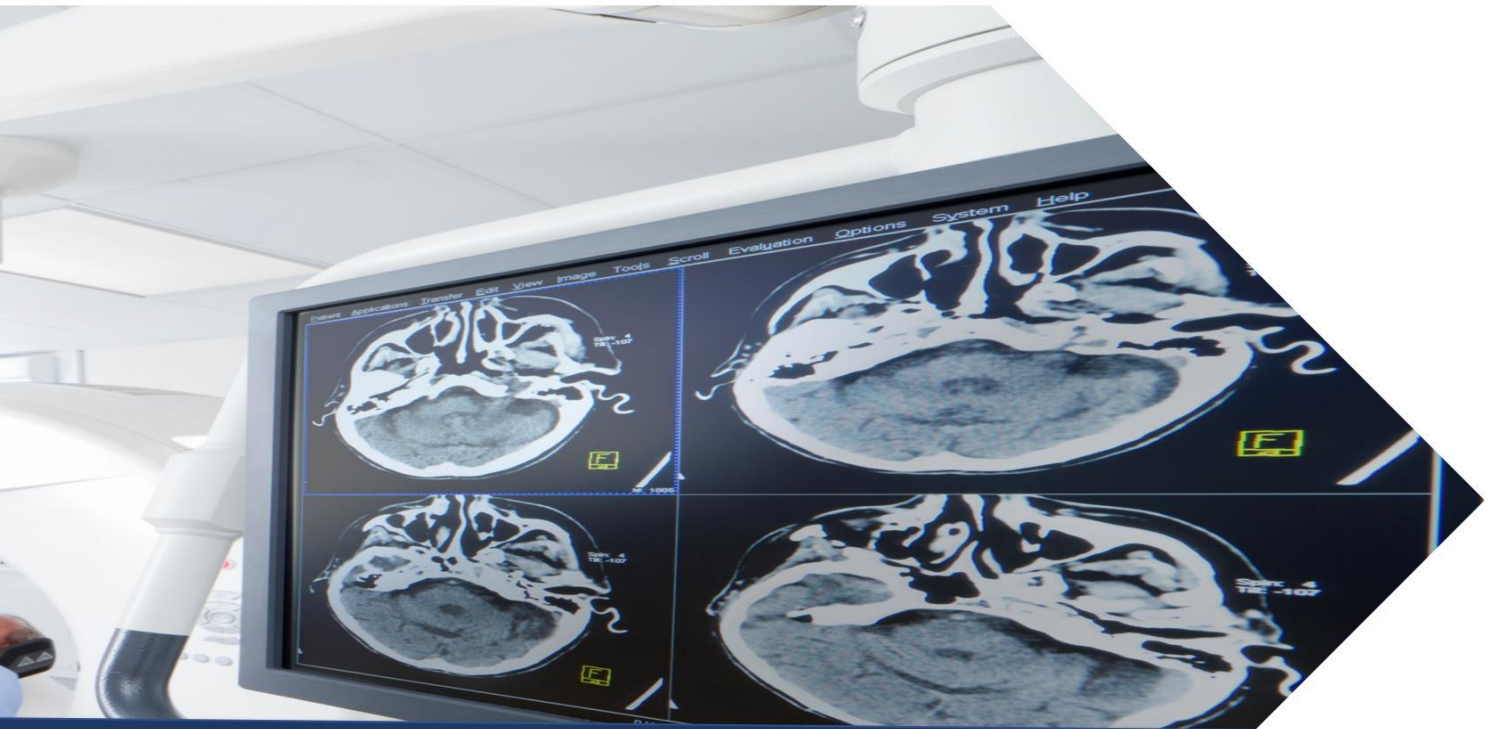
Programmes	Code	Research Field*
Doctor of Philosophy (Biomedical Engineering / Biomedical Engineering – Double Degree)	PMBE	A
Doctor of Philosophy (Health Science)	PMBH	C

***Mode:**

1 = Course work, 2 = Research

*** Research Field:**

A= Biomedical Engineering
B= Rehabilitation Technology
C= Health Sciences



MASTER OF SCIENCE (BY TAUGHT COURSE)

Programme Specifications

SBEHS offers the **Master of Science (Biomedical Engineering)** programme by course work mode offered in full-time. The MSc (Biomedical Engineering) can be completed within three semesters (1½ years).

General Information

1. Awarding Institution	Universiti Teknologi Malaysia
2. Teaching Institution	Universiti Teknologi Malaysia
3. Programme Name	Master of Science (Biomedical Engineering)
4. Final Award	Master of Science (Biomedical Engineering)
5. Programme Code	MMBC
6. Professional or Statutory Body of Accreditation	MQA
7. Language(s) of Instruction	English
8. Mode of Study (Conventional, distance learning, etc)	Conventional (Course work)
9. Mode of operation (Franchise, self-govern, etc)	Self-governing
10. Study Scheme (Full Time/Part Time)	Full Time
11. Study Duration	Minimum : 1.5 yrs Maximum : 3 yrs

Entry Requirement

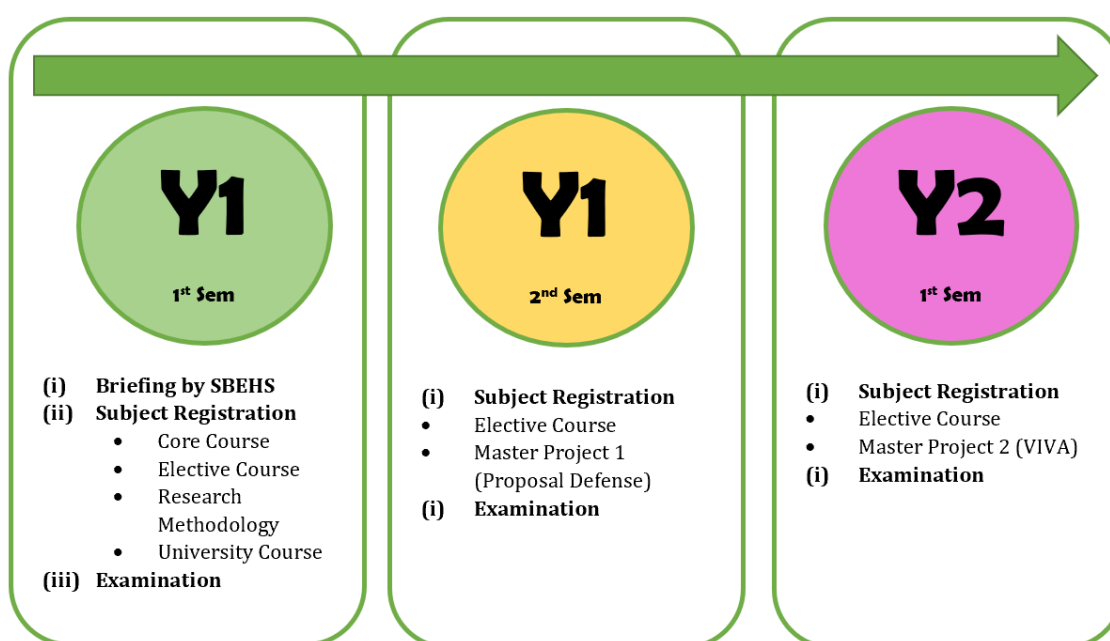
- Bachelor Degree in Engineering (Biomedical, Electrical, Mechanical, Computer), Science (Physics, Biology, Chemistry, Mathematics, Medical and Health), Medical or other related disciplines from UTM; **OR**
- Other recognized Higher Learning Institution with CGPA ≥ 3.0 or equivalent. For CGPA < 3.0 , relevant work experience is needed
- An International student candidate is required to have a minimum qualification of the Test of English as a Foreign Language (TOEFL) of 525 or TOEFL-IBT of 69 or International English Language Test System (IELTS) of band 5.5.

Award Requirements

In order for the students to be awarded with Master of Science (Biomedical Engineering) degree, they are required to complete and achieve a minimum cumulative of 45 credit hours with a minimum CGPA of 3.00.

Overall Programme Flowchart

This programme flowchart can be used as a guideline for students to ensure that they are well informed on action items which need to be fulfilled during their active semester. This is also to avoid any late subject registration at the beginning of every semester and to assist all students with their research timeline towards graduate on time (GOT).



Programme Educational Objectives (PEO)

PEO measures the quality of the programme by describing the expected achievement of working graduates within three to five years after graduation.

PEO	Programme Educational Objectives
PEO1	Mastery of knowledge and competency in advanced areas of Biomedical Engineering field.
PEO2	Professionalism and high standards of ethical conducts within organization and society.
PEO3	Responsive to changing situations by continuously acquiring new knowledge and skills

Programme Learning Outcomes (PLO)

After having completed the programme, graduates should be able to demonstrate the following competencies:

PLO	Intended Learning Outcomes	Skill Classification
PLO1	(Knowledge and Understanding) - Attain advanced knowledge to solve critical issues of a field in Biomedical Engineering.	Technical
PLO2	(Cognitive skills) - Critically solve and manage complex problems using systematic approaches	Technical
PLO3	(Practical Skills) - Adapt technical and scientific skills to solve problems in a field of Biomedical Engineering.	Technical
PLO4	(Interpersonal skills) - Demonstrate effective collaboration with stakeholders professionally.	Generic
PLO5	(Communication skills) - Use a broad range of information, media and technology to support study and research findings.	Generic
PLO6	(Digital Skills) - Competently use digital technologies and software to support research works or studies.	Generic
PLO7	(Numerical Skills) - Analyse numerical and graphical data using quantitative or qualitative tools in solving problems.	Generic
PLO8	(Leadership, Autonomy and Responsibility) - Demonstrate leadership, autonomy and responsibility in conducting and managing research and resources.	Generic
PLO9	(Personal Skills) - Exemplify self-advancement through continuous academic development.	Generic
PLO10	(Entrepreneurial Skills) - Initiate entrepreneurial project with relevant knowledge and expertise.	Generic
PLO11	(Ethics and Professionalism Skills) - Demonstrate respectable ethical research conducts and professionalism skills in an organization and society.	Generic

Course Classification

Students are required to successfully complete a minimum of **45 credits** which include at least:

Code	Course	Credit
University Course (A)		
UHA* ***3	University General Elective Courses (to choose from the list given by School of Graduate Studies) https://sps.utm.my/academic-related-resources/	3
UMBP 0013	Research Methodology	3
Total Credit (A)		6
Core Course (B)		
MMBC 1003	Biomedical Measurement Technique	3
MMBC 1013	Diagnostic and Therapeutic Technology	3
MMBC 1023	Advanced Biomedical Engineering	3
MMBC 1033	Medical Informatics	3
MMBC 1043	Biomechanics	3
Total Credit (B)		15
Elective Courses (Choose 4 courses only)		
MMBC 1053	Anatomy and Physiology for Engineers	3
MMBC 1063	Biomedical Fluid Mechanics	3
MMBC 1073	Introduction to Biostatistics	3
MMBC 1093	Medical Imaging and Image Processing	3
MMBC 1083	Healthcare Technology Management	3
MMBC 1103	Neuroscience	3
MMBC 1113	Pathophysiology	3
MMBC 1123	Advance Biosignal Processing	3
MMBC 1143	Rehabilitation Engineering	3
MMBC 1153	Cardiovascular Engineering	3
MMBC 1163	Tissue Engineering	3
MMBC 1173	Biomedical Electronic System Design	3

MMBC 1183	Biomaterials Characterization and Analysis	3
MMBC 1193	Genetic Engineering	3
Total Credit (C)		12
Master Project		
MMBC 1184	Master Project 1	4
MMBC 1198	Master Project 2	8
Total Credit (D)		12
Total Credit (A + B + C + D)		45

Percentage of Course Classification

No.	Classification	Credit Hours	Percentage
i.	Core Courses	15	35.7%
ii.	Elective Course	12	28.6%
iii.	Master Project	12	28.6%
iv.	University Course	6	7.1%
Total		45	100

Marking and Assessment

Marks	Grade	Evaluation Point	Interpretation
90-100	A+	4.00	Excellent Pass
80-89	A	4.00	
75-79	A-	3.67	
70-74	B+	3.33	Good Pass
65-69	B	3.00	
60-64	B-	2.67	Pass
55-59	C+	2.33	Fail
50-54	C	2.00	
45-49	C-	1.67	
40-44	D+	1.33	
35-39	D	1.00	
30-34	D-	0.67	
00-29	E	0.00	

Course Menu

JULY INTAKE

YEAR 1: SEMESTER 1			
Code	Course	Credit	Pre-requisite
MMBC 1003	Biomedical Measurement Technique	3	
MMBC 1013	Diagnostic and Therapeutic Technology	3	
MMBC 1023	Advanced Biomedical Engineering	3	
MMBC 1**3	Elective 1	3	
UHA* ***3	University General Elective Course	3	
UMBP 0013	Research Methodology	3	
Total Credit		18	
Cumulative Credits		18	

YEAR 1: SEMESTER 2			
Code	Course	Credit	Pre-requisite
MMBC 1033	Medical Informatics	3	
MMBC 1043	Biomechanics	3	
MMBC 1184	Master Project 1	4	
MMBC 1**3	Elective 2	3	
MMBC 1**3	Elective 3	3	
Total Credit		16	
Cumulative Credits		34	

YEAR 2: SEMESTER 1			
Code	Course	Credit	Pre-requisite
MMBC 1198	Master Project 2	8	
MMBC 1**3	Elective 4	3	
Total Credit		11	
Cumulative Credits		45	

FEBRUARY INTAKE

YEAR 1: SEMESTER 1			
Code	Course	Credit	Pre-requisite
MMBC 1033	Medical Informatics	3	
MMBC 1043	Biomechanics	3	
MMBC 1**3	Elective 1	3	
MMBC 1**3	Elective 2	3	
UHA* ***3	University General Elective Course	3	
UMBP 0013	Research Methodology	3	
Total Credit		18	
Cumulative Credits		18	

YEAR 1: SEMESTER 2			
Code	Course	Credit	Pre-requisite
MMBC 1003	Biomedical Measurement Technique	3	
MMBC 1013	Diagnostic and Therapeutic Technology	3	
MMBC 1023	Advanced Biomedical Engineering	3	
MMBC 1**3	Elective 1	3	
MMBC 1184	Master Project 1	4	
Total Credit		16	
Cumulative Credits		34	

YEAR 2: SEMESTER 1			
Code	Course	Credit	Pre-requisite
MMBC 1198	Master Project 2	8	
MMBC 1**3	Elective 4	3	
Total Credit		11	
Cumulative Credits		45	

Elective Course	
Code	Course
MMBC 1053	Anatomy and Physiology for Engineers
MMBC 1063	Biomedical Fluid Mechanics
MMBC 1073	Introduction to Biostatistics
MMBC 1083	Healthcare Technology Management
MMBC 1093	Medical Imaging and Image Processing
MMBC 1103	Neuroscience
MMBC 1113	Pathophysiology
MMBC 1123	Advance Biosignal Processing
MMBC 1143	Rehabilitation Engineering

MMBC 1153	Cardiovascular Engineering
MMBC 1163	Tissue Engineering
MMBC 1173	Biomedical Electronic System Design
MMBC 1183	Biomaterials Characterization and Analysis
MMBC 1193	Genetic Engineering
University Elective Course	
UH** ***3	University Elective

Graduation Checklist

To graduate, students must pass all the stated courses in this checklist. It is the responsibility of the students to ensure that all courses are taken and passed. Students who do not complete any of the course are not allowed to graduate.

No.	Code	Course	Credit Earned (Jkd)	Credit Counted (Jkk)	Tick (✓) If Passed
Engineering Courses					
1	MMBC 1003	Biomedical Measurement Technique	3	3	
2	MMBC 1013	Diagnostic and Therapeutic Technology	3	3	
3	MMBC 1023	Advanced Biomedical Engineering	3	3	
4	MMBC 1**3	Elective 1	3	3	
5	MMBC 1033	Medical Informatics	3	3	
6	MMBC 1043	Biomechanics	3	3	
7	MMBC 1184	Master Project 1	4	4	
8	MMBC 1**3	Elective 2	3	3	
9	MMBC 1**3	Elective 3	3	3	
10	MMBC 1198	Master Project 2	8	8	
11	MMBC 1**3	Elective 4	3	3	
12	UMBP 0013	Research Methodology	3	3	
13	UHA* ***3	University General Elective Course	3	3	
Total Credit			45	45	

Course Synopsis

MMBC 1003: Biomedical Measurement Technique

Synopsis

This course provides the students a complete exposure of various recording mechanism and biomedical parameters measured for diagnostic application. Also introduces students to design biomedical measurement systems and biomedical instrumentation. The architecture of electronic instruments used to measure

physiological parameters is addressed, as well as the analysis of major process functions integrated in these instruments.

MMBC 1013: Diagnostic and Therapeutic

Synopsis

This course is designed to introduce students on how the bio-signal is measured, recorded and monitored and details on the broad collection of diagnostic and therapeutic equipments. At the end of the course, student will be able to learn various techniques that have been used in healthcare environment, clinical or research.

MMBC 1023: Advanced Biomedical Engineering

Synopsis

This course provides the students with the introduction to advanced technologies of biomedical engineering in the field of bioinstrumentation, biophysics, biomaterials and biomechanics. The impact of technologies on clinical research, rehabilitation engineering, and patient care will be dealt along with professional ethics. The course explores techniques for assessing current information practices, determining the information needs of health care providers and patients, developing interventions using biomedical technology, and evaluating the impact of those interventions.

MMBC 1033: Medical Informatics

Synopsis

This course provides students with the organization of medical information, the effective management of information using computer technology, and the impact of such technology on medical research, education, and patient care. The course explores techniques for assessing current information practices, determining the information needs of health care providers and patients, developing interventions using computer technology, and evaluating the impact of those interventions.

MMBC 1043: Biomechanics

Synopsis

This course provides the students with application of the principles of mechanics and the techniques of engineering to the human body. The series of lectures explore the musculoskeletal system and highlights selected applications in the area of orthopedics (gait analysis, joint replacement) and analyzing the various forms of human movement.

MMBC 1053: Anatomy and Physiology for Engineers

Synopsis

This course provides fundamental concepts of the basic structure and function of the human body as an integrated set of systems from an engineering perspective. This course will expand student's knowledge in the engineering approach toward understanding functions and by giving some engineering solutions and increasing the ability of the students to integrate between the engineering technology and multiple related medical disciplines. Engineering principles will be used to analyse anatomical structures and physiological functions at the tissue, organ, and systems levels.

MMBC 1063: Biomedical Fluid Mechanics

Synopsis

This course provides the students with application of the principles of mechanics and the engineering techniques which is the fluid mechanics to the biological fluid flow, in particular cardiovascular system. Other system related to biological flow will be explored such as respiratory flow, flow around body, and bird flight mechanism. By the end of the course, student should be able to understand fluid mechanics and its pertinent application to flow in the biological system – cardiovascular system, respiratory system and the likes. Other outcome of this course would be for the student to apply fluid mechanics analysis of human circulation, as well as artificial organs implanted within human body for disease treatment.

MMBC 1073: Introduction to Biostatistics

Synopsis

This course provides statistical concepts and methods with emphasis on applications in clinical medicine, epidemiology and public health. This course also explores advanced biostatistical methods that have been used in designing and analyzing biomedical and public health investigations.

MMBC 1083: Healthcare Technology Management

Synopsis

This course provides the students the ability to develop a systematic process for planning and managing health technology assets to achieve the highest quality care at the best cost. It explains the concepts of health care management and describes the various types of health plan in operation today. This course also covers the strategic planning as well as technology assessment, facilities planning, procurement, and service or maintenance management.

MMBC 1093: Medical Imaging and Image Processing

Synopsis

This course provides students with an overview of the key concepts behind the main imaging modalities used in diagnostic imaging. The course also introduces students in the basic concepts and methods for image analysis and processing in biomedical engineering and medical physics as well as the use of basic software for image analysis and processing in biomedical engineering and medical physics.

MMBC 1103: Neuroscience

Synopsis

This Neuroscience course is a comprehensive introduction to the mammalian nervous system, focusing on the structure and function of the human brain. Anatomical, cellular, chemical, physiological, and molecular aspects of neuroscience will be discussed. Topics that will be covered include: neurons and glia, neuroanatomy, action potentials, synaptic transmission, neurotransmitters, sensory systems (vision, hearing, and touch), motor systems, behavioral responses, development, learning and memory, aging, mental illness, neurodegenerative diseases, and genomics. An inquiry-based approach will be taken to facilitate student learning of the material.

MMBC 1184: Master Project 1

Synopsis

The research project proposal emphasizes integration and application of knowledge to solve a biomedical engineering problem. The student must identify a thesis advisor, conduct preliminary research, write research proposal and make a presentation which will be evaluated. For seminar, student will attend paper presentation to expose themselves into research and to gain new knowledge.

MMBC 1198: Master Project 2

Synopsis

The research project thesis emphasizes integration and application of knowledge to solve a biomedical engineering problem. The student must conduct research, document the findings and make a presentation which will be evaluated.

UMBP0013: Research Methodology

Synopsis

This course covers the general principles of Research Methodology that are applicable to any discipline. It discusses the fundamental process in conducting an academic research. The theoretical and practical aspects of preparing a research proposal presented. Amongst topics that will be covered are introduction to research and its philosophy, problem formulation and research objective, literature review,

research methodology and design, data collection procedures, data analysis, research proposal and thesis preparation and research management.



MASTER OF PHILOSOPHY (BY RESEARCH)

Programme Specifications

School of Biomedical Engineering and Health Sciences (SBEHS) offers the following three master programmes by research mode:

1. Master of Philosophy (Rehabilitation Technology)
2. Master of Philosophy (Biomedical Engineering)
3. Master of Philosophy (Biomedical Engineering-Double Degree)*

*Universiti Teknologi Malaysia (UTM) and Technical University Ilmenau (TUIL) Germany have started an International Double Degree programme in Biomedical Engineering. The student will be awarded with 2 certificates, which are Master in Engineering (Biomedical) from UTM and/or Master in Biomedical Engineering (MSc) from TUIL. The students are required to spend at least 7 months at the partner university. Limited scholarships from German's government are available for selected students.

Programme Features

These three Masters by research programmes are offered as full-time. A student will carry out research in any one of the areas of the research chosen. Each research project is supervised by a lecturer of a graduate faculty. A graduate faculty member is an academic staff who has a doctoral degree qualification or an academic staff who holds an academic post of at least associate professor and is involved directly or indirectly in the post-graduate programmes. Co-supervisors may also come from a related industry.

General Information

1. Awarding Institution	Universiti Teknologi Malaysia
2. Teaching Institution	Universiti Teknologi Malaysia
3. Programme Code and Name	MMBE Master of Philosophy (Biomedical Engineering) MMBE Master of Philosophy (Biomedical Engineering-Double Degree) MMBR Master of Philosophy (Rehabilitation Technology)
4. Final Award	Master of Philosophy (Biomedical Engineering) Master of Philosophy (Biomedical Engineering, UTM + Msc Computer Engineering, Ilmenau, Germany) Master of Philosophy (Rehabilitation Technology)
5. Professional or Statutory Body of Accreditation	Malaysia Qualification Agency
6. Language(s) of Instruction	English
7. Mode of Study (Conventional, distance learning, etc)	Conventional
8. Mode of operation (Franchise, self-govern, etc)	Self-governing
9. Study Scheme (Full Time/Part Time)	Full Time
10. Study Duration	Minimum : 1.5 yrs (3 semester) Maximum : 4 yrs (8 semester)

Entry Requirement

Master of Philosophy (Biomedical Engineering)

- Bachelor of Engineering (Biomedical, Mechanical, Electrical, Chemical, Computer), Bachelor of Science (Biology, Physics, Chemistry), Bachelor of Medicine with CPA ≥ 3.0 will be considered for this programme; OR
- Bachelor of Engineering with CPA < 3.0 and one year working experience in areas related to Medical Engineering
- An International student candidate is required to have a minimum qualification of the Test of English as a Foreign Language (TOEFL) of 525 or TOEFL-IBT of 69 or International English Language Test System (IELTS) of band 5.5

Master of Philosophy (Rehabilitation Technology)

- Bachelor Degree in any field of Allied Health Sciences, related to Therapy and Rehabilitation, Sports Science, engineering field such as Electrical Engineering, Biomedical Engineering, Mechanical Engineering or related disciplines with good honour from Universiti Teknologi Malaysia or other institutions of higher education approved by the Senate; or
- A student candidate with lower qualifications will be considered if the candidate is proven to have adequate academic background and appropriate working experience
- An International student candidate is required to have a minimum qualification of the Test of English as a Foreign Language (TOEFL) of 525 or TOEFL-IBT of 69 or International English Language Test System (IELTS) of band 5.5.

Award Requirements

Assessment is done by examining first assessment reports (research proposal), second assessment report (*mini-viva*), each semester's progress reports, and thesis examination (*viva-voce*).

All students registered for MPhil programmes must undergo the first assessment by presenting their research proposal (after completed General Elective University Course and Research Methodology Course), and the second assessment (*mini-viva*) by presenting their on-going research's progress in regards to their research proposal.

Students who opted for the double degree programme must undergo the first assessment at their home university and only the second assessment at their partner university. To be inaugurated by any degree, all students must undergo thesis examination which can be done at least two-months after the second assessment.

The first assessment and the second assessment are scheduled according to the student's appropriate semester of study as described below:

Task	Full Time
Proposal Defense	Semester 2
Mini Viva	Semester 3 or 4
Progress Report	Week 12 (Every semester)

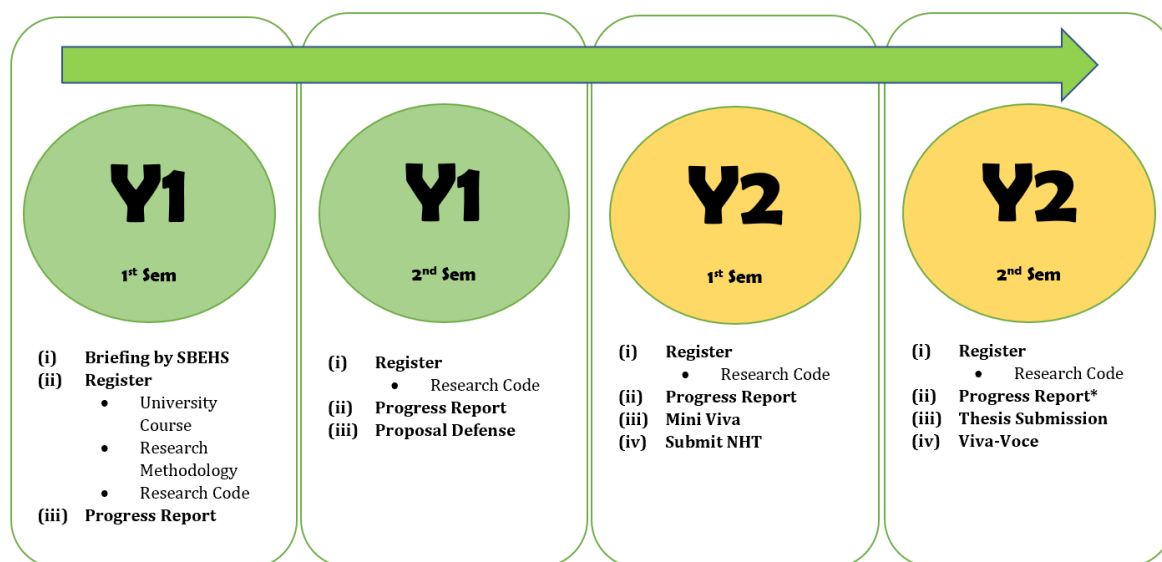
Students who are submitting the final draft of their thesis should send in the Notice of Thesis Submission to the Faculty at least 3 months prior to the date of submitting their thesis.

Additional requirements

In addition to the university compulsory course, research students may be required to attend lectures related to their research fields. The courses to be taken shall be determined by the respective department graduate committee from time to time. As part of their training, students are required to present in seminars and conferences, as well as producing technical reports or papers for publications in proceedings or journals.

Overall Programme Flowchart

This programme flowchart can be used as a guideline for students to ensure that they are well informed on action items which need to be fulfilled during their active semester. This is also to avoid any late subject registration at the beginning of every semester and to assist all students with their research timeline towards graduate on time (GOT).



Master of Philosophy (Biomedical Engineering)

Programme Educational Objectives (PEO)

PEO measures the quality of the programme by describing the expected achievement of working graduates within three to five years after graduation.

PEO	Programme Educational Objectives
PEO1	Generate in-depth, relevant and cutting-edge knowledge through original, ethical and scholarly research.
PEO2	Utilized the research knowledge for the benefit of communities, society, nation and humanities
PEO3	Advocate relevant knowledge and expertise through effective oral and written communications
PEO4	Pursue lifelong learning, such as graduate work and other professional education.
PEO5	Become effective collaborators and innovators, leading or participating in efforts to address social, technical and business challenges

Programme Learning Outcomes (PLO)

After having completed the programme, graduates should be able to demonstrate the following competencies:

PLO	Intended Learning Outcomes	Skill Classification
PLO1	Show a systematic comprehension and in-depth understanding of a discipline and mastery of skills and research methods related to the field of biomedical engineering.	Technical
PLO2	Show capabilities to generate, design, implement and adopt the integral part of research process with scholarly strength and ethics	Technical
PLO3	Contribute to the original research by making critical analysis, evaluation and synthesis of new and complex ideas that broadened the boundary of knowledge.	Technical
PLO4	Practice research ethics and conduct responsible research	Generic
PLO5	Communicate with peers, scholarly community and society at large concerning the field of expertise.	Generic

PLO6	Promote technological, social and cultural progress in a knowledge- based society in the academic and professional context	Generic
PLO7	Demonstrate sensitivity to social needs and readiness to apply relevant knowledge to fulfilling them	Generic
PLO8	Demonstrate the awareness of effective team-working conducting research	Generic
PLO9	Demonstrate leadership capability and the ability to effectively deliver knowledge, scientific findings, recommendations and rationale to peers and experts.	Generic
PLO10	Ability to gather, organize, adapt contemporary knowledge effectively and capable of utilizing appropriate computational tools independently.	Generic
PLO11	Demonstrate the ability of managing and conducting research or other activities, and display the awareness of the need to exploit all possible resources and opportunities which include personal, institutional or business linkages and collaboration	Generic

Course Menu

Master of Philosophy (Biomedical Engineering)

Semester	Full-Time	Description	Credit
1	MMBE1100	Research	0
	MMBE1200	Research	0
2	MMBE2100	Research	0
	MMBE2200	Research	0
3	MMBE3100	Research	0
	MMBE3200	Research	0

General Elective University Course (Compulsory)			
Code	New Code	Course	Credit
UMBP0010	UMBP0010	Research Methodology	HW
UH** ***3	UH** ***3	General Elective University Course	3

Master of Philosophy (Rehabilitation Technology)

Programme Educational Objectives (PEO)

P PEO measures the quality of the programme by describing the expected achievement of working graduates within three to five years after graduation.

PEO	Programme Educational Objectives
PEO1	Generate in-depth, relevant and cutting-edge knowledge through original, ethical and scholarly research.
PEO2	Utilized the research knowledge for the benefit of communities, society, nation and humanities
PEO3	Advocate relevant knowledge and expertise through effective oral and written communications
PEO4	Pursue lifelong learning, such as graduate work and other professional education.
PEO5	Become effective collaborators and innovators, leading or participating in efforts to address social, technical and business challenges

Programme Learning Outcomes (PLO)

After having completed the programme, graduates should be able to demonstrate the following competencies:

PLO	Intended Learning Outcomes	Skill Classification
PLO1	Show a systematic comprehension and in-depth understanding of a discipline and mastery of skills and research methods related to the field of rehabilitation engineering.	Technical
PLO2	Show capabilities to generate, design, implement and adopt the integral part of research process with scholarly strength and ethics	Technical
PLO3	Contribute to the original research by making critical analysis, evaluation and synthesis of new and complex ideas that broadened the boundary of knowledge.	Technical
PLO4	Practice research ethics and conduct responsible research	Generic
PLO5	Communicate with peers, scholarly community and society at large concerning the field of expertise.	Generic
PLO6	Promote technological, social and cultural progress in a knowledge-based society in the academic and professional context	Generic

PLO7	Demonstrate sensitivity to social needs and readiness to apply relevant knowledge to fulfilling them	Generic
PLO8	Demonstrate the awareness of effective team-working conducting research	Generic
PLO9	Demonstrate leadership capability and the ability to effectively deliver knowledge, scientific findings, recommendations and rationale to peers and experts.	Generic
PLO10	Ability to gather, organize, adapt contemporary knowledge effectively and capable of utilizing appropriate computational tools independently.	Generic
PLO11	Demonstrate the ability of managing and conducting research or other activities, and display the awareness of the need to exploit all possible resources and opportunities which include personal, institutional or business linkages and collaboration	Generic

Master of Philosophy (Rehabilitation Technology)

Semester	Full-Time	Description	Credit
1	MMBR1100	Research	0
	MMBR1200	Research	0
2	MMBR2100	Research	0
	MMBR2200	Research	0
3	MMBR3100	Research	0
	MMBR3200	Research	0

General Elective University Course (Compulsory)			
Code	New Code	Course	Credit
UMBP0010	UMBP0010	Research Methodology	HW
UH** ***3	UH** ***3	General Elective University Course	3

Master Thesis Submission Requirement

1. Notice of Thesis Submission (NHT)

Students who are submitting the final draft of their thesis should send in the Notice of Thesis Submission to the Faculty at least three (3) months prior to the date of submitting their thesis.

Notice of Thesis Submission valid period is for one (1) year from the date of JAPSU approval

2. Publication Requirement for Thesis Submission

A master by research candidate may submit his/her thesis for viva-voce provided that he/she has produced **at least one (1) accepted or published** publication from the journal article, conference proceeding or book chapter



DOCTOR OF PHILOSOPHY (BY RESEARCH)

Programme Specifications

School of Biomedical Engineering and Health Sciences (SBEHS) offers four Doctor of Philosophy programmes:

1. Doctor of Philosophy (Health Science)
2. Doctor of Philosophy (Biomedical Engineering)
3. Doctor of Philosophy (Biomedical Engineering) – Double Degree*

*Universiti Teknologi Malaysia (UTM) and Technical University Ilmenau (TUIL) Germany have started an International Double Degree programme in Biomedical Engineering. The doctorate double degree programme enables student to be awarded with 2 certificates, which are Doctor of Philosophy (PhD) degree in Biomedical Engineering from UTM and Doctor in Computer Science and Automation (Dr.-Ing) from Technical University Ilmenau, Germany (TUIL). The students are required to spend at least 9 months at the partner university.

Programme Features

SBEHS offers Doctor of Philosophy program by research. This program is offered as a full-time. A student will carry out research in any one of the areas of research chosen. Each research project is supervised by a lecturer of the Graduate Faculty. A Graduate Faculty member is an academic staff who has a doctoral degree qualification or an academic staff who holds an academic post at least senior lecturer and is involved directly or indirectly in the postgraduate programs. Co-supervisor may also come from a related industry.

General Information

1. Awarding Institution	Universiti Teknologi Malaysia
2. Teaching Institution	Universiti Teknologi Malaysia
3. Programme Code Name	PMBE Doctor of Philosophy (Biomedical Engineering) PMBH Doctor of Philosophy (Health Sciences)
4. Final Award	Doctor of Philosophy (Biomedical Engineering) Doctor of Philosophy (Health Sciences)
5. Professional or Statutory Body of Accreditation	Malaysia Qualification Agency
6. Language(s) of Instruction	English

7. Mode of Study (Conventional, distance learning, etc)	Conventional
8. Mode of operation (Franchise, self-govern, etc)	Self-governing
9. Study Scheme (Full Time/Part Time)	Full Time
10. Study Duration	Minimum : 3 years (6 semester) Maximum : 6 years (12 semester)

Entry Requirement

Doctor of Philosophy (Biomedical Engineering)

- Master of Engineering (Biomedical Engineering, Mechanical Engineering, Electrical Engineering, Chemical Engineering, Computer Engineering), Master of Science (Biology, Physics, Chemistry), Master of Medicine with CPA ≥ 3.0 will be considered for this program; **OR**
- Other qualifications equivalent to a Master's degree and experience in the relevant field recognized by the Senate; **OR**
- Candidates who are currently registered in a Master's Degree programme at Universiti Teknologi Malaysia, and approved by the Graduate Studies Committee of the respective faculty and the Senate.
- An International student candidate is required to have a minimum qualification of the Test of English as a Foreign Language (TOEFL) of 525 or TOEFL-IBT of 69 or International English Language Test System (IELTS) of band 5.5

Doctor of Philosophy (Health Science)

- Master Degree in Rehabilitation Technology, Electrical Engineering, Biomedical Engineering, Mechanical Engineering, Medical Physics, Health Sciences, Sport Sciences with CPA ≥ 3.0 will be considered for this program; **OR**
- Related fields with good honour from Universiti Teknologi Malaysia or any other institution of higher learning recognised by the Senate
- An International student candidate is required to have a minimum qualification of the Test of English as a Foreign Language (TOEFL) of 525 or TOEFL-IBT of 69 or International English Language Test System (IELTS) of band 5.5

Award Requirements

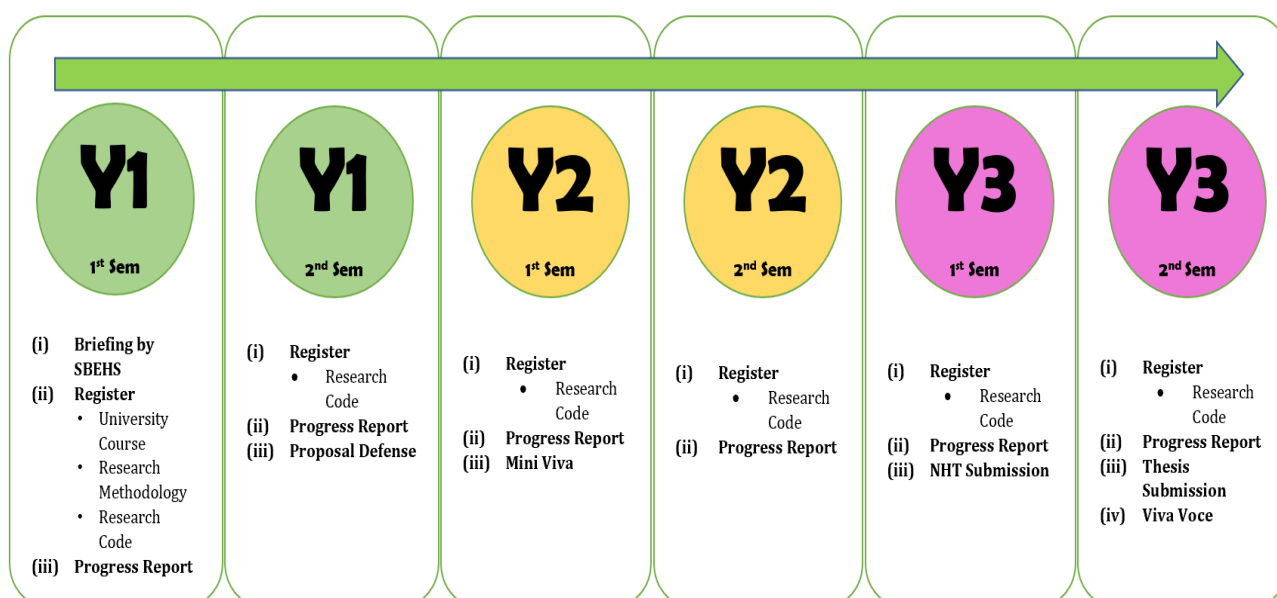
Assessment is done by examining first assessment report and presentation (research proposal), each semester's progress reports, second assessment report and presentation (mini viva) and thesis examination (viva voce).

All PhD students must undergo first assessment report and presentation by presenting their research proposal after completed General Elective University Course and Research Methodology Course. They also must undergo second assessment report and presentation (mini viva) at the middle of their study to present their progress. The first and second assessments are scheduled according to the student's appropriate semester of study as follows:

Task	Full Time
First Assessment	Semester 2
Second Assessment (Mini Viva)	Semester 3 or 4
Progress Report	Week 12 (Every semester)

Overall Programme Flowchart

This programme flowchart can be used as a guideline for students to ensure that they are well informed on action items which need to be fulfilled during their active semester. This is also to avoid any late subject registration at the beginning of every semester and to assist all students with their research timeline towards graduate on time (GOT).



Doctor of Philosophy (Biomedical Engineering)

Educational Objectives (PEO)

PEO measures the quality of the programme by describing the expected achievement of working graduates within three to five years after graduation.

PEO	Programme Educational Objectives
PEO1	Generate in-depth, relevant and cutting-edge knowledge through original, ethical and scholarly research.
PEO2	Utilized the research knowledge for the benefit of communities, society, nation and humanities
PEO3	Advocate relevant knowledge and expertise through effective oral and written communications
PEO4	Pursue lifelong learning, such as graduate work and other professional education.
PEO5	Become effective collaborators and innovators, leading or participating in efforts to address social, technical and business challenges

Programme Learning Outcomes (PLO)

After having completed the programme, graduates should be able to demonstrate the following competencies:

PLO	Intended Learning Outcomes	Skill Classification
PLO1	Show a systematic comprehension and in-depth understanding of a discipline and mastery of skills and research methods related to the field of biomedical engineering.	Technical
PLO2	Show capabilities to generate, design, implement and adopt the integral part of research process with scholarly strength and ethics	Technical
PLO3	Contribute to the original research by making critical analysis, evaluation and synthesis of new and complex ideas that broadened the boundary of knowledge.	Technical
PLO4	Practice research ethics and conduct responsible research	Generic
PLO5	Communicate with peers, scholarly community and society at large concerning the field of expertise.	Generic

PLO6	Promote technological, social and cultural progress in a knowledge- based society in the academic and professional context	Generic
PLO7	Demonstrate sensitivity to social needs and readiness to apply relevant knowledge to fulfilling them	Generic
PLO8	Demonstrate the awareness of effective team-working conducting research	Generic
PLO9	Demonstrate leadership capability and the ability to effectively deliver knowledge, scientific findings, recommendations and rationale to peers and experts.	Generic
PLO10	Ability to gather, organize, adapt contemporary knowledge effectively and capable of utilizing appropriate computational tools independently.	Generic
PLO11	Demonstrate the ability of managing and conducting research or other activities, and display the awareness of the need to exploit all possible resources and opportunities which include personal, institutional or business linkages and collaboration	Generic

Course Menu

Doctor of Philosophy (Biomedical Engineering)

Full Time	Description	Credit
PMBE1100	Research	0
PMBE1200	Research	0
PMBE2100	Research	0
PMBE2200	Research	0
PMBE3100	Research	0
PMBE3200	Research	0
PMBE4100	Research	0
PMBE4200	Research	0
PMBE5100	Research	0
PMBE5200	Research	0
PMBE6100	Research	0
PMBE6200	Research	0
PMBE7100	Research	0
PMBE7200	Research	0

General Elective University Course (Compulsory)			
Code	New Code	Course	Credit
UMBP 0010	UMBP 0010	Research	HW

		Methodology	
UH** ***3	UH** ***3	General Elective University Course	3

Doctor of Philosophy (Health Science)

Educational Objectives (PEO)

PEO measures the quality of the programme by describing the expected achievement of working graduates within three to five years after graduation.

PEO	Programme Educational Objectives
PEO1	Generate in-depth, relevant and cutting-edge knowledge through original, ethical and scholarly research.
PEO2	Utilized the research knowledge for the benefit of communities, society, nation and humanities
PEO3	Advocate relevant knowledge and expertise through effective oral and written communications
PEO4	Pursue lifelong learning, such as graduate work and other professional education.
PEO5	Become effective collaborators and innovators, leading or participating in efforts to address social, technical and business challenges

Programme Learning Outcomes (PLO)

After having completed the programme, graduates should be able to demonstrate the following competencies:

PLO	Intended Learning Outcomes	Skill Classification
PLO1	Show a systematic comprehension and in-depth understanding of a discipline and mastery of skills and research methods related to the field of health science.	Technical
PLO2	Show capabilities to generate, design, implement and adopt the integral part of research process with scholarly strength and ethics	Technical
PLO3	Contribute to the original research by making critical analysis, evaluation and synthesis of new and complex ideas that broadened the boundary of knowledge.	Technical
PLO4	Practice research ethics and conduct responsible research	Generic

PLO5	Communicate with peers, scholarly community and society at large concerning the field of expertise.	Generic
PLO6	Promote technological, social and cultural progress in a knowledge- based society in the academic and professional context	Generic
PLO7	Demonstrate sensitivity to social needs and readiness to apply relevant knowledge to fulfilling them	Generic
PLO8	Demonstrate the awareness of effective team-working conducting research	Generic
PLO9	Demonstrate leadership capability and the ability to effectively deliver knowledge, scientific findings, recommendations and rationale to peers and experts.	Generic
PLO10	Ability to gather, organize, adapt contemporary knowledge effectively and capable of utilizing appropriate computational tools independently.	Generic
PLO11	Demonstrate the ability of managing and conducting research or other activities, and display the awareness of the need to exploit all possible resources and opportunities which include personal, institutional or business linkages and collaboration	Generic

Course Menu

Doctor of Philosophy (Health Science)

Full Time	Description	Credit
PMBH1100	Research	0
PMBH1200	Research	0
PMBH2100	Research	0
PMBH2200	Research	0
PMBH3100	Research	0
PMBH3200	Research	0
PMBH4100	Research	0
PMBH4200	Research	0
PMBH5100	Research	0
PMBH5200	Research	0
PMBH6100	Research	0
PMBH6200	Research	0
PMBH7100	Research	0

PMBH7200	Research	0
----------	----------	---

General Elective University Course (Compulsory)			
Code	New Code	Course	Credit
UMBP 0010	UMBP 0010	Research Methodology	HW
UH** ***3	UH** ***3	General Elective University Course	3

PhD Thesis Submission Requirement

1. Notice of Thesis Submission (NHT)

Students who are submitting the final draft of their thesis should send in the Notice of Thesis Submission to the Faculty at least three (3) months prior to the date of submitting their thesis.

Notice of Thesis Submission valid period is for one (1) year from the date of JAPSU approval

2. Publication Requirement for Thesis Submission

A doctoral candidate may submit his/her thesis for viva-voce provided that he/she has produced at least one (1) indexed journal article or two (2) indexed conference proceeding accepted or published in SCOPUS/ERA or WOS

Details on English Language Requirements for Postgraduate Programmes

An International student candidate is required to have a minimum qualification of the Test of English as a Foreign Language (TOEFL) of 525 or TOEFL-IBT of 69 or International English Language Test System (IELTS) of band 5.5.

Exemption may be given to those who originate from countries whose native language is English or who graduated from English-speaking countries. Those who do not meet the minimum requirement must attend and pass the Intensive English Programme before they are allowed to proceed with their respective programs of study.

Applicants who do not meet the English proficiency requirements of their chosen programme at Universiti Teknologi Malaysia (UTM) can improve their English at Intensive English Programme (IEP) at Language Academy, UTM or CIEP at ELS Language Centers in Malaysia.

UTM accepts IELTS Level 5.5 and above upon completion of IEP conducted by Language Academy, UTM or ELS English Certificate (level 107) as an ENGLISH LANGUAGE ENTRY REQUIREMENTS FOR INTERNATIONAL STUDENTS. Students who choose to attend IEP (Language Academy, UTM) must attain IELTS 5.5 or attend ELS and must pass the required English Course(s) before starting their programmes in UTM.

Candidates who did their Bachelor or Master or PhD from the following countries are exempted from the UTM English language requirements. The countries are as follows:

Anguilla	Antigua and Barbuda	Australia	Bangladesh	Bermuda
British Virgin Island	Bahamas	Barbados	Canada	Cayman Island
Christmas Island	Cook Island	Falkland Islands	Fiji	Guernsey
Guam	Gibraltar	Grenada	Guyana	Ghana
Hong Kong	India	Isle of Man	Ireland	Liberia
Jersey	Jamaica	Kiribati	Kenya	Montserrat
Malawi	Malta	Marshall Islands	Mauritius	Niue
Micronesia	Namibia	Nauru	New Zealand	Philippines
Nigeria	Norfolk Island	Papua New Guinea	Pakistan	Saint Kitts and Nevis
Puerto Rico	Palau	Rwanda	Singapore	Seychelles
Saint Lucia	Saint Vincent and the Grenadines	St Helena	Samoa	Swaziland
Sierra Leone	Solomon Island	South Africa	Sudan	Uganda
Tanzania	Tonga	Trinidad & Tobago	Turks and Caicos Island	United Kingdom
US Virgin Islands	United States of America	Zambia	Zimbabwe	

Exemption for candidates from Indonesia, Brunei and other nations that use Malay as medium of communication are exempted from UTM English language requirements based on the following conditions:

- The candidate intends to register for a MSc. And PhD programme by research.
- The candidate declares that the thesis/dissertation will be written in Malay and approved by the supervisor.



School of Biomedical Engineering and Health Sciences
FACULTY OF ENGINEERING
UNIVERSITI TEKNOLOGI MALAYSIA

TEL : +6(07) - 5558400

FAX : +6(07) - 5558515

<https://engineering.utm.my/biomedical/>

