

UNDERGRADUATE HANDBOOK 2018/2019

FACULTY OF ENGINEERING AND HEALTH SCIENCES

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

ADMINISTRATION TEAM





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ASSOC CHAIR (Quality & Strategy) Assoc. Prof. Ir. Dr. Azli bin Yahya



DIRECTOR (Clinical Science & Sports Technology) Dr. Maheza Irna binti Mohamad Salim DIRECTOR (Biomedical Engineering) Assoc. Prof. Ir. Dr. Tan Tian Swee

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Bachelor of Engineering (Bio-Medical)

BACHELOR OF ENGINEERING (BIO-MEDICAL) PROGRAMME SPECIFICATIONS

The Bachelor of Engineering (Bio-Medical) is offered on a full-time basis. The fulltime programme is offered only at the UTM Johor Bahru campus. Student enrolment for full-time programme is subjected to the student's entry qualifications and the duration of study is between four (4) to six (6) years.

The curriculum is planned based on a 2-semester per academic session. Generally, students are expected to undertake courses between twelve (12) to eighteen (18) credit hours per semester or equivalent for credit exemption. Assessment is based on coursework and final examinations given throughout the semester.

General Information

1.	Awarding Institution	Universiti Teknologi Malaysia
2.	Teaching Institution	Universiti Teknologi Malaysia
3.	Programme Name	Bachelor of Engineering (Bio-Medical)
4.	Final Award	Bachelor of Engineering (Bio-Medical)
5.	Programme Code	SMBE-03
6. of A	Professional or Statutory Body ccreditation	Malaysian Qualification Agency Engineering Accreditation Council
7.	Language(s) of Instruction	English and Bahasa Melayu
8. dista	Mode of Study (Conventional, ance learning, etc)	Conventional
9. self-	Mode of operation (Franchise, -govern, etc)	Self-governing
10.	Study Scheme (Full Time/Part Time)	Full Time
11.	Study Duration	Minimum: 4 years Maximum: 6 years

Course Classification

No.	Classification	Credit Hours	Percentage
i.	University Courses a. General b. Language c. Co-Curriculum	12 8 3	16.7%
ii.	Faculty & Programme Core	106	76.8%
iii.	Programme Electives	9	6.5%
	Total	138	100%
А	Engineering Courses (a) Lecture/Project/Laboratory (b) Industrial Training (c) Final Year Project	97 5 6	78.3%
	Total Credit Hours for Part A	108	
В	Related Courses (a) Applied Science/Mathematic/Computer (b) Management/Law/Humanities/Et hics/Economy (c) Language (d) Co-Curriculum	15 4 8 3	21.7%
	Total Credit Hours for Part B	30	
	Total Credit Hours for Part A and B	138	100%
	Total Credit Hours to Graduate	138 credit hou	ırs

Programme Educational Objectives (PEO)

After having exposed to 3 to 5 years working experience, our graduates should become professionals who demonstrate the following competencies:

Code	Intended Educational Objectives	
PEO1	Graduates with competency to work in biomedical industry.	
PEO2	Graduates with leadership positions in the biomedical engineering sector	
PEO3	Graduates embrace professional development through biomedical engineering practice and life-long learning.	
PEO4	Graduates who conduct their professional work ethically and contribute towards societal responsibilities.	

Programme Learning Outcomes (PLO)

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

Code	Intended Learning Outcomes
PLO1	Apply knowledge of science and engineering fundamentals to the solution of complex biomedical engineering problems.
PLO2	Identify, formulate and solve complex biomedical engineering problems through structured literature research and scientific approach using first principles of mathematics, natural sciences and engineering sciences.
PLO3	Design solutions for complex biomedical engineering problems with consideration for public health and safety, cultural, societal, and environmental needs.
PLO4	Conduct investigation into complex Biomedical Engineering problems using research-based knowledge and methodology to provide scientific conclusions.
PLO5	Select and apply appropriate techniques, resources, and modern medical engineering and IT tools, to complex biomedical engineering activities, with an understanding of the limitations.
PLO6	Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues to professional biomedical engineering practice.
PLO7	Understand the role of biomedical engineers in society regarding social, cultural, environmental and global responsibilities for sustainable development.
PLO8	Ability to evaluate and make appropriate professional decision by taking into account ethical principles, social and environmental responsibilities.

PLO9	Communicate effectively on complex engineering activities through written, oral, visual and graphical forms to colleagues and society at large.
PLO10	Develop leadership attributes and be committed in achieving common goals in multi-disciplinary setting using good team working skills.
PLO11	Ability to adapt with the latest development within the biomedical engineering field for life-long learning and continuous knowledge improvement.
PLO12	Demonstrate knowledge and understanding of management and financial aspects of biomedical engineering and develop entrepreneurship skills.

Entry Requirements

The minimum qualifications for candidates who intend to do a Bachelor of Engineering (Bio-Medical) are as follows:

1) Minimum results based on **the Malaysian High School Certificate (STPM)** (results would be based on the general requirements as well as other conditions as the pre-requisites for the programme set by the university).

University General Requirements:

- i. Passed Malaysian Certificate Examination (SPM) or equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a credit in Bahasa Melayu/Bahasa Malaysia, July paper
- ii. Passed MOEM Matriculation/UM Science Foundation with CGPA of at least 2.00
- iii. Obtained at least a Band 2 in Malaysia University English Test (MUET).

Special Requirements for the Programme

- Passed with a credit in Mathematics at SPM level or equivalent
- Obtained at least a Grade B- (CGPA 2.67) Biology at Matriculation/Foundation level
- Passed with at least Grade C+ (2.33) in Matriculation/Foundation in any TWO (2) the following subjects: Chemistry, Mathematics and Physics
- Not having any health problems that will prevent student from taking up practical work
- 2) Minimum requirements for **Matriculation Certificates (KPM) / Asasi Sains UM** (fulfil the general requirements set by the university as well as other conditions of the programme).

General University Requirements

- Passed Malaysian Certificate Examination (SPM) or equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a credit in Bahasa Melayu/Bahasa Malaysia, July paper
- Passed MOEM Matriculation/UM Science Foundation with CGPA of at least 2.00
- Obtained at least a Band 2 in Malaysia University English Test (MUET)

Special Requirements of the Programme:

- Passed with a credit in Mathematics at SPM level or equivalent
- Obtained at least a Grade B- (CGPA 2.67) Biology at Matriculation/Foundation level
- Passed with at least Grade C+ (2.33) in Matriculation/Foundation in any TWO (2) the following subjects: Chemistry, Mathematics and Physics
- Not having any health problems that will prevent student from taking up practical work
- 3) Minimum qualifications for students with **Certificates/Diplomas** (fulfill the general requirements set by the university as well as specific requirements of the programme).

General University Requirements

- Passed Malaysian Certificate Examination (SPM) or equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a credit in Bahasa Melayu/Bahasa Malaysia, July paper
- Obtained a Diploma or equivalent qualification recognized by the Malaysian Government and approved by the Senate,

or

- Passed STPM examination in 2009 or before and obtained the following:
- Grade C (CGPA 2.00) in General Paper; and
- Grade C (CGPA 2.00) in TWO (2) other subjects

or

- Passed Matriculation Examination in 2009 or before and obtained at least CGPA 2.00
- Obtained at least a Band 2 in Malaysia University English Test (MUET)

Special Requirements of the Programme:

• Obtained a Diploma related to the applied course from UTM or equivalent with at least CGPA 2.50

or

- For those who obtained a CGPA 2.50 but have at least TWO (2) years working experience in related field are eligible to apply; and
- Passed with a credit in Mathematics at SPM level

or

• Obtained at least Grade C in any of Mathematics subjects

Note :-

Year of entry and duration of study will be based on the credit exemptions or credit transfer awarded by the university.

Award Requirements

To graduate, students must:

- Attain a total of not less than 138 credit hours with a minimum CGPA of 2.0.
- Professional Skill Certificate (PSC)
 - 1. How to Get Yourself Employed (HTGYE)
 - 2. ISO 9001: 2008 Quality Management System Requirement (ISO)

- 3. Occupational Safety and Health Awareness (OSHA)
- 4. How to Manage Your Personal Finance (HTMYPF)
- 5. Test of English Communication Skills for Graduating Students (TECS):
 - (i) TECS 1001 (Paper I Oral Interaction)
 - (ii) TECS 1002 (Paper II Writing)

Cross-Campus Programme

Students are given the opportunity to enroll in a few courses in participating universities. The grades and credits obtained during this period are transferable.

The programme is open to undergraduates who have undergone a minimum of two semesters of their studies with the following conditions:

- (i) The total number of credits allowed to be taken is between twelve (12) and eighteen (18) credits only.
- (ii) The student should hold a minimum CGPA of 3.00 at the time of application.
- (iii) The student is not a residence of or originated from the state where the university that he/she intends to attend is located.

The student will not be charged tuition fees by the participating university but shall pay the regular tuition fees at UTM. However, should the participating university provide accommodation, the student will need to pay accommodation fees.

Professional Skills Certificate (PSC)

Students must enroll in certificate programmes offered by the Centres of Excellence in the University and the School of Professional and Continuing Education (SPACE) as part of the award requirement:

- 1. How to Get Yourself Employed (HTGYE)
- 2. ISO 9001: 2008 Quality Management System Requirement (ISO)
- 3. Occupational Safety and Health Awareness (OSHA)
- 4. How to Manage Your Personal Finance (HTMYPF)
- 5. Test of English Communication Skills for Graduating Students (TECS):
 - (i) TECS 1001 (Paper I Oral Interaction)
 - (ii) TECS 1002 (Paper II Writing)

Course Menu

YEAR 1 (SEMESTER 1)			
Code	Courses	Credit	Pre-req
SMBE 1012	Introduction to Biomedical Engineering	2	
SMBE 1513	Basic Anatomy and Physiology	3	
SKEU 1023	Circuit Theory	3	
SSCE 1693	Engineering Mathematics 1	3	
ULAB 1122	Academic English Skills	2	
UHAS 1172	Malaysian Dynamics (Local)	2	
ULAM 1012	Malay Language Communication 2 (International)	2	
UHAK 1012	Graduate Success Attributes	2	
TOTAL	CREDIT HOURS	17	

Y	YEAR 1 (SEMESTER 2)			
Code	Courses	Credit	Pre-req	
SMBE 1523	Advanced Anatomy and Physiology	3	SMBE 1513	
SMBE 1313	Statics and Dynamics	3		
SKEU 1223	Digital Electronics	3		
SSCE 1793	Differential Equations	3		
UICI 1012	Islamic and Asian Civilization (local)			
UHAK 1022	Malaysian Studies (international)	2		
ULA* 1112	English of Language Skills	2		
TOTAL	CREDIT HOURS	16		

YEAR 2 (SEMESTER 1)			
Code	Courses	Credit	Pre-req
SKEU 2073	Signals and Systems	3	
SKEU 1063	Electronic Devices	3	
UHAK	Introduction to Entrepreneurship	2	

1032			
SMBE 2712	Laboratory 1	2	
SSCE 1993	Engineering Mathematics 2	3	SSCE 1693
ULAB 2122	Advanced Academic English Skills	2	ULAB 1122
SMBE 2033	Computer Programming for Biomedical Engineer	3	
TOTAL	CREDIT HOURS	18	

YEAR 2 (SEMESTER 2)			
Code	Courses	Credit	Pre-req
UKQ*2 **2	Elective of Service Learning Co- Curriculum	2	
UICL 2**2	Elective of Knowledge Enhancement		
UHAK2 **2	Elective of Generic Skill \int	2	
UICL 2302	Science and Technology Thinking	2	
SKEU 2523	Electromagnetic Field Theory	3	SSCE 1993
SSCE 2193	Engineering Statistics	3	
SKEU 3133	System Modelling and Analysis	3	
SMBE 2513	Basic Rehabilitation	3	
TOTAL C	CREDIT HOURS	18	

YEAR 3 (SEMESTER 1)			
Code	Courses	Credit	Pre-req
SKEU 3063	Electronic Circuits and Systems	3	SKEU 1063
SKEU 3533	Communication Principles	3	SKEU 2073
SMBE 3712	Laboratory 2	2	
SMBE 3313	Biomedical Materials	3	
SSCE 2393	Numerical Methods	3	
SMBE 3423	Clinical Engineering	3	ULAB 2122
TOTAL CREDIT HOURS 17			

YEAR 3 (SEMESTER 2)				
Code	Courses	Credit	Pre-req	
SMBE 3323	Solid Mechanics	3		
SMBE 3023	Biomedical Imaging	3		
SMBE 3722	Laboratory 3	2		
SMBE 3033	Microprocessor Systems	3		
SMBE 3043	Instrumentation and Measurement in Biomedical	3		
ULAB 3162	English for Professional Purposes	2	ULAB 2122	
TOTAL	CREDIT HOURS	16		

SHORT SEMESTER					
Code	Courses	Credit	Pre-req		
SMBU	inductrial Training (11)M()	5	SMBE		
4915			3423		
TOTAL	TOTAL CREDIT HOURS 5				

YEAR 4 (SEMESTER 1)					
Code	Courses	Credit	Pre-req		
SMBE 4313	Biomedical Systems Design	3			
SMBE 4413	Biochemistry for Biomedical Engineers	3			
SMBE 4712	Laboratory 4	2			
SMBU 4812	Project Part 1	2			
SMBE 4023	Biomedical Signal Processing	3	SKEU 2073		
SMBE 4**3	Elective 1	3			
UKQE 3001	Extracurricular Experiential Learning (ExCEL)	1			
TOTAL C	CREDIT HOURS	17			

YEAR 4 (SEMESTER 2)						
Code	Courses	Credit	Pre-req			
SMBU 4824	Project Part 2	4	SMBU 4812			
SMBE 4**3	Elective 2	3				
SMBE 4**3	Elective 3	3				
SHAS 4542	Engineering Management	2				

SMBE 4032	Professional Biomedical Engineering Practice	2	
TOTAL C	REDIT HOURS	14	

Elective Courses

CODE	COURSES	CREDIT	PRE-REQ
SMBE 4043	Biomedical Image Processing	3	
SMBE 4053	Biosystem Modeling	3	
SMBE 4063	Advanced Biomedical Signal Processing	3	SMBE 4023
SMBE 4073	Biosensor and Transducers	3	
SMBE 4083	Artificial Intelligence	3	
SMBE 4323	Biomedical Devices	3	
SMBE 4333	Biologically-inspired Devices	3	
SMBE 4343	Cell and Tissue Engineering	3	
SMBE 4423	Biomedical Informatics	3	
SMBE 4433	Biomedical Instrumentation Management	3	
SMBE 4513	Rehabilitation Engineering	3	SMBE 2513
SMBE 4523	Sports Technology in Exercise Rehabilitation	3	
SMBE 4113	Bio-Fabrication	3	
SMBE 4123	Bio-Material Characterization and Analysis	3	
SMBE 4133	Machining and Testing for Biomedical Engineer	3	
SMBE 4153	Electronic CAD Digital System Design	3	
SMBE 4163	Advance Computer Programming and Data Structure	3	

**Choose three (3) courses from this group.

Elective of Generic Skill Courses

CODE	COURSES	CREDIT	PRE-REQ
UHAK 2012	Leadership in Organization	2	
UHAK 2022	Critical and Creative Thinking	2	

UHAK 2032	The Human Side of Knowledge Management	2	
UHAK 2042	Development and Global Issues	2	
UHAK 2052	Guidance and Counselling	2	
UHAK 2062	Psychology of Adjustment	2	
UHAK 2072	Fundamental of Intellectual Property	2	
UHAK 2082	Law of Entrepreneur	2	
UHAK 2092	Entrepreneurship and Enterprise Development	2	
UHAK 2012	Social Entrepreneurship	2	
UHAK 2112	Engineering Communication	2	
UHAK 2122	Human Communication	2	
UHAK 2132	Professional Ethic	2	

Elective of Knowledge Enhancement Courses

CODE	COURSES	CREDIT	PRE-REQ
UICL 2012	Al-Qur'an and Human Civilization	2	
UICL 2032	Life institution and Sustainable Development	2	
UICL 2042	Future Study	2	
UICL 2052	Family Law	2	
UICL 2062	World Science	2	
UICL 2072	Sustainable Economy	2	
UICL 2082	Practices and Concept of Halal Management	2	
UICL 2092	Philosophy of Islamic Art	2	
UICL 2102	Islam and Health	2	
UICL 2132	Islamic Entrepreneurship	2	

Elective of Language Skills Courses

CODE	COURSES	CREDIT	PRE-REQ
ULAA 1112	Arabic Language	2	

ULAJ 1112	Japanese Language 1	2	
ULAC 1112	Mandarin Language 1	2	
ULAF 1112	France Language	2	
ULAN 1112	Persian Language	2	

Total Credits Earned: 138

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 COUNT- ED (JKK)	TICK (√) IF PASSED		
BIO-	BIO-MEDICAL ENGINEERING COURSES						
1	SMBE 1012	Introduction to Biomedical Engineering	2	2			
2	SMBE 1513	Basic Anatomy and Physiology	3	3			
3	SKEU 1023	Circuit Theory	3	3			
4	SSCE 1693	Engineering Mathematics 1	3	3			
5	ULAB 1122	Academic English Skills	2	2			
6	UHAS 1172	Malaysian Dynamics (Local)	2	2			
7	ULAM 1012	Malay Language Communication 2 (International)					
8	UHAK 1012	Graduate Success Attributes	2	2			
9	SMBE 1523	Advanced Anatomy and Physiology	3	3			
10	SMBE 1313	Statics and Dynamics	3	3			
11	SKEU 1223	Digital Electronics	3	3			
12	SSCE 1793	Differential Equations	3	3			
13	UICI 1012	Islamic and Asian Civilization (local)	2	2			

14	UHAK1022	Malaysian Studies			
·		(international)			
15	ULA* 1112	English of Language Skills	2	2	
16	SKEU 2073	Signals and Systems	3	3	
17	SKEU 1063	Electronic Devices	3	3	
18	UHAK 1032	Introduction to Entrepreneurship	2	2	
19	SMBE 2712	Laboratory 1	2	2	
20	SSCE 1993	Engineering Mathematics 2	3	3	
21	ULAB 2122	Advanced Academic English Skills	2	2	
22	SMBE 2033	Computer Programming for Biomedical Engineer	3	3	
23	UKQ* 2**2	Elective of Service Learning Co-Curriculum	2	2	
25	UICL 2**2	Elective of Knowledge Enhancement	2	2	
27	UHAK 2**2	Elective of Generic Skill			
28	UICL 2302	Science and Technology Thinking	2	2	
29	SKEU 2523	Electromagnetic Field Theory	3	3	
30	SSCE 2193	Engineering Statistics	3	3	
31	SKEU 3133	System Modeling and Analysis	3	3	
32	SMBE 2513	Basic Rehabilitation	3	3	
33	SKEU 3063	Electronic Circuits and Systems	3	3	
34	SKEU 3533	Communication Principles	3	3	
35	SMBE 3712	Laboratory 2	2	2	
36	SMBE 3313	Biomedical Materials	3	3	
37	SSCE 2393	Numerical Methods	3	3	
38	SMBE 3423	Clinical Engineering	3	3	
39	SMBE 3323	Solid Mechanics	3	3	
40	SMBE 3023	Biomedical Imaging	3	3	
41	SMBE 3722	Laboratory 3	2	2	
42	SMBE 3033	Microprocessor Systems	3	3	
43	SMBE 3043	Measurement in Biomedical	3	3	
44	ULAB 3162	English for Professional Purposes	2	2	
45	SMBU 4915	Industrial Training (HW)	5	HL	
46	SMBE 4313	Biomedical Systems Design	3	3	
47	SMBE 4413	Biochemistry for	3	3	

		Biomedical Engineers			
48	SMBE 4712	Laboratory 4	2	2	
49	SMBU 4812	Project Part 1	2	2	
50	SMBE 4023	Biomedical Signal Processing	3	3	
51	SMBE 4**3	Elective 1	3	3	
52	UKQE 3001	Extracurricular Experiential Learning (ExCEL)	1	1	
53	SMBU 4824	Project Part 2	4	4	
54	SMBE 4**3	Elective 2	3	3	
55	SMBE 4**3	Elective 3	3	3	
56	SHAS 4542	Engineering Management	2	2	
57	SMBE 4032	Professional Biomedical Engineering Practice	2	2	
TOT	AL CREDIT TO	GRADUATE (a + b + c)	138	133	
OTH	ER COMPULSO				
PLOT	essional Skills	Certificate (PSC) (UTMS	SPACE/ Scr	1001)	
1	GLL 1001	How to Get Your Self Empl	oyed		
2	GLL 1029	ISO 9001:2008 Quality Management System Requirement			
3	GLL 1040	Occupational Safety, Healt	Occupational Safety, Health and Environment		
4	GLL 1041	How to Manage Your Perso	nal Finance		
Test of English Communication Skill (TECS)					
(Language Academy, Faculty of Social Sciences and Humanities)					
-	guage Acadel	iny, i dealey of Social Sele			-,
1	TECS 1001	Oral Interaction			- ,

Course Synopsis

Core Courses

SKEU 1023 Circuit Theory

This course introduces students to the basic laws, theorems and methods of DC and AC circuit analysis such as Ohms law, Kirchhoff Current and Voltage Laws, Thevenin and Norton theorems, concept of series and parallel circuits etc. Based on these, the students are expected to be able to solve variables in any given DC and AC electric circuits. With the knowledge learned, the student would be able to apply the basic laws, theorem and methods of analysis for solving various problems in circuit analysis with confidence.

SKEU 1223 Digital Electronics

This course emphasizes on the design, analysis, planning and implementation of complex digital systems using programmable logic, with specific focus on programmable logic devices. In order to facilitate the learning process, computer-aided design (CAD) software is used throughout the course. Some practical or

almost actual environment problems and solutions are provided. With the knowledge learned, the student would be able to analyze the counter and register circuits completely with confidence and design synchronous counters.

SKEU 2073 Signals and Systems

This course introduces the students to the different types of signals and systems. Emphasis mainly will be on continuous signal. Signal representation in both the time (Fourier series) and frequency domain (Fourier and Laplace transform) will be discussed. The concept of transfer function is introduced and the applications of the Laplace transform (such as for the solution of differential equations, and circuit analysis) is presented. Finally, the use of Bode plot in filter design will be covered.

SKEU 1063 Electronics Devices

This is the first course in the field of electronics. It consists of basic electronic devices such as the diode, the bipolar junction transistor, and the field effect transistor. Course content will include the devices' basic structure, biasing and basic applications. With the knowledge learned, the student would be able to apply the basic laws, theorem and methods of analysis for solving various basic biasing circuits using data sheet with confidence.

SMBE 2033 Computer Programming Techniques For Biomedical Engineer

As a fundamental course, this course equips the students with theory and practice on problem solving techniques by using the structured approach. From this course, the student will be equipped with skills of programming to solve simple to moderate problems. The course covers the following: preprocessor directives, constants and variables, data types, input and output statements, text files, control structures: sequential, selection and loop, built-in and user-defined functions, one dimensional and two dimensional arrays.

SKEU 2523 Electromagnetic Field Theory

This course introduces students to some major views and theories in the area of electrostatic, magnetostatic and electromagnetic fields. This elementary electromagnetic field theory is summarized in Maxwell's equations for static and time varying fields in integral and differential forms, and also a time domain analysis of wave propagation.

SKEU 3133 System Modeling And Analysis

This course introduces the students to the fundamental ideas and definitions of control systems such as block diagrams, plants or processes, open loop and close loop control systems, transfer functions and transient and steady state responses. Students will be taught how to obtain mathematical models of actual physical systems such as electrical, mechanical, electromechanical and simple fluid flow systems in transfer function and state-space equation. Methods of system representation such as block diagram representation and signal flow graphs will be examined. The students will also be exposed to techniques of analysing control systems such as time domain analysis and stability. Finally, an introduction to the design and analysis of control systems using MATLAB will also be given.

SKEU 3063 Electronic Circuits And System

This course introduces students to some major views and theories in amplifiers and its application. It will examine some key issues in basic definition, construction of analogue amplifiers, operational amplifiers and analogue system with special focus on analysis of transistor amplifiers through small signal equivalent circuits. This course also covers some topics in functional electronic circuits. The circuits are derived from a diverse electronic circuitry existed in many electronic instrumentations. The course will also provide practice in carrying out a computer simulation and modelling of the amplifier's circuits using PSPICE or MultiSim software. The function, the behaviour and the characteristics of the functional circuits are analysed.

SKEU 3533 Communication Principles

This course introduces the students the basic principles of communication systems. The fundamental concepts of analogue modulation in particular amplitude and frequency modulations will be strongly emphasized. Topics include types of modulated waveforms, transmitter and receiver structures. The two most significant limitations on the performance of a communications system; bandwidth and noise will be discussed. The concept of sampling, quantization and line coding techniques in rendering an information signal to be compatible with a digital system are explained prior to the study of coded pulse modulation and pulse code modulation (PCM). The waveforms and spectral analysis of bandpass digital modulations are introduced. The system performance in terms of bit error rate (BER) will also be covered. Finally, multiplexing, a method to utilize the communication resource efficiently is studied where two techniques will be explored; time-division and frequency-division multiplexing.

SMBE 3033 Microprocessor System

This course introduces the principles and applications of microprocessors. Topics emphasized are processor architecture in detail incorporation with HLL language and fundamentals of designing and implementing the embedded system. This course emphasizes on understanding the fundamentals of microprocessor operation, writing coherent and error-free HLL programmes, and designing basic microprocessor-based circuits. With the knowledge learned, the student would be able to design microprocessor-based systems using HLL programmes completely.

Syllabus Summary: Laboratory Courses

SMBE 2712 Laboratory 1

The course includes the experiments on basic electrical, electronic, signal processing, technical drawing and programming that are related to biomedical engineering. It exposes the students to some common electrical and electronic components, circuits and theorem such as Thevenin and Norton theorem, RLC circuits and MSI circuits. On the other hand, this teaching laboratory also provides the skill of programming for embedded system, digital signal processing in Matlab

and technical drawing using software.

SMBE 3712 Laboratory 2

The purpose of this course is to provide students with practical experience in using lab electrical instruments, equipment, analyse experimental results, read components data sheets, and develop report-writing skills. Minimum 10 experiments from participating third year laboratories included but not limited to Basic Electronic, instrumentation, Microcontroller, Neuroscience, Physio Therapy, Biomaterials and Biomechanics. The students should be able to improve their communication skills and team-working environment.

SMBE 3722 Laboratory 3

The course provides students with the opportunity to integrate technical knowledge and generic skills attained in the earlier years. This is to be achieved within the context of a medical engineering project conducted in a small team (typically six students) under the supervision of an academic staff. Topics supplementing this course include Bioinstrumentation, Biomechanics and Biomaterial, Medical Imaging, Biomedical Signal Processing and Clinical engineering. The laboratory is conducted based on Conceive-Design-Implement-Operate (CDIO) in which students are required to solve real and complex engineering problem by collecting information and feedback from the end user, design suitable experimental procedures for their innovations, present their innovations and finally submit the report.

SMBE 4712 Laboratory 4

This course involves experiments in many different areas of biomedical engineering including but not limited to Bioinstrumentation, Biomechanics & Biomaterials, Medical Imaging, Biomedical Signal Processing and Clinical Engineering. This laboratory session is conducted as a Problem-Based Learning (PBL) approach. The students are grouped into 4-5 students per a group, and they will be given problems to solve that require them to do pre-labs and conduct experiments within 4 weeks. The students are required to solve the given problems as a team, design suitable experimental procedures, conduct the experiments, present the problem solutions and submit a full formatted report.

Syllabus Summary: Mathematical Courses

SSCE 1693 Engineering Mathematics 1

This course is about multivariable calculus of real and vector-valued functions. The basic theory of partial derivatives and multiple integrals of real functions with their applications are discussed. This theory is extended to vector valued functions to describe motion in space, directional derivatives, gradient, divergence and curl, line integrals, surface integrals and volume integral. Related theorems, namely Green's Theorem, Stokes' Theorem and Gauss Divergence Theorem and their applications are discussed in detail.

SSCE 1793 Differential Equations

This is an introductory course on differential equations. Topics include first order ordinary differential equations (ODEs), linear second order ODEs with constant coefficients, the Laplace transform and its inverse, Fourier series, and partial differential equations (PDEs). Students will learn how to classify and solve first order ODEs, use the techniques of undetermined coefficients, variation of parameters and the Laplace transform to solve ODEs with specified initial and boundary conditions, and use the technique of separation of variables to solve linear second order PDEs.

SSCE 1993 Engineering Mathematics 2

This course is about multivariable calculus of real and vector-valued functions. The basic theory of partial derivatives and multiple integrals of real functions with their applications are discussed. This theory is extended to vector valued functions to describe motion in space, directional derivatives, gradient, divergence and curl, line integrals, surface integrals and volume integral. Related theorems, namely Green's Theorem, Stokes' Theorem and Gauss Divergence Theorem and their applications are discussed in detail.

SSCE 2193 Engineering Statistics

This course begins with basic statistics, elementary probability theory and properties of probability distributions. Introduction to sampling distribution, point and interval estimation of parameters and hypothesis testing are also covered. Simple linear regression and one-way analysis of variance are also taught in this course. Students are also introduced to some nonparametric methods in analysing data.

SSCE 2393 Numerical Methods

This course discuss problem solving using numerical methods that involve nonlinear equations, systems of linear equation, interpolation and curve fitting, numerical differentiation and numerical integration, Eigen value problems, ordinary differential equations and partial differential equations.

Syllabus Summary: Biomedical Courses

SMBE 1513 Basic Anatomy And Physiology

This course is a study of anatomical terminologies, body's structures, orientation and physiological event of human body systems through lectures, models and diagrams. Knowledge in anatomy is fundamental in biomedical engineering programmes because it provides the pathway to integrate between the engineering technology and multiple related medical disciplines. Emphasis is placed on the most important systems of organs (respiration, heart and circulation, nervous system, digestion, secretion, skeleton and muscles, immune system, reproductive system and sensory organs). Each topic is preceded by some comments concerning evolution and/or embryology and a few topics in applied physiology will be presented. The content of the lectures is adapted to engineers, an emphasis is placed on medical terminology and the project component is mainly focusing on biomedical technology related to human physiology and structure. Even after graduation, knowledge in anatomy is still applicable in many medical disciplines such as research and technology developments, medical technology consultancy, hospital management and health care industries.

SMBE 1012 Introduction To Biomedical Engineering

This is a course specially designed to introduce biomedical and health science engineering and motivate students to understand the programme of biomedical engineering at UTM. This course introduces the programme offered and gives an opportunity for student to comprehend what they are entitled to for the next 4 years. It also gives an overview on how to cope with the university environment. Lastly, this course will facilitate the students to plan their career path towards a biomedical engineer.

SMBE 1523 Advanced Anatomy And Physiology

This course is an advanced study of anatomical terminologies, body structures, orientation and physiological events of human body systems through lectures, models and diagrams. Knowledge in anatomy & physiology are fundamental in biomedical engineering programmes because it provides the pathway to integrate between the engineering technology and medical disciplines. Even after graduation, knowledge in anatomy & physiology can be applicable in many medical disciplines such as research and technology developments, medical technology consultancy, hospital management and health care industries.

SMBE 1313 Statics And Dynamics

Mechanics & biology have always fascinated humankind. In Biomedical Engineering programmes, statics and dynamics are two basic important subjects to equip undergraduates with the necessary tools to solve bio-mechanic related problems. This course covers the concepts and principles of statics and dynamics that are applied in the biomedical field. Covered in the course will be explanations of point and rigid body behavior under static loads and during motion. Emphasis is placed on the importance of satisfying equilibrium, analysing structure, biomechanics of human joints, kinematics and kinetics of rigid bodies.

SMBE 2513 Basic Rehabilitation

This course aims to introduce students to the basics of rehabilitation so that they can understand important rehabilitation concepts and issues in disability management, within the context of rehabilitation engineering. It will equip students with basic knowledge and skills for the application of science, technology and engineering to the design and development of assistive (adaptive) technology and rehabilitation techniques. It will provide students with an understanding of the nature of problems confronting people with disabilities and an ability to provide technical solutions for these problems.

SMBE 3313 Biomedical Materials

This course provides an introduction to the fundamentals of and recent advances in biomedical materials. It covers a broad spectrum of biomedical materials which include metals, ceramics, polymers and composites. It takes an interdisciplinary approach to describing the chemistry and physics of materials, their biocompatibility, and the consequences of implantation of devices made of these materials into the human body. The course is also designed to familiarise students with failure of materials through fracture, fatigue, wear and corrosion.

SMBE 3323 Solid Mechanics

The course provides students with the knowledge to determine the strength and stiffness of structures being used. The structures that will be studied in this course are bars, pins, bolts, shafts and beams and the types of applied loading are axial forces, deformations due to the change in temperature, torsional loads, transverse loads and combination of these loads. At the end of the course, students should be able to determine the mechanical properties of the materials with respect to their strength and stiffness. Students should be able to calculate stresses, strains and deformations in structures due to various types of loading conditions. The students should also be able to use the acquired knowledge to solve real problems either coming from research problems, or from real-world biomedical problems.

SMBE 3023 Biomedical Imaging

A course is for introducing and exposing students to the world of medical tomography. It focuses on physical, operation and signal formation of medical tomography techniques from various imaging modalities such as MRI, ultrasound, CT-scan, nuclear medicine and X-ray.

SMBE 3423 Clinical Engineering

This course introduces students to major principles of clinical engineering as part of the preparation for industrial training. The scope of clinical engineering covers pre-market, market and post-market life-cycle of medical devices as well as risk and personnel management. These include procurement planning, incident investigation, equipment management, productivity, cost effectiveness, information systems integration, and patient safety activities. Students will also be exposed to the related law, standard and regulation for medical devices. Other than that, principle of medical devices will also be discussed in the course

SMBE 3043 Instrumentation And Measurement In Biomedical

This course introduces students to biomedical measurement systems and biomedical instrumentation design. 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.

SMBE 4915 Industrial Training (HW)

Industrial Training Programme is a compulsory component of the undergraduate curriculum at the Faculty of Biomedical & Health Science Engineering. Placements at the participating industries are structured for undergraduates in the third semester of their third year study. The industries where the students will be attached to during their training is listed in the supporting document (LI-CL). These industries cover all areas in Biomedical Engineering such as biomedical

instrumentation and signal processing, clinical science and engineering, therapy and rehabilitation and biomechanics and biomaterial. The nature of jobs involved in the training includes designing, manufacturing, testing, maintaining, fabricating and etc.

SMBE 4812 Project Part I

The aim of the Final Year Project (FYP) is to give students opportunity to apply the knowledge that they have gained while studying in FKBSK to solve practical engineering problems. By doing so, it is hoped that the students will gain knowledge and experience in solving problems systematically thus when they graduate, they will be ready to work as reliable and productive engineers.

SMBE 4824 Project Part Ii

This course is a continuation from SMBE 4812.Students must submit a project thesis and present it at the end of the semester. Grades will be given for both.

Elective Courses

SMBE 4043 Biomedical Image Processing

This course introduces students to introductory and intermediate levels of image processing techniques. The area of coverage would be the digitization process as a mean to acquire the digital image. Next would be the enhancement and restoration processes which are to improve the quality of the image for next stage processing. Both the spatial domain and frequency domain approaches will be covered. The next stage would be the segmentation process. This is an important step towards advanced level processing. Finally, the topic of compression and coding will be covered. MATLAB will be used extensively for better understanding. By adapting this knowledge, students will be able to develop essential technical skills in solving biomedical image problems with some degree of accuracy. It focuses on medical image processing of image obtained from the various imaging modalities such as MRI, ultrasound, CT-scan, nuclear medicine and X-ray.

SMBE 4053 Biosystem Modeling

The objective of this course is to introduce students to the mathematical model, methods and their biological application, and model of subsystem in human body. This course introduces students to some major views and theories in modeling the subsystem in human body. It is almost impossible to cover all subsystems in human body. As guidance, topics may include: the maintenance of cell homeostasis, excitation and conduction in nerve fibers, synaptic transmission and the neuromuscular junction, properties of muscles, the lung - physical and mechanical aspects of respiration, volume and composition of body fluids - the kidney, the cardiovascular systems, the heart as a pump, neural control of the heart and circulation, and the autonomic nervous system. The course will also provide practice in carrying out a computer simulation and modeling of bio system using Matlab/Simulink/LabView software.

SMBE 4063 Advanced Biomedical Signal Processing

This course presents two fundamental concepts of signal processing: linear systems and stochastic processes. Various estimation, detection and filtering methods are taught and demonstrated on biomedical signals. All methods will be developed to answer concrete question on specific biomedical signal such as ECG, EEG and etCO2. The focus of the course is a series of labs that provide practical experience in processing biomedical data, with examples from cardiology, neurology, respiratory and speech processing.

SMBE 4073 Biosensors And Transducers

This course is intended to introduce the function of biosensor and a transducer in the medical electronics industry. An overview of biosensors and an in-depth and quantitative view of device design including fabrication technique. Discussion of the current state of the art biosensor to enable continuation into advanced biosensor design and fabrication. Topics emphasize biomedical, bio-processing, military, environmental, food safety, and bio-security applications.

SMBE 4083 Artificial Intelligence

This course introduces students to the fundamentals of two techniques of artificial intelligence (AI), namely, fuzzy logic and neural networks. Both techniques have been successfully applied by many industries in consumer products and industrial systems. Fuzzy logic offers flexibility in developing rule-based systems using natural language type of rules. Neural networks on the other hand, have strong generalization and discriminant properties and offer a simple way of developing system models and function approximation. They are highly applicable for many pattern recognition applications. This course gives the students appropriate knowledge and skills to develop, design and analyze effectively these two AI techniques for practical problems with some degree of accuracy. The students will also be given a hands-on programming experience in developing fuzzy logic and neural networks system to effectively solve real world problems.

SMBE 4323 Biomedical Devices

A biomedical device is a product which is used for medical purposes in patients, in diagnosis, therapy or surgery. It includes a wide range of products varying in complexity and application and sometimes categorized into either passive or active devices. Examples include tongue depressors, medical thermometers, blood sugar meters, total artificial hearts, joint replacement devices, fibrin scaffolds, stents and X-ray machines. The global market of biomedical devices reached roughly 209 billion US Dollar in 2006 and is expected to grow with an average annual rate of 6 - 9% through 2010. Due to its importance, this course will introduce to students some of the many types of devices that are currently being used in the medical field.

SMBE 4333 Biological Inspired Devices

The course provides students with an overview of non-conventional engineering approaches is biology, and to show how these approaches can be used to design

and develop better (simpler, more robust, energy-efficient) solutions, especially in the development of novel biomedical devices. The focus of the course will be mainly on the physical part (i.e. the structure and function) of organisms or parts of the organism, rather than the signal processing part. The students will practice on implementing bio-inspired mechanism in solving engineering problems.

SMBE 4343 Cell And Tissue Engineering

Tissue engineering integrates principles of engineering and life sciences towards the fundamental understanding of structure-function relationships in normal and pathological tissues. The course will cover the introduction and fundamentals of tissue engineering, extracellular matrix, cells, biomaterials in tissue engineering, scaffold in tissue engineering, in vitro and in vivo strategies, clinical applications of tissue engineering and ethical and regulatory issues in tissue engineering.

SMBE 4423 Biomedical Informatics

The course provides the student with the basic theoretical knowledge and practical experience from the area of medical informatics and radiobiology. The medical informatics knowledge covers area of processing of medical data, fundamentals of medical information system design, computer-aided medical diagnostics, and telemedicine. The radiobiology covers the physics of radiation, application of radiation in diagnostic and therapeutic, and radiation safety.

SMBE 4513 Rehabilitation Engineering

This course will focus on the principles and application of rehabilitation sciences & assistive technology from the rehabilitation engineering perspective. It aims to provide the students with in-depth understanding pertaining important issues in rehabilitation engineering and equip students with knowledge and skills for the application of science, technology and engineering to the design and development of assistive (adaptive) technology and rehabilitation systems. It will also provide students with an understanding of the nature of problems confronting people with disabilities and an ability to provide technical solutions for these problems. Interdisciplinary interaction and team working for optimal disability management will be stressed, with emphasis being given to the role of the rehabilitation engineering professional in the team.

SMBE 4523 Sports Technology In Exercise Rehabilitation

The course provides fundamental concept of sports science, technology and exercise rehabilitation. It focuses on total fitness, the biomechanics of sports, common injuries that occur in sport and how to prevent it. The application of technology in the process in exercise rehabilitation, assessment of injury, sports massage and psychological aspect of injuries are also addressed.

SMBE 4433 Biomedical Instrumentation Management

Healthcare technology management provide an overview of systematic process in which qualified health care professionals, typically clinical engineers, in

partnership with other healthcare leaders, plan for and manage health technology assets to achieve the highest quality care at the best cost. It explains the basic concepts of managed care and describes the various types of health plan in operation today. This course will cover the strategic planning as well as technology assessment and facilities planning proceed with technology procurement and conclude with service or maintenance management.

Bachelor of Science (Equine Management)

BACHELOR OF SCIENCE (EQUINE MANAGEMENT)

PROGRAMME SPECIFICATIONS

The rapid development of equine industry in Malaysia has demanded more experts in the field of equine science and equine management. Universiti Teknologi Malaysia (UTM) aspires to be the pioneer among higher learning institutions in Malaysia and in the South East Asia region to promote equine sports and equestrian activities among students as well as the public to develop interest and passion for the sports.

The curriculum structure for Bachelor of Science (Equine Management) has taken into consideration requirements and recommendations of various equine associations, equine establishments and especially the Malaysian Equine Council (MEM). The curriculum will mainly cover the basic theories of equine science and equine management whilst developing the students with practical skills, good communication, leadership quality as well as entrepreneurship.

Methods of teaching and learning is through lectures, tutorials, practical work, group discussions, individual presentations, group presentations and industrial training. The percentage of the study methods being delivered are 72% teaching courses, 18% practical, 6% industrial training, 4% of individual and group projects.

1.	Awarding Institution	Universiti Teknologi Malaysia
2.	Teaching Institution	Universiti Teknologi Malaysia
3.	Programme Name	Bachelor of Science (Equine Management)
4.	Final Award	Bachelor of Science (Equine Management)
5.	Programme Code	SMBQ-03
6. Acc	Professional or Statutory Body of creditation	Malaysian Qualification Agency (MQA)
7.	Language(s) of Instruction	English and Bahasa Melayu
8. dist	Mode of Study (Conventional, tance learning, etc)	Conventional
9. self	Mode of operation (Franchise, -govern, etc)	Self-governing
10.	Study Scheme (Full Time/Part Time)	Full Time and Part Time
11.	Study Duration	Minimum: 4 years Maximum: 6 years

General Information

Course Classification

No.	Classification	Credit Hours	Percentage
i.	General University Course	23	17.3%
ii.	Programme Core Course	70	52.6%
iii.	Programme Elective Course	40	30.1%
	Total	133	100%
	Total Credit Hours to Graduate	133 credit ho	ours

Programme Educational Objectives (PEO)

After having exposed to 3 to 5 years working experience, our graduates should become professionals who demonstrate the following competencies:

Code	Intended Educational Objectives
PEO1	Skilled and competent in equine science and equine management globally and are able to contribute to the development of the country's equine industry.
PEO2	Highly capable in project management specifically related to the equine industry and practice.
PEO3	Prominent leaders or members of equine teams while being creative, innovative, and are able to adapt to the equine industry.
PEO4	Proficient in communicating effectively within the equine industry network and socially responsible while being involved with high ethical standards.

Programme Learning Outcomes (PLO)

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

Code	Intended Learning Outcomes				
PLO1	Ability to understand and apply knowledge of equine science and				
	equine management				

PLO2	Ability to analyse and manage resources related to the field of equine
PLO3	Ability to solve problems creatively using knowledge and technical
	skills in equine science and equine management.
PLO4	Ability to communicate effectively in both written and verbal
	communication.
PLO5	Ability to think creatively and critically in solving problems related to
	equine field.
PLO6	Demonstrate confidence to act effectively individually or in a team.
PLO7	Demonstrate ability to practice lifelong learning.
PLO8	Ability to identify business opportunities and demonstrate
	entrepreneurship skills.
PLO9	Demonstrate responsible behaviour and good leadership skills.
PLO10	Demonstrate professionalism and good ethics.

Entry Requirements

The minimum qualifications for candidates who intend to do a Bachelor of Science (Equine Management) are as follows:

4) Minimum results based on **the Malaysian High School Certificate (STPM)** (results would be based on the general requirements as well as other conditions as the pre-requisites for the programme set by the university).

University General Requirements:

- iv. Passed Malaysian Certificate Examination (SPM) or equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a credit in Bahasa Melayu/Bahasa Malaysia, July paper
- v. Passed MOEM Matriculation/UM Science Foundation with CGPA of at least 2.00
- vi. Obtained at least a Band 2 in Malaysia University English Test (MUET).

Special Requirements for the Programme

- Passed with a credit in Mathematics at SPM level or equivalent
- Obtained at least a Grade B- (CGPA 2.67) Biology at Matriculation/Foundation level
- Passed with at least Grade C+ (2.33) in Matriculation/Foundation in any TWO (2) the following subjects: Chemistry, Mathematics and Physics
- Not having any health problems that will prevent student from taking up practical work
- 5) Minimum requirements for Matriculation Certificates (KPM) / Asasi Sains UM (fulfil the general requirements set by the university as well as other conditions of the programme).

General University Requirements

 Passed Malaysian Certificate Examination (SPM) or equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a credit in Bahasa Melayu/Bahasa Malaysia, July paper

- Passed MOEM Matriculation/UM Science Foundation with CGPA of at least 2.00
- Obtained at least a Band 2 in Malaysia University English Test (MUET)

Special Requirements of the Programme:

- Passed with a credit in Mathematics at SPM level or equivalent
- Obtained at least a Grade B- (CGPA 2.67) Biology at Matriculation/Foundation level
- Passed with at least Grade C+ (2.33) in Matriculation/Foundation in any TWO (2) the following subjects: Chemistry, Mathematics and Physics
- Not having any health problems that will prevent student from taking up practical work
- 6) Minimum qualifications for students with **Certificates/Diplomas**

(fulfill the general requirements set by the university as well as specific requirements of the programme).

General University Requirements

- Passed Malaysian Certificate Examination (SPM) or equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a credit in Bahasa Melayu/Bahasa Malaysia, July paper
- Obtained a Diploma or equivalent qualification recognized by the Malaysian Government and approved by the Senate,

or

- Passed STPM examination in 2009 or before and obtained the following:
- Grade C (CGPA 2.00) in General Paper; and
- Grade C (CGPA 2.00) in TWO (2) other subjects

or

- Passed Matriculation Examination in 2009 or before and obtained at least CGPA 2.00
- Obtained at least a Band 2 in Malaysia University English Test (MUET)

Special Requirements of the Programme:

• Obtained a Diploma related to the applied course from UTM or equivalent with at least CGPA 2.50

or

- For those who obtained a CGPA 2.50 but have at least TWO (2) years working experience in related field are eligible to apply; and
- Passed with a credit in Mathematics at SPM level

or

• Obtained at least Grade C in any of Mathematics subjects

Note :-

Year of entry and duration of study will be based on the credit exemptions and credit transfer awarded by the university.

Specific Programme Requirements:

Passed fitness test and interview

and

Do not have any physical disability.

International Students

University Basic Entry Requirements:

The general minimum requirement for entry into a Bachelor's Degree Programme is as follows:

General Certificate of Education (GCE) 'A' Level, Diploma in the related field or other equivalent pre-university examinations;

or

Any other certificate that is recognized by Senat of the University equivalent to the above;

or

participate in the bridging program organized by the university

and

Score at least 5.5 in IELTS, 500 in TOEFL or 79 in IBT.

Award Requirements

To graduate, students must:

- Attain a total of not less than 133 credit hours with a minimum CGPA of 2.0.
- Professional Skill Certificate (PSC)

1. How to Get Yourself Employed (HTGYE)

2. ISO 9001: 2008 Quality Management System Requirement (ISO)

- 3. Occupational Safety and Health Awareness (OSHA)
- 4. How to Manage Your Personal Finance (HTMYPF)
- 5. Test of English Communication Skills for Graduating Students (TECS):
- (i) TECS 1001 (Paper I Oral Interaction)
- (ii) TECS 1002 (Paper II Writing)

CROSS-CAMPUS PROGRAMME

Students are given the opportunity to enrol in a few courses in participating universities. The grades and credits obtained during this period are transferable.

The programme is open to undergraduates who have undergone a minimum of two semesters of their studies with the following conditions:

- (i) The total number of credits allowed to be taken is between twelve (12) and eighteen (18) credits only.
- (ii) The student should hold a minimum CGPA of 3.50 and Band 4 MUET at the time of application.
- (iii) The student is not a residence of or originated from the state where the university that he/she intends to attend is located.

The student will not be charged tuition fees by the participating university but shall pay the regular tuition fees at UTM. However, should the participating university provide accommodation, the student will need to pay accommodation fees.

PROFESSIONAL SKILLS CERTIFICATE (PSC)

Students are given a chance to enrol in certificate programmes offered by the Centres of Excellence in the University and the School of Professional and Continuing Education (SPACE) during semester breaks

- 1. How to Get Yourself Employed (HTGYE)
- 2. ISO 9001: 2008 Quality Management System Requirement (ISO)
- 3. Occupational Safety and Health Awareness (OSHA)
- 4. How to Manage Your Personal Finance (HTMYPF)
- 5. Test of English Communication Skills for Graduating Students (TECS):
 - (i) TECS 1001 (Paper I Oral Interaction)
 - (ii) TECS 1002 (Paper II Writing)

COURSE MENU

YEAR 1	(SEMESTER 1)		
Code	Courses	Credit	Pre-Req
SMBQ 1013	Introduction to Equine Science and Industry	3	
SPPR 2922	Physical Strength and Conditioning	2	
SMBQ 1023	Introduction to Management	3	
SMBQ 1093	Basic Horse Handling	3	
SMBQ	Practical Experience in Equine Farm	2	

1282	Management I		
UHAS	Malaysian Dynamics (Local)		
1172		2	
ULAM	Malay Language Communication 2		
1012	(International)		
ULAB	English for Academic Communication	2	
1122			
TOTAL C	REDIT HOURS	17	

YEAR 1	(SEMESTER 2)		
Code	Courses	Credit	Pre-Req
SMBQ	Sports Psychology	2	
1102			
SMBQ	Foundation of Equine Performance	2	
1112			
SMBQ	Equine Anatomy and Physiology	3	
1203			
SMBQ	Farm and Stable Management	3	
1033			
SMBQ	Practical Experience in Equine Farm	2	
1292	Management II		
UHAK	Graduate Success Attributes	2	
1012			
UICI	Islamic and Asian Civilization (TITAS) – Local,		
1012		С	
UHAK	Malaysian Studies (International)	2	
1022	ر		
TOTAL	CREDIT HOURS	16	

YEAR 2	(SEMESTER 1)		
Code	Courses	Credit	Pre-Req
SMBQ	Horse Riding I: Endurance	2	
2122			
SMBQ	Basic Equine Healthcare and Diseases	3	
2213			
SMBQ	Commercial Equine Facilities Design and	3	
2043	Management		
SMBQ	Practical Experience in Equine Farm	2	
2302	Management III		
UICL	Elective of Knowledge Enhancement		
2**2	<u> </u>	ъ	
UHAK	Elective of Soft Skills	Z	
2**2			
ULAB	Advanced Academic English Skills	2	ULAB
2122			1122
UKQ*	Co-curriculum and Service Learning	2	
2**2			
SPPR	Training Method	2	
4842			
TOTAL	CREDIT HOURS	18	

YEAR 2	(SEMESTER 2)		
Code	Courses	Credit	Pre-Req
SMBQ	Equine Business Management	3	
SMBQ 2062	Principles of Risk Management	2	
SMBQ 2133	Horse Behaviour and Training	3	
SMBQ 2142	Horse Riding II: Dressage	2	
SMBQ 2223	Equine Disease Management	3	
SMBQ 2312	Practical Experience in Equine Farm Management IV	2	
UICL 2302	Sciences and Technology Thinking	2	
TOTAL	CREDIT HOURS	17	

YEAR 3	(SEMESTER 1)		
Code	Courses	Credit	Pre-Req
SMBQ	Equine Nutrition	3	
3243			
SMBQ	Equine Lameness and Conditioning	3	
3233			
SMBQ	Horse Riding III: Jumping	2	
3152			
SMBQ	Practical Experience in Equine Farm	2	
3322	Management V		
SMBQ	Event and Competition Management	3	
3073			
UHAK	Introduction to Entrepreneurship	2	
1032			
TOTAL	CREDIT HOURS	15	

YEAR 3	(SEMESTER 2)		
Code	Courses	Credit	Pre-Req
SMBQ	Research Methodology	2	
3302			
SMBQ	Equestrian Motion Analysis	3	
3183			
SMBQ	Equine Quarantine	3	
3263			
SMBQ	Practical Experience in Equine Farm	2	
3332	Management VI		
ULAB	English for Professional Purposes	2	ULAB
3162			2122
ULAX	Elective Foreigner Language	2	
1112			
TOTAL	CREDIT HOURS	14	

SHORT	SEMESTER					
Code	Courses	Credit	Pre-Req			
SMBU	Industrial Training	8				
4368	4368					
TOTAL	CREDIT HOURS	8				

YEAR 4	(SEMESTER 1)		
Code	Courses	Credit	Pre-Req
SMBQ	Riding Instructor Training	3	
4163			
SMBQ	Equine Evaluation and Selection	3	
4173			
SMBQ	Equine for Disabled	3	
4193			
SMBQ	Equine Seminar	2	
4082			
SMBQ	Practical Experience in Equine Farm	2	
4342	Management VII		
SMBU	Undergraduate Project I	2	
4102			
TOTAL	CREDIT HOURS	15	

YEAR 4	(SEMESTER 2)		
Code	Courses	Credit	Pre-Req
SMBQ 4253	Equine Therapy and Rehabilitation	3	
SMBQ 4273	Equine Reproduction and Breeding Technologies	3	
SMBQ 4352	Practical Experience in Equine Farm Management VIII	2	
SMBU 4114	Undergraduate Project II	4	
UKQE 3001	Extracurricular Experiential Learning (ExCEL)	1	
TOTAL	CREDIT HOURS	13	

Elective of Generic Skill Courses

CODE	COURSES	CREDIT	PRE-REQ
UHAK	UHAK Leadership in Organization		
2012			
UHAK	Critical and Creative Thinking	2	
2022			
UHAK	The Human Side of Knowledge Management	2	
2032			
UHAK	Development and Global Issues	2	

2042			
UHAK	Guidance and Counselling	2	
2052			
UHAK	Psychology of Adjustment	2	
2062			
UHAK	Fundamental of Intellectual Property	2	
2072			
UHAK	Law of Entrepreneur	2	
2082			
UHAK	Entrepreneurship and Enterprise	2	
2092	Development		
UHAK	Social Entrepreneurship	2	
2102			
UHAK	Engineering Communication	2	
2112			
UHAK	Human Communication	2	
2122			
UHAK	Professional Ethic	2	
2132			

Elective of Knowledge Enhancement Courses

CODE	COURSES	CREDIT	PRE-REQ
UICL 2012	Al-Qur'an and Human Civilization	2	
UICL 2032	Life institution and Sustainable Development	2	
UICL 2042	Future Study	2	
UICL 2052	ICL Family Law		
UICL 2062	ICL World Science D62 ICL		
UICL 2072	ICL Sustainable Economy 072		
UICL 2082	L Practices and Concept of Halal Management		
UICL 2092	Philosophy of Islamic Art	2	
UICL 2102	JICL Islam and Health 2102		
UICL 2132	Islamic Entrepreneurship	2	

Elective of Language Skills Courses

CODE	COURSES	CREDIT	PRE-REQ
ULAA	Arabic Language	2	
1112			
ULAJ Japanese Language 1		2	
1112			

ULAC	Mandarin Language 1	2	
1112			
ULAF	France Language	2	
1112			
ULAN	Persian Language	2	
1112			

Total Credits Earned: 133

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 COUNT- ED (JKK)	TICK (√) IF PASSED
		EQUINE MANAGEMEN	T COURSES		
1	SMBQ 1013	Introduction to Equine Science and Industry	3	3	
2	SPPR 2922	Physical Strength and Conditioning	2	2	
3	SMBQ 1023	Introduction to Management	3	3	
4	SMBQ 1093	Basic Horse Handling	3	3	
5	SMBQ 1282	Practical Experience in Equine Farm Management I	2	2	
6	UHAS 1172	Malaysian Dynamics (Local)	2	2	
7	ULAM 1012	Malay Language Communication 2 (International)			
8	ULAB 1122	English for Academic Communication	2	2	
9	SMBQ 1102	Sports Psychology	2	2	
10	SMBQ 1112	Foundation of Equine Performance	2	2	

11	SMBQ	Equine Anatomy and Physiology	3	3	
12	SMBO	Farm and Stable	3	3	
12	1033	Management	5	5	
13	SMBO	Practical Experience in	2	2	
15	1292	Fquine Farm	-	-	
		Management II			
14	UHAK	Graduate Success	2	2	
	1012	Attributes	_		
15	UICI	Islamic and Asian			
	1012	Civilization (TITAS) -			
		Local	2	2	
16	UHAK	Malaysian Studies			
	1022	(International)			
17	SMBQ	Horse Riding I:	2	2	
	2122	Endurance			
18	SMBQ	Basic Equine Healthcare	3	3	
	2213	and Diseases			
19	SMBQ	Commercial Equine	3	3	
	2043	Facilities Design and			
		Management			
20	SMBQ	Practical Experience in	2	2	
	2302	Equine Farm			
		Management III			
21	UICL	Elective of Knowledge			
	2**2	Enhancement	2	2	
22	UHAK	Elective of Soft Skills			
22		Advanced Academic	2	2	
23	ULAB 2122	Auvanceu Acauemic	Z	Z	
25		Co-curriculum and	2	2	
25	0KQ* 2**2	Service Learning	Z	Z	
27	SDDD	Training Method	2	2	
27	4842	Training Method	2	2	
28	SMBO	Equine Business	3	3	
20	2053	Management	5	5	
29	SMBO	Principles of Risk	2	2	
25	2062	Management	-	-	
30	SMBO	Horse Behaviour and	3	3	
	2133	Training	-	-	
31	SMBQ	Horse Riding II:	2	2	
	2142	Dressage			
32	SMBQ	Equine Disease	3	3	
	2223	Management			
33	SMBQ	Practical Experience in	2	2	
	2312	Equine Farm			

		Management IV			
34	UICL	Sciences and	2	2	
	2302	Technology Thinking			
35	SMBQ	Equine Nutrition	3	3	
	3243				
36	SMBQ	Equine Lameness and	3	3	
	3233	Conditioning			
37	SMBQ	Horse Riding III:	2	2	
	3152	Jumping			
38	SMBQ	Practical Experience in	2	2	
	3322	Equine Farm			
	CMDO	Management V	2	2	
39	SMBQ	Event and Competition	3	3	
40	3073	Management	2	2	
40	UHAK 1022	Introduction to	2	2	
41	1032 SMPO	Bosopreh Mothodology	2	2	
41	3302	Research Methodology	2	2	
42	SMBO	Equestrian Motion	3	3	
72	3183	Analysis	5	5	
43	SMBO	Fourine Quarantine	3	3	
	3263		U U		
44	SMBO	Practical Experience in	2	2	
	3332	Equine Farm	_	_	
		Management VI			
45	ULAB	English for Professional	2	2	
	3162	Purposes			
46	ULAX	Elective Foreigner	2	2	
	1112	Language			
47	SMBU	Industrial Training	8	HL	
	4368	5			
48	SMBO	Riding Instructor	3	3	
	4163	Training			
49	SMBO	Equine Evaluation and	3	3	
	4173	Selection			
50	SMBO	Equine for Disabled	3	3	
	4193		_	_	
51	SMBO	Equine Seminar	2	2	
	4082				
52	SMBO	Practical Experience in	2	2	
	4342	Equine Farm			
		Management VII			
53	SMBU	Undergraduate Project I	2	2	
	4102				
54	SMBO	Equine Therapy and	3	3	
L					

	4253	Rehabilitation							
55	SMBQ 4273	Equine Reproduction and Breeding Technologies	3	3					
56	SMBQ 4352	Practical Experience in Equine Farm Management VIII	2	2					
57	SMBU 4114	Undergraduate Project II	4	4					
58	UKQE 3001	Extracurricular Experiential Learning (ExCEL)	1	1					
TOTAL CREADIT 133 125									
OTHER COMPULSORY COURSES									
Professional Skills Certificate (PSC) (UTMSPACE/ School)									
1	GLL 1001	How to Get Your Self Employed							
2	GLL 1029	ISO 9001:2008 Quality N Requiren							
3	GLL 1040	Occupational Safety, Health and Environment							
4	GLL 1041	How to Manage Your Personal Finance							
Test of English Communication Skill (TECS)									
(Language Academy, Faculty of Social Sciences and Humanities)									
1	TECS 1001	Oral Interaction							
2	TECS 1002	Writin							

COURSE SYNOPSIS

CORE COURSES

SMBQ 1013 Introduction To Equine Science And Industry

This course in general acts as an introduction to the students to get an overview of the equine sports and industry. Students will learn the economic aspect of equine as well as the different entities that define the equine industries as a whole. Students will be able to evaluate and analyse domestic equine industry in terms of its impact and economic performance

SMBQ 1033 Farm and Stable Management

Management of horse stable requires particular skills and understanding. The horse is a complex animal whose psychology is vital to its effective husbandry. The routine of this husbandry is vital, as is the understanding of different methods. The basic principles of horse care are fundamental and underpin the requirements of whichever area of the horse industry the student finds employment.

SMBQ 1093 Basic Horse Handling

This course is an introduction to the basic skills necessary for daily care and maintenance of the horse. Topics include safety, stall care, feeding and basic nutrition, handling and restraint, vices, common cause and treatment of lameness, equine emergencies and first aid, bandaging, basic medications, and trailer safety. Preventative health care, deworming and vaccination programs, and dental and farrier care are introduced.

SMBQ 1023 Introduction to Management

The aim of this course is to provide a general introduction in management to students whose field of study is not management, but whose careers are likely to have a significant managerial component. Students will be able to understand the concepts and language of management and to be aware of the relationships among all management disciplines. This course aims to provide you with an overview of the role of management thereby giving you an appreciation of the key issues associated with achieving purposeful activity within organisations.

SMBQ 1102 Sports Psychology

This course aims to prepare students with the knowledge in sports psychology in relation to the equine industry. This course exposes the students on how psychological factors affect performance and how participation in equine sports and exercise affect psychological and physical factors. In addition, students are also able to discuss the instruction and training of psychological skills for performance improvement when applied or working with athletes, coaches, and parents regarding injury, rehabilitation, communication, team building, and career transitions.

SMBQ 1112 Foundation of Equine Performance

The aim of this course is to further previous knowledge gained in other courses and recognise the qualities needed in a competition horse. This course also aims to develop an understanding on the foundation of equine performance in order to produce and sustain performance horses at a competitive level.

SMBQ 1203 Equine Anatomy & Physiology

This module aims for students to understand and clearly define the anatomical features of the horse and develop the ability to identify the anatomy structures of the musculoskeletal system. Students will develop the ability to identify anatomical features and relate its structure to function. This module also aims to build the knowledge and understanding of the mechanisms of energy metabolism and means of monitoring performance. An in-depth understanding of equine physiology is vital when training horses to a high level whilst minimising the risk of injury.

SMBQ 2043 Commercial Equine Facilities Design and Management

This course focuses on the design and construction of various types of private and commercial equine facilities. Topics include property layout, construction options,

equipment, hay production and pasture management, water and waste management, zoning requirements, environmental impact of stables, legal obligations, contracts and liability, and economics and business management of facilities.

SMBQ 2053 Equine Business Management

This course aims to address the types of organisation that require commercial managers within the Equine sector and the responsibilities that are fundamental to the role of a commercial manager. The course addresses the complexity of the equine market and the influence this will have on the strategic aims of a business or the entry to market of new business. The course also addresses the relevance of sustainability within a commercial context.

SMBQ 2062 Principles of Risk Management

This course aims to prepare students the knowledge in risk management for equine industry. This course exposes the students with the principles of risk management, risk management strategies, identifying the risks, assessing the risks, and managing the risk that will occur in various parties such as riders, staffs, horse, equipment, facilities and managing the incidents. Students are also able to discuss about the issues related to managing the risk in equine industry.

SMBQ 2122 Horse Riding I Endurance

This course focuses on the knowledge and development of basic skills pertaining to Endurance riding. Students will acquire knowledge and understanding which covers the aspect of the horse as well as the rider on the subject of Endurance riding. Students will then develop the ability and skills required to be able to conduct Endurance riding with a sound base of knowledge to reflect equine performance.

SMBQ 2133 Horse Behaviour and Training

This course focuses on understanding and determining the horse behaviour. Students will acquire the knowledge and skills to identify and observe the horse behaviour to ensure well-being and soundness of the horse. Modern day management of horses often result in equine behavioural problems and these problems have a wide impact on equine welfare. Developing an understanding of innate equine behaviour and methods of behavioural training could vastly improve equine welfare for the horses concerned. This module aims to develop application of training techniques as a solution to given behavioural problems. This will be achieved through developing an understanding of a range of training methods and behavioural modification techniques.

SMBQ 2142 Horse Riding Ii Dressage

This course focuses on the knowledge and development of basic skills pertaining to Dressage. Students will acquire knowledge and understanding which covers the aspect of the horse as well as the rider on the subject of Dressage. Students will develop the skills required to be able to conduct Dressage with a sound base of knowledge to reflect equine performance.

SMBQ 2213 Basic Equine Healthcare and Disease

This course aims to equip the students with the knowledge of basic equine healthcare that covers the fundamental aspects such as physical condition of the horse, routine care, feeding and exercise. Students will learn management practices and routine preventive care of horses which will contribute to equine healthcare and welfare.

SMBQ 2223 Equine Disease Management

This course aims to equip the student with the knowledge of equine diseases and health management of horses. Students will be more knowledgeable and proficient at recognizing and managing some of the major health problems associated with equine. The emphasis of this course will be on preventive maintenance and necessary managerial practices needed to keep the equine health and welfare.

SMBQ 3073 Event and Competition Management

The main aim of this course is to enable the learner to identify and evaluate the factors that affect the demand for recreational facilities and special events, considering social and environmental concerns with a long-term strategic view. In addition, the on-going processes involved in facility management are emphasised whilst considering organisational constraints. Also, the aim is to provide learners with the skills necessary to plan, manage, deliver and evaluate an event.

SMBQ 3152 Horse Riding Iii Show Jumping

This course focuses on the knowledge and development of basic skills pertaining to Show Jumping. Students will acquire knowledge and understanding which covers the aspect of the horse as well as the rider on the subject of Show Jumping. Students will develop the skills required to be able to conduct show jumping with a sound base of knowledge to reflect equine performance.

SMBQ 3183 Equestrian Motion Analysis

This course is to develop students understanding of biomechanical factors influencing the athletic horse. The specific aims are to understand the relationship between equine anatomy, movement and performance; and to develop understanding and practical skills in the methodologies for measuring biomechanical parameters. Students will also be able to do an analysis to evaluate equine performance within biomechanical parameters.

SMBQ 3243 Equine Nutrition

The module aims are to build on knowledge gained within the horse management module, to develop knowledge of nutritional requirements in a wide variety of horses, recognise the significance of poor ration formulation within the industry and the environmental management of arable crops.

SMBQ 3233 Equine Lameness & Conditioning

This course aims to expose the students to the principles of clinical evaluation and interpretation of lameness disorders of the fore-and hind limbs of horses. Students will gain knowledge on methods used in large-animal radiography and the latest techniques for managing and treating equine lameness. Anatomy and pathology of some areas of the musculoskeletal system are also introduced.

SMBQ 3263 Equine Quarantine

This course aims to equip the student with the knowledge of equine quarantine which covers the aspect of legal requirements and the whole procedure and process of quarantine in Malaysia. This course touches on the management of horses which contribute to equine healthcare and welfare.

SMBQ 3302 Research Methodology

This course introduces undergraduate students in education as an informal training in handling research. Basically, this course describes the nature of educational research and also introduces the steps in the research process. Relevant topics in this course include identification of research problems, ethical issues in conducting a research, the definition of research and importance of research in the field of education. This course also covers important characteristics of research mainly the research problems, questions and objectives, hypothesis testing and implementing a research, literature review, research design, sampling methods, research instruments (qualitative and quantitative), collecting and data administration, data analysis (qualitative and quantitative) including descriptive and inferential statistics. This course also provides students with necessary information and suggestions on how to put a research report together in a correct and efficient manner.

SEQA 4082 Equine Seminar

This course will equip students with the knowledge and skills to write papers and articles related to organizing seminars on current issues in the field of equine science and equine management. The course contents cover the aspects of producing writing seminar papers or academic articles, poster presentation, present papers and discuss current issues in the field of equine in Malaysia and internationally.

SMBQ 4163 Riding Instructor Training

This module is designed to aid the students who wish to take an instructional role in the industry. Students will gain knowledge on the coaching perspective, how to organise, conduct, demonstrate and evaluate performance of the rider and the horse. Students will be able to do an assessment and provide solutions during their class lessons.

SMBQ 4173 Equine Evaluation & Selection

This course aims to provide students with knowledge from the functional aspect of performance and anatomy, breed standards in the equine industry, components of judging various breeds and judging various disciplines. This course also provides the ability for students to assess equines' market value, understanding the market value, factors that drive a horse's price and various horse price-ranges for better purchase decision. This course also provides the students with observation techniques, effective behavioural measuring techniques, interpretation of behavioural monitoring, developing potentials, training programmes and specialist training equipment. Students will also acquire knowledge for veterinary and farriery procedures, practice examination for purchase, identify the causes and treatment of lameness, hoof structure and function.

SMBQ 4193 Equine for Disabled

This course aims to provide students with the knowledge, concepts, principles and theories involved in equine for disabled. There are several common disabilities that can get benefit from the equine treatment such as Cerebral Palsy, Down Syndrome, Brain Injury, Seizure Disorders, Autism, Autistic Spectrum Disorders, learning disabilities.

SMBQ 4253 Equine Therapy and Rehabilitation

The modern horse is subject to a wide range of uses which can potentially cause physiological stress and strain on the horse, particularly the musculoskeletal system. This course aims to build on existing knowledge and give students an understanding of the types of susceptibilities that the horse may be subjected to and of the therapeutic and rehabilitation techniques currently practised.

SMBQ 4273 Equine Reproduction and Breeding Technologies

This course provides an introduction to the anatomy and physiology of reproduction in the mare and the stallion. The course also aims to develop the ability to care for a range of breeds and young stock and to allow the students to develop an understanding of the principles of breeding management.

SMBQ 4368 Industrial Training

This course opens opportunities for students to experience practical training in any institution or industry related to the field of equine. Students have the opportunity to practice the knowledge they have learned in real-life situations and at the same time learn more about the knowledge, skills, management and technology of the industry. In addition to providing a record of daily work in the industry, at the end of the course, students should prepare a written report and reflect on the training industries that have been implemented.

FACULTY OF ENGINEERING SCHOOL OF BIOMEDICAL ENGINEERING AND HEALTH SCIENCES

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