



UTM
UNIVERSITI TEKNOLOGI MALAYSIA

UNDERGRADUATE HANDBOOK

2019/2020

FACULTY OF ENGINEERING

SCHOOL OF BIOMEDICAL ENGINEERING AND HEALTH SCIENCES



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

ADMINISTRATION TEAM



CHAIR
School of Biomedical Engineering & Health Sciences
Assoc. Prof. Dr. Kahar Bin Osman



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



ASSOC CHAIR
(Facilities)
Dr. Maheza Irma Mohamad Salim



Director
(Biomedical Engineering)
Assoc. Prof. Dr. Tan Tian Swee



Director
(Clinical Sciences and Sports Technology)
Dr. Aizreena Azaman

Position	Name
Chair	Assoc. Prof. Dr. Kahar Osman kahar@biomedical.utm.my
Associate Chair (Quality and Strategy)	Assoc. Prof. Ir. Dr. Azli Yahya azli@fke.utm.my
Associate Chair (Facilities)	Dr. Maheza Irna Mohamad Salim maheza@biomedical.utm.my
Director (Biomedical Engineering)	Assoc. Prof. Ir. Dr. Tan Tian Swee tantianswee@biomedical.utm.my
Director (Clinical Sciences and Sports Technology)	Dr. Aizreena Azaman aizreena@biomedical.utm.my
Academic Coordinator (SPACE UTM)	Dr. Mohd Najeb Bin Jamaludin najeb@biomedical.utm.my
Postgraduate Program Coordinator	Dr. Ting Chee Ming cmting@utm.my
Program Coordinator (Biomedical Engineering)	Dr. Asnida Abd Wahab asnida@biomedical.utm.my
Program Coordinator (Equine Management)	Pn. Fuziaton Binti Baharudin fuziaton@utm.my

Bachelor of Engineering (Biomedical)

BACHELOR OF ENGINEERING (BIOMEDICAL) PROGRAMME SPECIFICATIONS

The Bachelor of Engineering (BioMedical) is offered on a full-time basis. The full-time 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 (Biomedical)
4. Final Award	Bachelor of Engineering (Biomedical)
5. Programme Code	SEBB-01
6. Professional or Statutory Body of Accreditation	Malaysian Qualification Agency Engineering Accreditation Council
7. Language(s) of Instruction	English and Bahasa Melayu
8. Mode of Study (Conventional, distance learning, etc)	Conventional
9. Mode of operation (Franchise, self-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%
A	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	
B	Related Courses (a) Applied Science/Mathematic/Computer (b) Management/Law/Humanities/En gineering/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 hours	

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

For Malaysian Students

General Entry Requirements:

1. A pass in Malaysian Certificate of Education (SPM) or equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a credit in Bahasa Melayu/Bahasa Malaysia (July paper), **and**
2. Having Diploma or equivalent qualification recognized by the Malaysian Government, **or**
3. A pass in Malaysian Higher School Certificate (STPM) with at least C grade (CGPA 2.00) in General Paper and C grade (CGPA 2.00) in any two of the taken subjects in the STPM, **or**
4. A pass in Malaysian Matriculation Certificate / Foundation with minimum CGPA of 2.00, **or**
5. Hold A – Level / International Baccalaureate / Australian Matriculation (Ausmat) Certificate.
6. Attained a minimum Band 2 in Malaysian University English Test (MUET)/ Band 5.5 in IELTS/ Score of 500 in TOEFL PBT/ Score of 59 in TOEFL IBT.

Special Requirements for the Programme

1. Comply to university general requirements, **and**
2. Comply to special requirements for the programme.

Please refer to admission.utm.my/undergraduate-malaysian/ for further details.

3. Do not have any physical disabilities

For International Students

General Entry Requirements:

1. Passed General Certificate of Education (GCE), 'A' Level, Diploma in related field or other equivalent pre-university examinations; **or**
2. Any other certificate that is recognized by Senat of the University

- equivalent to the above; **or**
3. Participate in the bridging program organized by the university, **and**
 4. Pass the English Proficiency requirements.
 5. Pass the Health requirements.

Please refer to admission.utm.my/entry-requirements-ug-international/ for further details.

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 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 3.00 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 enrol 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
SEBB 1012	Introduction to Biomedical Engineering	2	
SEBB 1513	Basic Anatomy and Physiology	3	
SEEU 1023	Circuit Theory	3	
SSCE 1693	Engineering Mathematics 1	3	
UHLB 1112	English Communication Skills	2	
UHMS 1172	Malaysian Dynamics (Local)	2	
UHLM 1012	Malay Language Communication 2 (International)		
UHMT 1012	Graduate Success Attributes	2	
TOTAL CREDIT HOURS		17	

YEAR 1 (SEMESTER 2)			
Code	Courses	Credit	Pre-req
SEBB 1523	Advanced Anatomy and Physiology	3	SEBB 1513
SEBB 1313	Statics and Dynamics	3	
SEEU 1223	Digital Electronics	3	
SSCE 1793	Differential Equations	3	
UHS 1012	Islamic and Asian Civilization (local)	2	
UHMS	Malaysian Studies (international)		

1022			
UHL* 1112	English of Language Skills	2	
TOTAL CREDIT HOURS		16	

YEAR 2 (SEMESTER 1)			
Code	Courses	Credit	Pre-req
SEEU 2073	Signals and Systems	3	
SEEU 1063	Electronic Devices	3	
UBSS 1032	Introduction to Entrepreneurship	2	
SEBB 2712	Laboratory 1	2	
SSCE 1993	Engineering Mathematics 2	3	SSCE 1693
UHLB 2122	Academic Communication Skills	2	UHLB 1112
SEBB 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	
UHI* 2**2	Elective of Knowledge Enhancement	2	
UHM* 2**2	Elective of Generic Skill		
UHIT 2302	Science and Technology Thinking	2	
SEEU 2523	Electromagnetic Field Theory	3	SSCE 1993
SSCE 2193	Engineering Statistics	3	
SEEU 3133	System Modelling and Analysis	3	
SEBB 2513	Basic Rehabilitation	3	
TOTAL CREDIT HOURS		18	

YEAR 3 (SEMESTER 1)			
Code	Courses	Credit	Pre-req
SEEU	Electronic Circuits and Systems	3	SEEU 1063

3063			
SEEU 3533	Communication Principles	3	SEEU 2073
SEBB 3712	Laboratory 2	2	
SEBB 3313	Biomedical Materials	3	
SSCE 2393	Numerical Methods	3	
SEBB 3423	Clinical Engineering	3	UHLB 2122
TOTAL CREDIT HOURS		17	

YEAR 3 (SEMESTER 2)			
Code	Courses	Credit	Pre-req
SEBB 3323	Solid Mechanics	3	
SEBB 3023	Biomedical Imaging	3	
SEBB 3722	Laboratory 3	2	
SEBB 3033	Microprocessor Systems	3	
SEBB 3043	Instrumentation and Measurement in Biomedical	3	
UHLB 3132	English for Professional Purposes	2	UHLB 2122
TOTAL CREDIT HOURS		16	

SHORT SEMESTER			
Code	Courses	Credit	Pre-req
SEBB 4915	Industrial Training (HW)	5	SEBB 3423
TOTAL CREDIT HOURS		5	

YEAR 4 (SEMESTER 1)			
Code	Courses	Credit	Pre-req
SEBB 4313	Biomedical Systems Design	3	
SEBB 4413	Biochemistry for Biomedical Engineers	3	
SEBB 4712	Laboratory 4	2	
SEBB 4812	Project Part 1	2	
SEBB 4023	Biomedical Signal Processing	3	SEEU 2073
SEBB 4**3	Elective 1	3	

UKQT 3001	Extracurricular Experiential Learning (ExCEL)	1	
TOTAL CREDIT HOURS		17	

YEAR 4 (SEMESTER 2)			
Code	Courses	Credit	Pre-req
SEBB 4824	Project Part 2	4	SEBB 4812
SEBB 4**3	Elective 2	3	
SEBB 4**3	Elective 3	3	
SHAS 4542	Engineering Management	2	
SEBB 4032	Professional Biomedical Engineering Practice	2	
TOTAL CREDIT HOURS		14	

Elective Courses

Code	Courses	Credit	Pre-req
SEBB 4043	Biomedical Image Processing	3	
SEBB 4053	Biosystem Modelling	3	
SEBB 4063	Advanced Biomedical Signal Processing	3	SEBB 4023
SEBB 4073	Biosensor and Transducers	3	
SEBB 4083	Artificial Intelligence	3	
SEBB 4323	Biomedical Devices	3	
SEBB 4333	Biologically-inspired Devices	3	
SEBB 4343	Cell and Tissue Engineering	3	
SEBB 4423	Biomedical Informatics	3	
SEBB 4433	Biomedical Instrumentation Management	3	
SEBB 4513	Rehabilitation Engineering	3	SEBB 2513
SEBB 4523	Sports Technology in Exercise Rehabilitation	3	
SEBB 4113	Bio-Fabrication	3	
SEBB 4123	Bio-Material Characterization and Analysis	3	
SEBB 4133	Machining and Testing for Biomedical Engineer	3	

SEBB 4153	Electronic CAD Digital System Design	3	
SEBB 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
UHMT 2012	Leadership in Organization	2	
UHMS 2022	Critical and Creative Thinking	2	
UHMS 2032	The Human Side of Knowledge Management	2	
UHMS 2042	Development and Global Issues	2	
UHMT 2052	Guidance and Counselling	2	
UHMT 2062	Psychology of Adjustment	2	
UBSS 2072	Fundamental of Intellectual Property	2	
UBSS 2082	Law of Entrepreneur	2	
UBSS 2092	Entrepreneurship and Enterprise Development	2	
UBSS 2012	Social Entrepreneurship	2	
UHMS 2112	Engineering Communication	2	
UHMS 2122	Human Communication	2	
UHMT 2132	Professional Ethic	2	

Elective of Knowledge Enhancement Courses

Code	Courses	Credit	Pre-req
UHII 2012	Al-Qur'an and Human Civilization	2	
UHIT 2032	Life institution and Sustainable Development	2	
UHIZ 2042	Future Study	2	
UHIT 2052	Family Law	2	
UHIZ 2062	World Science	2	
UHS 2072	Sustainable Economy	2	

UHS 2082	Practices and Concept of Halal Management	2	
UHII 2092	Philosophy of Islamic Art	2	
UHII 2102	Islam and Health	2	
UHII 2132	Islamic Entrepreneurship	2	

Elective of Language Skills Courses

Code	Courses	Credit	Pre-req
UHLA 1112	Arabic Language	2	
UHLJ 1112	Japanese Language 1	2	
UHLC 1112	Mandarin Language 1	2	
UHLJ 1112	France Language	2	
UHLN 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 Counted (JKK)	Tick (✓) If Passed
Biomedical Engineering Courses					
1	SEBB 1012	Introduction to Biomedical Engineering	2	2	
2	SEBB 1513	Basic Anatomy and Physiology	3	3	
3	SEEU 1023	Circuit Theory	3	3	
4	SSCE 1693	Engineering Mathematics 1	3	3	
5	UHLB1112	English Communication Skills	2	2	
6	UHMS 1172	Malaysian Dynamics (Local)	2	2	
7	UHLM 1012	Malay Language			

		Communication 2 (International)			
8	UHMT 1012	Graduate Success Attributes	2	2	
9	SEBB 1523	Advanced Anatomy and Physiology	3	3	
10	SEBB 1313	Statics and Dynamics	3	3	
11	SEEU 1223	Digital Electronics	3	3	
12	SSCE 1793	Differential Equations	3	3	
13	UHS 1012	Islamic and Asian Civilization (local)	2	2	
14	UHMS 1022	Malaysian Studies (international)			
15	UHL* 1112	English of Language Skills	2	2	
16	SEEU 2073	Signals and Systems	3	3	
17	SEEU 1063	Electronic Devices	3	3	
18	UBSS 1032	Introduction to Entrepreneurship	2	2	
19	SEBB 2712	Laboratory 1	2	2	
20	SSCE 1993	Engineering Mathematics 2	3	3	
21	UHLB 2122	Academic Communication Skills	2	2	
22	SEBB 2033	Computer Programming for Biomedical Engineer	3	3	
23	UKQ* 2**2	Elective of Service Learning Co-Curriculum	2	2	
25	UHI* 2**2	Elective of Knowledge Enhancement	2	2	
27	UHM*2**2	Elective of Generic Skill			
28	UHIT 2302	Science and Technology Thinking	2	2	
29	SEEU 2523	Electromagnetic Field Theory	3	3	
30	SSCE 2193	Engineering Statistics	3	3	
31	SEEU 3133	System Modeling and Analysis	3	3	
32	SEBB 2513	Basic Rehabilitation	3	3	
33	SEEU 3063	Electronic Circuits and Systems	3	3	
34	SEEU 3533	Communication Principles	3	3	
35	SEBB 3712	Laboratory 2	2	2	
36	SEBB 3313	Biomedical Materials	3	3	
37	SSCE 2393	Numerical Methods	3	3	
38	SEBB 3423	Clinical Engineering	3	3	
39	SEBB 3323	Solid Mechanics	3	3	
40	SEBB 3023	Biomedical Imaging	3	3	
41	SEBB 3722	Laboratory 3	2	2	

42	SEBB 3033	Microprocessor Systems	3	3	
43	SEBB 3043	Instrumentation and Measurement in Biomedical	3	3	
44	UHLB 3132	Professional Communication Skills	2	2	
45	SEBB 4915	Industrial Training (HW)	5	HL	
46	SEBB 4313	Biomedical Systems Design	3	3	
47	SEBB 4413	Biochemistry for Biomedical Engineers	3	3	
48	SEBB 4712	Laboratory 4	2	2	
49	SEBB 4812	Project Part 1	2	2	
50	SEBB 4023	Biomedical Signal Processing	3	3	
51	SEBB 4**3	Elective 1	3	3	
52	UKQT 3001	Extracurricular Experiential Learning (ExCEL)	1	1	
53	SEBB 4824	Project Part 2	4	4	
54	SEBB 4**3	Elective 2	3	3	
55	SEBB 4**3	Elective 3	3	3	
56	SHAS 4542	Engineering Management	2	2	
57	SEBB 4032	Professional Biomedical Engineering Practice	2	2	
TOTAL CREDIT TO GRADUATE (a + b + c)			138	133	
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 Management System Requirement			
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	Writing			

Course Synopsis

Core Courses

SEEU 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.

SEEU 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.

SEEU 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.

SEEU 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.

SEBB 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.

SEEU 2523 Electromagnetic Field Theory

This course introduces students to some major views and theories in the area of electrostatic, magnetostatics 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.

SEEU 3133 System Modelling 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.

SEEU 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.

SEEU 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.

SEBB 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.

SEBB 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.

SEBB 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.

SEBB 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.

SEBB 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.

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 non-linear equations, systems of linear equation, interpolation and curve fitting, numerical differentiation and numerical integration, Eigen value problems, ordinary differential equations and partial differential equations.

SEBB 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.

SEBB 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.

SEBB 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.

SEBB 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.

SEBB 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.

SEBB 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.

SEBB 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.

SEBB 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.

SEBB 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

SEBB 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.

SEBB 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.

SEBB 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.

SEBB 4824 Project Part II

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

Elective Courses

SEBB 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.

SEBB 4053 Biosystem Modelling

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.

SEBB 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.

SEBB 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.

SEBB 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.

SEBB 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.

SEBB 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.

SEBB 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.

SEBB 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.

SEBB 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.

SEBB 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.

SEBB 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.

SEBB 4113 Bio-Fabrication

This subject provides the importance of additive manufacturing and its role in prototyping, development, transplant, implant and innovation of biomedical products. Different process technologies for additive manufacturing and bioprinting devices, systems, capabilities, materials and applications will be covered. It takes an interdisciplinary approach to describing the chemistry and physics of devices, materials, their compatibility, and the applications of additive manufacturing and machining of advanced materials in a wide range of applications of biomedical products.

SEBB 4123 Bio-Material Characterization and Analysis

This course is intended to expose the students with the most important characterization instruments to analyze the physico-chemical properties of a biomaterial. A range of advanced techniques for the materials characterization analysis, including materials composition, surface morphological, thermal, spectroscopy and chromatography analyses are introduced by discussing the basic underlying principle and the analysis procedures. Several case studies and recording data are evaluated and analyzed to improve the student's understanding

in selecting types of characterization instruments in analyzing a biomaterial. Depending on the availability and functionality of instruments, lab visits and demonstrations will be scheduled following the class.

SEBB 4133 Machining and Testing for Biomedical Engineer

This course is designed for students to learn and experience the process of machining, testing and advance analysis. This course will be focusing on selected biomedical related parts and carry out course learning using conventional and advanced manufacturing techniques such as using 3D printed machine, and Computer Numerical Control (CNC) machining techniques. Once parts are manufactured, mechanical testing will be carried out using conventional and advanced method employing Universal Testing Machine (UTM) to determine mechanical properties of parts. Further analysis will also be done to corroborate findings with theoretical foundation of material.

SEBB 4153 Electronic CAD Digital System Design

This course presents design methods to construct digital systems, including combinational circuit and sequential circuit. Topics include: (1) Computer-Aided Design (CAD) tools for design, (2) Hardware Description Languages (HDL) for simulation and synthesis, and (3) state machine specification, design, and simulation. In this course, some of the important features of HDL will be examined. The course will enable students to design, simulate, model and analyze digital designs. The dataflow, structural, and behavioral modeling techniques will be discussed and related to how they are used to design combinational and sequential circuits. The use of test benches to exercise and verify the correctness of hardware models will also be described. Practical experience is gained by implementing various designs on a prototype FPGA board.

SEBB 4163 Advance Computer Programming and Data Structure

This course discusses programming problems, why they are problems, and the approach C++ has taken to solve such problems using object-oriented programming approach (OOP). From this course, the students will be equipped with skills of advanced C++ programming language to solve moderate to advanced problems that related with biomedical engineering or healthcare application using OOP approach. It will also cover some basic data structure such as list structure and tree structure. The course covers the following syllabus: Introduction to objects, fast recap of C language syntax, data abstraction, class and object implementation, object initialization and cleanup, function and operator overloading, constants, inline functions, inline functions, name controls, etc. This course covers hands-on tutorial to expose the students to some modern C++ Integrated Development Environment (IDE) for biomedical and healthcare application development. This course also applies the group design project. The students will be divided in groups to propose a group project to solve complex problems that related with biomedical engineering or healthcare application. Before attending this course, the students should have prior knowledge in C programming language, number representation (binary, octal, hexadecimal,

decimal), signed/unsigned number arithmetic (1's compliment and 2's compliment), and simple logic functions (AND, OR, XOR, NOT, etc).

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.

General Information

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	SEBQ-01
6. Professional or Statutory Body of Accreditation	Malaysian Qualification Agency (MQA)
7. Language(s) of Instruction	English and Bahasa Melayu
8. Mode of Study (Conventional, distance learning, etc)	Conventional
9. Mode of operation (Franchise, self-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

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 (Compulsory)	40	30.1%
	Total	133	100%
Total Credit Hours to Graduate		133 credit hours	

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

For Malaysian Students

General Entry Requirements:

1. A pass in Malaysian Certificate of Education (SPM) or equivalent with a credit in Bahasa Melayu/Bahasa Malaysia or a credit in Bahasa Melayu/Bahasa Malaysia (July paper), **and**
2. Having Diploma or equivalent qualification recognized by the Malaysian Government, **or**
3. A pass in Malaysian Higher School Certificate (STPM) with at least C grade (CGPA 2.00) in General Paper and C grade (CGPA 2.00) in any two of the taken subjects in the STPM, **or**
4. A pass in Malaysian Matriculation Certificate / Foundation with minimum CGPA of 2.00, **or**
5. Hold A – Level / International Baccalaureate / Australian Matriculation (Ausmat) Certificate.
6. Attained a minimum Band 2 in Malaysian University English Test (MUET)/ Band 5.5 in IELTS/ Score of 500 in TOEFL PBT/ Score of 59 in TOEFL IBT.

Special Requirements for the Programme

1. Comply to university general requirements, **and**
2. Obtained a Diploma or equivalent in the field related to the applied course from UTM or other recognized institution with at least CGPA 2.75, **or**
3. Passed Malaysian Certificate of Education (SPM) or equivalent and has 3 years of working experience and attended at least 3 short courses recognized by the Malaysian Equine Council.
4. Credits in SPM Mathematics
5. Passed fitness test and interview conducted by the program.
6. Do not have any physical disabilities

Please refer to admission.utm.my/undergraduate-malaysian/ for further details.

For International Students

General Entry Requirements:

1. Passed General Certificate of Education (GCE), 'A' Level, Diploma in related field or other equivalent pre-university examinations; **or**
2. Any other certificate that is recognized by Senat of the University equivalent to the above; **or**
3. Participate in the bridging program organized by the university, **and**
4. Pass the English Proficiency requirements.
5. Pass the Health requirements.

Please refer to admission.utm.my/entry-requirements-ug-international/ for further details.

Award Requirements

To be conferred a degree, 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
 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:

1. The total number of credits allowed to be taken is between twelve (12) and eighteen (18) credits only.
2. The student should hold a minimum CGPA of 3.50 and Band 4 MUET at the time of application.
3. 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
SEBQ 1013	Introduction to Equine Science and Industry	3	
SHPR 1952	Physical Fitness and Wellness	2	
SEBQ 1023	Introduction to Management	3	
SEBQ 1093	Basic Horse Handling	3	
SEBQ 1282	Practical Experience in Equine Farm Management I	2	
UHMS 1172	Malaysian Dynamics (Local)	2	
UHLM 1012	Malay Language Communication 2 (International)		
UHLB 1112	English Communication Skills	2	
TOTAL CREDIT HOURS		17	

YEAR 1 (SEMESTER 2)			
Code	Courses	Credit	Pre-Req
SEBQ 1102	Sports Psychology	2	
SEBQ 1112	Foundation of Equine Performance	2	
SEBQ 1203	Equine Anatomy and Physiology	3	

SEBQ 1033	Farm and Stable Management	3	
SEBQ 1292	Practical Experience in Equine Farm Management II	2	
UHMT 1012	Graduate Success Attributes	2	
UHS 1012	Islamic and Asian Civilization (TITAS) – Local	} 2	
UHMS 1022	Malaysian Studies (International)		
SHPR 2922	Strength and Physical Conditioning	2	
TOTAL CREDIT HOURS		18	

YEAR 2 (SEMESTER 1)			
Code	Courses	Credit	Pre-Req
SEBQ 2122	Horse Riding I: Endurance	2	
SEBQ 2213	Basic Equine Healthcare and Diseases	3	
SEBQ 2043	Commercial Equine Facilities Design and Management	3	
SEBQ 2302	Practical Experience in Equine Farm Management III	2	
UICL 2**2	Elective of Knowledge Enhancement	} 2	
UHAK 2**2	Elective of Soft Skills		
UHLB 2122	Academic Communication Skills	2	UHLB 1112
UKQ* 2**2	Co-curriculum and Service Learning	2	
TOTAL CREDIT HOURS		16	

YEAR 2 (SEMESTER 2)			
Code	Courses	Credit	Pre-Req
SEBQ 2053	Equine Business Management	3	
SEBQ 2062	Principles of Risk Management	2	
SEBQ 2133	Horse Behaviour and Training	3	
SEBQ 2142	Horse Riding II: Dressage	2	
SEBQ 2223	Equine Disease Management	3	
SEBQ 2312	Practical Experience in Equine Farm Management IV	2	
UHIT 2302	Sciences and Technology Thinking	2	
TOTAL CREDIT HOURS		17	

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

YEAR 3 (SEMESTER 2)			
Code	Courses	Credit	Pre-Req
SEBQ 3302	Research Methodology	2	
SEBQ 3183	Equestrian Motion Analysis	3	
SEBQ 3263	Equine Quarantine	3	
SEBQ 3332	Practical Experience in Equine Farm Management VI	2	
UHLB 3132	Professional Communication Skills	2	UHLB 2122
UHL* 1112	Elective Foreigner Language	2	
TOTAL CREDIT HOURS		14	

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

YEAR 4 (SEMESTER 1)			
Code	Courses	Credit	Pre-Req
SEBQ 4163	Riding Instructor Training	3	
SEBQ 4173	Equine Evaluation and Selection	3	
SEBQ 4193	Equine for Disabled	3	
SEBQ 4082	Equine Seminar	2	
SEBQ 4342	Practical Experience in Equine Farm Management VII	2	

SEBQ 4102	Undergraduate Project I	2	
TOTAL CREDIT HOURS		15	

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

Elective of Generic Skill Courses

Code	Courses	Credit	Pre-req
UHMT 2012	Leadership in Organization	2	
UHMT 2022	Critical and Creative Thinking	2	
UHMS 2032	The Human Side of Knowledge Management	2	
UHMS 2042	Development and Global Issues	2	
UHMT 2052	Guidance and Counselling	2	
UHMT 2062	Psychology of Adjustment	2	
UBSS 2072	Fundamental of Intellectual Property	2	
UBSS 2082	Law of Entrepreneur	2	
UBSS 2092	Entrepreneurship and Enterprise Development	2	
UBSS 2102	Social Entrepreneurship	2	
UHMS 2112	Engineering Communication	2	
UHMS 2122	Human Communication	2	
UHMT 2132	Professional Ethic	2	

Elective of Knowledge Enhancement Courses

Code	Courses	Credit	Pre-req
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UHII 2012	Al-Qur'an and Human Civilization	2	
UHIT 2032	Life institution and Sustainable Development	2	
UHIZ 2042	Future Study	2	
UHIT 2052	Family Law	2	
UHIZ 2062	World Science	2	
UHS 2072	Sustainable Economy	2	
UHS 2082	Practices and Concept of Halal Management	2	
UHII 2092	Philosophy of Islamic Art	2	
UHII 2102	Islam and Health	2	
UHII 2132	Islamic Entrepreneurship	2	

Elective of Language Skills Courses

Code	Courses	Credit	Pre-req
UHLA 1112	Arabic Language	2	
UHLJ 1112	Japanese Language 1	2	
UHLK 1112	Mandarin Language 1	2	
UHLJ 1112	France Language	2	
UHLN 1112	Persian Language	2	

Total Credits Earned: 133

GRADUATION CHECKLIST

To be conferred a degree, students must pass all the courses stipulated in the list below. All students are responsible for completing all subjects successfully.

No.	Code	Course	Credit Earned (JKD)	Credit Counted (JKK)	Tick (✓) If Passed
Equine Management Courses					
1	SEBQ 1013	Introduction to Equine Science and Industry	3	3	
2	SHPR 1952	Physical Fitness and Wellness	2	2	
3	SEBQ 1023	Introduction to Management	3	3	
4	SEBQ	Basic Horse Handling	3	3	

	1093				
5	SEBQ 1282	Practical Experience in Equine Farm Management I	2	2	
6	UHMS 1172	Malaysian Dynamics (Local)	2	2	
7	UHLM 1012	Malay Language Communication 2 (International)			
8	UHLB 1112	English Communication Skills	2	2	
9	SEBQ 1102	Sports Psychology	2	2	
10	SEBQ 1112	Foundation of Equine Performance	2	2	
11	SEBQ 1203	Equine Anatomy and Physiology	3	3	
12	SEBQ 1033	Farm and Stable Management	3	3	
13	SEBQ 1292	Practical Experience in Equine Farm Management II	2	2	
14	UHMT 1012	Graduate Success Attributes	2	2	
15	UHS 1012	Islamic and Asian Civilization (TITAS) – Local	2	2	
16	UHMS 1022	Malaysian Studies (International)			
17	SEBQ 2122	Horse Riding I: Endurance	2	2	
18	SEBQ 2213	Basic Equine Healthcare and Diseases	3	3	
19	SEBQ 2043	Commercial Equine Facilities Design and Management	3	3	
20	SEBQ 2302	Practical Experience in Equine Farm Management III	2	2	
21	UHI* 2**2	Elective of Knowledge Enhancement	2	2	
22	UHM* 2**2	Elective of Soft Skills			
23	UHLB 2122	Advanced Academic English Skills	2	2	
25	UKQ* 2**2	Co-curriculum and Service Learning	2	2	
27	SHPR 2922	Strength and Physical Condition	2	2	
28	SEBQ 2053	Equine Business Management	3	3	
29	SEBQ 2062	Principles of Risk Management	2	2	
30	SEBQ 2133	Horse Behaviour and Training	3	3	
31	SEBQ	Horse Riding II: Dressage	2	2	

	2142				
32	SEBQ 2223	Equine Disease Management	3	3	
33	SEBQ 2312	Practical Experience in Equine Farm Management IV	2	2	
34	UHII 2302	Sciences and Technology Thinking	2	2	
35	SEBQ 3243	Equine Nutrition	3	3	
36	SEBQ 3233	Equine Lameness and Conditioning	3	3	
37	SEBQ 3152	Horse Riding III: Jumping	2	2	
38	SEBQ 3322	Practical Experience in Equine Farm Management V	2	2	
39	SEBQ 3073	Event and Competition Management	3	3	
40	UBBS 1032	Introduction to Entrepreneurship	2	2	
41	SEBQ 3302	Research Methodology	2	2	
42	SEBQ 3183	Equestrian Motion Analysis	3	3	
43	SEBQ 3263	Equine Quarantine	3	3	
44	SEBQ 3332	Practical Experience in Equine Farm Management VI	2	2	
45	UHLB 3132	Professional Communication Skills	2	2	
46	UHL* 1112	Elective Foreigner Language	2	2	
47	SEBQ 4368	Industrial Training	8	HL	
48	SEBQ 4163	Riding Instructor Training	3	3	
49	SEBQ 4173	Equine Evaluation and Selection	3	3	
50	SEBQ 4193	Equine for Disabled	3	3	
51	SEBQ 4082	Equine Seminar	2	2	
52	SEBQ 4342	Practical Experience in Equine Farm Management VII	2	2	
53	SEBQ 4102	Undergraduate Project I	2	2	
54	SEBQ 4253	Equine Therapy and Rehabilitation	3	3	
55	SEBQ 4273	Equine Reproduction and Breeding Technologies	3	3	

56	SEBQ 4352	Practical Experience in Equine Farm Management VIII	2	2	
57	SEBQ 4114	Undergraduate Project II	4	4	
58	SEBQ 4083	Equine Seminar	3	3	
59	UKQT 3001	Extracurricular Experiential Learning (ExCEL)	1	1	
TOTAL CREDIT TO GRADUATE			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 Management System Requirement		
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	Writing		

COURSE SYNOPSIS

CORE COURSES

SEBQ 1013 Introduction to Equine Science and Industry

This course in general acts as an introduction to 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 industry as a whole. Students will be able to evaluate and analyse domestic equine sector in terms of its impact and economic performance.

SEBQ 1033 Farm and Stable Management

Management of a horse stable requires particular skills and knowledge. A horse is a complex animal whose psychology is vital to its adequate husbandry. The routine of farm practice is critical, so as the knowledge 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.

SEBQ 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 regime, handling and restraint, vices, float and trailer safety. Introduction to preventive health care, deworming, vaccination programs, dental care, and podiatry are

included.

SEBQ 1023 Introduction to Management

This course provides a general introduction in management to students. Students shall be able to understand the concepts, and jargons used in management as well as relationships among the management disciplines. This course provides an overview of the management roles where the students shall appreciate the key issues associated with achieving purposeful activities within organisations.

SEBQ 1102 Sports Psychology

This course prepares students with knowledge in sports psychology in relation to the equine activities. This course exposes students on psychological factors and how it affects performance of the athletes in equine sports. The students will be trained to conduct coaching instructions session using the psychological skills to improve performance of athletes.

SEBQ 1112 Foundation of Equine Performance

This course is to develop the comprehension of equine performance in sports. The knowledge will enable the students to understand the theory on how to produce high performance horses for competition. This course is advanced to the previous equine courses taught.

SEBQ 1203 Equine Anatomy & Physiology

This course aims for students to identify the anatomical features and structures of horses. Students will develop the ability to relate the anatomical structures function and the physiology of the horse emphasizing on the performance, and the mechanisms of energy metabolism.

SEBQ 2043 Commercial Equine Facilities Design and Management

This course focuses on the various types of constructional design of commercial equine facilities. The scope of this course includes property layout, construction options, equipment, hay production, pasture management, water and waste management, zoning requirements, environmental impact, legal obligations, contracts and liabilities, of the facilities.

SEBQ 2053 Equine Business Management

This course aims to provide knowledge to distinguished types of organisations and managers within the Equine sector. This course focuses on the responsibilities that are fundamental to the role of a commercial manager and the complexity of the equine market. The students will be exposed to strategic business planning to enter the market and to sustain the business within a commercial context.

SEBQ 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 management principles, strategies, identifying, assessing, and managing risk anticipated to occur to various parties such as riders, staffs, horse, equipment, and facilities. Students will be able to discuss on issues related to managing risk and incidents in equine industry.

SEBQ 2122 Horse Riding I Endurance

This course focuses on the knowledge and development of basic skills pertaining to Endurance riding. Students will acquire knowledge that covers the aspect of horses as well as riders on endurance riding. Students will then develop the skills required to performed endurance ride with a sound base of knowledge to reflect equine performance.

SEBQ 2133 Horse Behaviour and Training

This course exposes students on understanding horse behaviour. Students will be able to identify the horse behaviour of well-being and soundness in a horse. The students will be able to understanding the innate equine behaviour and apply the behavioural training method and technic to improve undesired behavioural problems.

SEBQ 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 that covers the aspect of the horse and the rider on Dressage. Students will develop the skills required to be able to performed Dressage ride with a sound base of knowledge to reflect equine performance.

SEBQ 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 healthcare and routine preventive management practices on horses.

SEBQ 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 will be on diseases preventive management and the necessary routine practices to keep the equine health and welfare.

SEBQ 3073 Event and Competition Management

The main aim of this course is to enable the students to identify and evaluate the factors affecting demand for recreational facilities and special events, considering social and environmental concerns with sustainability. The processes of facility management are emphasised whilst considering the common organisational constraints. This course shall provide the students with the skills to plan, manage, deliver and evaluate an event.

SEBQ 3152 Horse Riding III Show Jumping

This course focuses on the knowledge and development of basic skills in Show Jumping. Students will acquire knowledge and understanding that 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 perform show jumping with a sound base of knowledge to reflect equine performance.

SEBQ 3183 Equestrian Motion Analysis

This course is to develop students understanding the biomechanical factors influencing the athletic horse. The students shall be able to understand the relationship between equine anatomy, movement and performance; and apply the methodologies of measuring biomechanical parameters. Students will be able to analyse and evaluate equine performance within biomechanical parameters.

SEBQ 3243 Equine Nutrition

This course aims to exposes students on knowledge of nutritional requirements in horses according to their workload, health, age, activities, and performance as well as the height and weight as per the calories count. The students shall be able to identify the significance of nutrient product available in the market as well as the poor ration formulation within the industry.

SEBQ 3233 Equine Lameness & Conditioning

This course aims to expose the students to the principles of clinical manifestation to evaluate and interpret lameness disorders of the horses' limbs. Students will understand the use of methods commonly applied in large-animal such as radiography, and ultrasound imaging for diagnosing equine lameness. Anatomy and pathology of some areas of the musculoskeletal system are also introduced.

SEBQ 3263 Equine Quarantine

This course aims to equip the student with the knowledge of equine biosecurity management including quarantine practice, which covers the legal aspect and quarantine procedures of import and export of horses in Malaysia. This course covers the horses' biosecurity management in eventing premises.

SEBQ 3302 Research Methodology

This course introduces students to an informal training in handling research. Basically, this course describes the nature of educational research and also introduces the steps in the research process. The topics covers 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. The students shall gain the necessary information to put a research report together in a correct and efficient manner.

SEBQ 4082 Equine Seminar

This course will equip students with the knowledge and skills to write papers and articles related to organizing seminars of current issues in the field of equine science and 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.

SEBQ 4163 Riding Instructor Training

This course is to expose students to an instructional role in the industry. Students will gain knowledge on the coaching perspective, how to organise, conduct,

demonstrate and evaluate performance of the riders and horses. Students will be able to assess and provide solutions on riding instructions in this course.

SEBQ 4173 Equine Evaluation & Selection

This course aims to provide students with knowledge on methods and criteria to evaluate and select horses for repurchase and/or presales of horses. The will be exposed to the functional anatomy, breed standards, performance, functions, and net worth of horses as valued by the industry. The students shall be able to assess the horse's market value whilst understand the pricing factors that drive the market to decide for better purchase decision. Students will also acquire knowledge for the practical examination for pre-purchase or sales of the horse before the value on the horse could be determine.

SEBQ 4193 Equine for Disabled

This course aims to provide students with the knowledge, concepts, principles and theories involved in horse riding for the disabled, which is known as hippo therapy. The students shall understand the common disabilities that can get benefit from the hippo therapy as method of treatment for people with disability such as Cerebral Palsy, Down syndrome, Brain Injury, Seizure Disorders, Autism, Autistic Spectrum Disorders, and learning disabilities.

SEBQ 4253 Equine Therapy and Rehabilitation

This course provides students with the knowledge of alternative therapy and rehabilitation to cure certain musculoskeletal system problems commonly derived from post events. The students shall be able to understand the types of therapeutic and rehabilitation techniques currently practised and the application to the appropriate horses.

SEBQ 4273 Equine Reproduction and Breeding Technologies

This course provides an introduction to reproduction system, breeding process, and management of mares and stallions. The students shall be able to understand oestrus cycle of a mare, spermatogenesis in a stallion, fertility and infertility, process of puberty, pregnancy diagnosis, age of foetus, stage of gestation, and care for neonates and foals.

SEBQ 4368 Industrial Training

This course provides opportunities for students to experience practical training in any equine institution or industry. Students are exposed to the actual situations at work whilst learning the management and technology of the industry. The students will be assessed by their daily chores given by the industry, a written report that reflect industrial practice and field supervisors' feedback.

SEBQ *2 Practical Experiences in Equine Farm Management (I-VIII)**

This course provides opportunities for students to experience practical and hands-on training in equine farm or stable management. Students have the opportunity to practice the knowledge they have learned in real-life situations apply the skills obtained in the management of the farm and stable assigned. The practical experience in equine farm management consists of eight topics that are: 1) Horse Handling I, 2) Horse Handling II, 3) Horse Healthcare, 4) Horse Welfare, Oral Hygiene and Podiatry, 4) RDA I, 5) RDA 2, 7) Riding Instructor, 8) Horsemanship.

FACULTY OF ENGINEERING

SCHOOL OF BIOMEDICAL ENGINEERING AND HEALTH SCIENCES

UNIVERSITI TEKNOLOGI MALAYSIA
81310 UTM JOHOR BAHRU, JOHOR.

TEL : +6(07) - 5558400

FAX : +6(07) - 5558515

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