UTM
UNIVERSITI TEKNOLOGI MALAYSIA

Faculty of
Electrical Engineering

Academic Session
2024/2025

BACHELOR OF BIOMEDICAL ENGINEERING WITH HONOURS (SKEBH)

Undergraduate Booklet

Version 1.0

www.fke.utm.my

UTM
UNIVERSITI TEKNOLOGI MALAYSIA
Faculty of Electrical Engineering

ORGANISATION CHART

Faculty of Electrical Engineering
Universiti Teknologi Malaysia

PROFESSOR DR. JAFRI BIN DIN
Dean

PROF. IR. DR. HAZLINA BINTI SELAMAT
Director of Control & Mechatronics Engineering Department

ASSOC. PROF. TS. DR. SHAHRIN BIN MD. AYOB
Director of Electrical Power Engineering Department

PROF. IR. DR. RUBITA BINTI SUDIRMAN
Director of Electronic & Computer Engineering Department

PROF. IR. DR. MUHAMMAD NADZIR BIN MARSONO
Deputy Dean
(Academic & Student Affairs)

PROF. DR. SYED ABDUL RAHMAN BIN SYED ABU BAKAR
Deputy Dean
(Research, Innovation & Development)

MRS. NUR HAKIMI BINTI KARSONO
Deputy Registrar

DR. YUSMEERAZ BINTI YUSOF
Quality & Strategy Manager

ASSOC. PROF. IR. TS. DR. ASNIDA BINTI ABDUL WAHAB
Director of Biomedical Engineering & Health Sciences Department

ASSOC. PROF. IR. TS. DR. NURUL MU'AZZAH BINTI ABDUL LATIFF
Director of Communication Engineering Department

DR. USMAN ULLAH SHEIKH
Postgraduate Academic Manager

ASSOC. PROF. DR. KAMALUDIN BIN MOHAMAD YUSOF
External Program Academic Manager

ASSOC. PROF. IR. TS. DR. ASRUL IZAM BIN AZMI
Research Manager

MRS. NORAZILA BINTI SAFRI
Knowledge Management/Research Consultant Officer

MRS. NORLIZA BINTI ABD RAHIM
Senior Assistant Registrar

MRS. RAFIDAH BINTI MOHAMAD
IT Manager

MR. MOHD NAZMI BIN ISMAIL
Facility Manager

MRS. NUR FATIHAH BINTI MD RAFI
Assistant Accountant

MRS. NUR ASHIKIN BINTI ABD HADI
Executive Officer (Quality & Strategy)

Student Profile

BACHELOR OF BIOMEDICAL ENGINEERING WITH HONOURS

Name	
Matric Number	
Phone Number	
Email	
Academic Advisor	

"If you set yourself up for success, everything is possible"

PROGRAMME GUIDELINES

The University adopts the semester system and each academic year is divided into two (2) normal semesters, namely Semester I and Semester II, and a short semester at the end of Semester II. The new intake of undergraduate students is normally made during Semester I of an academic year. The minimum duration of the programme is four (4) years which is equivalent to 8 semesters.

All courses offered by the faculty have credits, except for courses which are approved by the University Senate. One (1) credit is equivalent to 14 hours of lectures or 30 hours of practical sessions (studio/project), in a semester. The total number of credits for the Bachelor of Biomedical Engineering with Honours (SKEB) programme is 137.

All students' performance and achievements are assessed formally. Each course is generally assessed based on the coursework, which constitutes not less than 50% of the overall marks, and a final exam paper, which contributes another 50%. Coursework can be in the form of homework, assignments, quizzes, tests and presentations. The final examination is conducted at the end of each academic semester. Students' performance in a course is indicated by the letter grade with the passing grade of 'D+'. Students who failed any of the courses (grade 'D' and below) are required to repeat the course during the subsquent semesters or whenever it is offered. Students may improve the grade of any course graded with 'B-' or lower, with a maximum allowance of 15 credits. Subject to the Faculty and University's Academic Regulation, students may withdraw from a course within the stipulated period. Other information on academic rules and regulations can be retrieved from the UTM website (UTM Academic Regulations).

A student must pass all courses specified in his/her programme of study and fulfil all the requirements specified for his/her programme of study set by the Faculty and University in order to be awarded with a Bachelor degree.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

After gaining 3 to 5 years of work experience, our graduates should have developed into professionals who demonstrate the following competencies :

PEO	PEO STATEMENTS
PEO1	Become Electrical Engineers who are competent, innovative, and productive in addressing stakeholders' needs.
PEO2	Grow professionally with proficient soft skills.
PEO3	Demonstrate high standards of ethical conduct, positive attitude, and societal responsibilities.

PROGRAMME LEARNING OUTCOMES (PLO)

PLO	PLO STATEMENTS
PLO1 (Engineering Knowledge)	Apply knowledge of mathematics, natural science, computing and engineering fundamentals, and an engineering specialization as specified in WK1 to WK4 respectively to develop solutions to complex engineering problems.
PLO2 (Problem Analysis)	Identify, formulate, research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences with holistic considerations for sustainable development (WK1 to WK4).
PLO3 (Designs/ Development of Solutions)	Design creative solutions for complex engineering problems and design systems, components or processes to meet identified needs with appropriate consideration for public health and safety, whole-life cost, net zero carbon as well as resource, cultural, societal, and environmental considerations as required (WK5).
PLO4 (Investigation)	Conduct investigation of complex engineering problems using research methods including research-based knowledge, including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions (WK8).
PLO5 (Tool Usage)	Create, select and apply, and recognize limitation of appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering problems (WK2 and WK6).
PLO6 (The Engineer & The World)	Analyze and evaluate sustainable development impacts to: society, the economy, sustainability, health and safety, legal frameworks, and the environment, in solving complex engineering problems (WK1, WK5, and WK7).
PLO7 (Ethics)	Apply ethical principles and commit to professional ethics and norms of engineering practice and adhere to relevant national and international laws. Demonstrate an understanding of the need for diversity and inclusion (WK9).
PLO8 (Individual and Collaborative Team Work)	Function effectively as an individual, and as a member or leader in diverse and inclusive teams and in multidisciplinary, face-to-face, remote and distributed settings (WK9).

PROGRAMME LEARNING OUTCOMES (PLO)

PLO	PLO STATEMENTS
PLO9 (Communication)	Communicate effectively and inclusively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, taking into account cultural, language, and learning differences.
PLO10 (Project Management and Finance)	Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects in multidisciplinary environments.
PLO11 (Life-long Learning)	Recognise the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change (WK8).

PROFESSIONAL SKILLS CERTIFICATE (PSC)

UTM has designed its own UTM Professional Skills Certificate (UTM PSC) programme managed by UTM Institute for Life Ready Graduate (UTM iLeague) to enhance the knowledge and skills of UTM students. It provides students with value-added courses so that they will have a competitive-edge skills when they enter the employment market. Students will receive a Certificate of UTM Professional Skills Programme and the courses taken will appear in the student transcript. Students are required to undertake and must pass five (5) PSC courses as listed as follows in order to graduate:

COMPULSORY COURSES (ALL THREE (3) COURSES)

NO	COURSES	CODE
1	Design Thinking for Entrepreneur	GLRB0010
2	Talent and Competency Management	GLRM0010
3	English Communication Skills for Graduating Students	GLRL0010

ELECTIVE COURSES (ANY TWO (2) OF THESE COURSES

NO	COURSES	CODE
1	Data Analytics for Organization	GLRT0010
2	Professional Ethics and Integrity	GLRM0020
3	Construction Management (Mechanical & Electrical)	GLRT0020
4	OSHE for Engineering Industry and Laboratory	GLRT0030
5	Quality Management for Built Environment and Engineering Professionals	GLRT0050
6	Safety and Health Officer Introductory Course	GLRT0060

PRISMS

PROGRAM INTEGRASI SARJANA MUDA-SARJANA

(4 YEARS BACHELOR DEGREE + 1 YEAR MASTER DEGREE)

PRISMS is a newly introduced programme that integrates undergraduate high-level elective SKEB 5**3 courses with the core courses of the Master degree programme. Under PRISMS, students have an opportunity to complete and receive two degrees which are Bachelor degree and Master degree within 5 years (4+1).

REQUIREMENT

Students who have completed third year second semester courses with a cumulative grade point average (CGPA) of 3.3 and above are eligible to apply for PRISMS. Students can apply using the PRISMS application form and must be recommended by the Academic Advisor, approved by the Program Director, and certified by the Dean of Faculty. Once the application to join PRISMS is approved, students can register for the SE**5**3 courses during the course pre-registration or compulsory registration period.

CREDIT TRANSFER

Students must obtain grade B and above of the high-level elective SKEB 5**3 courses for vertical credit transfer into the Master degree program that students plan to enroll. Maximum unit allowed for the credit transfer is twelve (12) credits.

For more information PRISMS, kindly visit FKE website.

BACHELOR OF BIOMEDICAL ENGINEERING WITH HONOURS (SKEBH)

Biomedical engineering and health sciences is a rapidly growing multidisciplinary field which combines engineering with the principle of biology and medicine to solve problems related to healthcare and the development of medical technologies. It consists a wide range of topics including anatomy and physiology, clinical engineering, rehabilitation, biomedical imaging, biomedical signal processing, biomechanics, bio-material, robotics, bio-informatics, tissue engineering, computer programming, electronics and other related topics. It is an excellent choice for individuals who are interested in using their technical skills to make a positive impact on healthcare and human health.

PROGRAMME SPECIFICATION

The Bachelor of Biomedical Engineering with Honours is offered either on a full-time or part time basis. The full-time programme is offered only at the UTM Main Campus in Johor Bahru, while the part-time programme is offered at UTM Kuala Lumpur. The duration of study for the full-time programme is subject to the student's entry qualifications and lasts between four (4) years to a maximum of six (6) years. The programme is offered on full-time basis and is based on a 2-Semester per academic session. Generally, students are expected to undertake courses equivalent to between fifteen (15) to eighteen (18) credit hours per semester. Assessment is based on courseworks and final examinations given throughout the semester.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO	EDUCATIONAL OBJECTIVE
PEO1	Become Biomedical Engineers who are competent, innovative, and productive in addressing stakeholders' needs.
PEO2	Grow professionally with proficient soft skills.
PEO3	Demonstrate high standards of ethical conduct, positive attitude, andsocietal responsibilities.

PROGRAMME GENERAL INFORMATION

Awarding Institution	Universiti Teknologi Malaysia
Teaching Institution	Universiti Teknologi Malaysia
Programme Name	Bachelor of Biomedical Engineering with Honours
Final Award	Bachelor of Biomedical Engineering with Honours
Programme Code	SKEB
Professional or Statutory Body of Accreditation	Board of Engineers Malaysia (BEM)
Language(s) of Instruction	English and Bahasa Melayu
Mode of Study	Conventional
Mode of Operation	Self-govern
Study Scheme	Full Time
Study Duration	Minimum 4 years, Maximum 6 years

Type of Sem	**No of Semester**		**No of Weeks / Semester**	
	Full Time	**Part Time**	**Full Time**	**Part Time**
Normal	8	-	18	-
Short	4	-	10	-

COURSE CLASSIFICATION

No	Classification	Credit Hour	Percentage
1	University General Course	16	11.7%
2	Mathematics	15	10.9%
3	Programme Core	94	68.6%
4	Programme Electives	9	6.57%
5	Free Electives	3	2.19%
TOTAL		**137**	**100%**
A	**ENGINEERING COURSE** • Lecture/Project/ Lab • Workshop/Field/Design • Industrial Training • Final Year Project	 92 - 5 6	
TOTAL CREDIT HOURS FOR PART A		**103**	**75.18%**
B	**NON-ENGINEERING** • Applied Sciences/ Mathematic / Com • Management/Law/Humanities/Ethics/Economy • Language • Co-Curriculum • Free Electives	 15 8 6 2 3	
TOTAL CREDIT HOURS FOR PART B		**34**	**24.82%**
TOTAL CREDIT HOURS FOR PART A & B		**137**	**100%**
TOTAL CREDIT HOURS FOR GRADUATE		**137**	

SKEBH COURSE MENU (INTAKE OCT 2024)

SKEBH COURSE MENU
(YEAR 1)

YEAR 1 (SEM 1) : 2024/25-1			
Code	**Courses**	**Credit**	**Pre-req**
ULRS 1032	Integrity and Anti-Corruption	2	
SKEB 1012	Introduction to Biomedical Engineering	2	
SKEB 1513	Human Anatomy and Physiology	3	
SKEE 1013	Electrical Circuit Analysis	3	
SSCE 1693	Engineering Mathematics I	3	
SKEE 1233	Digital Electronic Systems	3	
	TOTAL CREDIT HOURS	**16**	

YEAR 1 (SEM 2) : 2024/25-2			
Code	**Courses**	**Credit**	**Pre-req**
ULRS 1182	Appeciation of Ethics and Civilizations (for local students)	2	
UHLM 1012	Malay Language for Communication 2 (for international students)		
SKEB 2513	Basic Rehabilitation	3	SKEB 1513
SKEE 1103	C Programming for Engineers	3	
SSCE 1793	Differential Equations	3	SSCE 1693 (Min Grade D)
SKEB 1313	Statics and Dynamics	3	
SKEE 1073	Electronic Devices and Circuits	3	SKEE 1013
	TOTAL CREDIT HOURS	**17**	

SKEBH COURSE MENU
(YEAR 2)

YEAR 2 (SEM 3) : 2025/26-1			
Code	**Courses**	**Credit**	**Pre-req**
SKEE 2073	Signals and Systems	3	
SKEB 3323	Solid Mechanics	3	SKEB 1313
SSCE 1993	Engineering Mathematics II	3	SSCE 1693 (Min Grade D)
SKEE 3223	Microprocessor	3	SKEE 1233
SKEE 2752	Electronic Design Laboratory	2	
SSCE 2193	Engineering Statistics	3	
	TOTAL CREDIT HOURS	**17**	

YEAR 2 (SEM 4) : 2025/26-2			
Code	**Courses**	**Credit**	**Pre-req**
ULRS 1182	Appreciation of Ethics and Civilization (for international students)	2	
ULRS 1022	Philosophy and Current Issues (for local & international students)		
ULRF 2**2	Elective of Co-Curicular Service Learning	2	
UHLB 2122	Professional Communication Skills 1	2	
SSCE 2393	Numerical Methods	3	
SKEE 2523	Electromagnetic Field Theory	3	SSCE 1993
SKEE 3263	Electronic Systems	3	SKEE 1073
SKEB 3313	Biomedical Materials	3	
	TOTAL CREDIT HOURS	**18**	

SKEBH COURSE MENU (YEAR 3)

YEAR 3 (SEM 5) : 2026/27-1			
Code	**Courses**	**Credit**	**Pre-req**
UHL* 1112	Foreign Language for Communication	2	
UHLB 3132	Professional Communication Skills II	2	
SKEE 3133	System Modelling and Analysis	3	SKEE 2073
SKEB 3423	Clinical Engineering I	3	
SKEB 3533	Biomedical Communications	3	SKEE 2073
SKEB 3712	Specialized Biomedical Laboratory	2	
SKEB 3023	Biomedical Imaging	3	
	TOTAL CREDIT HOURS	**18**	

YEAR 3 (SEM 6) : 2026/27-2			
Code	**Courses**	**Credit**	**Pre-req**
ULRS 3032	Entrepreneurship and Innovation	2	
SKEB 4023	Biomedical Signal Processing	3	SKEE 2073
SKEB 3433	Clinical Engineering II	3	SKEB 3423
SKEB 3043	Instrumentation and Measurement in Biomedical	3	SKEE 3263
SKEE 3733	Integrated Design Project	3	
S*** ***3	Free Electives	3	
	TOTAL CREDIT HOURS	**17**	

YEAR 3 (SHORT SEMESTER) : 2026/27-3			
SKEE 3925	Industrial Training	5	Credit earned >=86 & SKEB 3433
	TOTAL CREDIT HOURS	**5**	

SKEBH COURSE MENU
(YEAR 4)

YEAR 4 (SEM 7) : 2027/28-1			
Code	**Courses**	**Credit**	**Pre-req**
SKEE 4542	Engineering Management Principles	2	
SKEE 4813	Methodology of Research and Development	3	
SKEB 4413	Biochemistry for Biomedical Engineers	3	
SKE*5**3/4**3	Field Elective 1 /PRISMS Elective 1	3	
SKE*5**3/4**3	Field Elective 2/ PRISM Elective 2	3	
SKE*5**3/4**3	Field Elective 3/ PRISM Elective 3/ Faculty FreeElective	3	
	TOTAL CREDIT HOURS	**17**	

YEAR 4 (SEM 8) : 2027/28-2			
Code	**Courses**	**Credit**	**Pre-req**
SKEE 4826	Final Year Project	6	SKEE 4813
SKEB 4033	Professional Biomedical Engineering Practice	3	
SKEB 4083	Biomedical Artificial Intelligence	3	SKEE 2073
	TOTAL CREDIT HOURS	**12**	

SKEBH COURSE MENU (ELECTIVES)

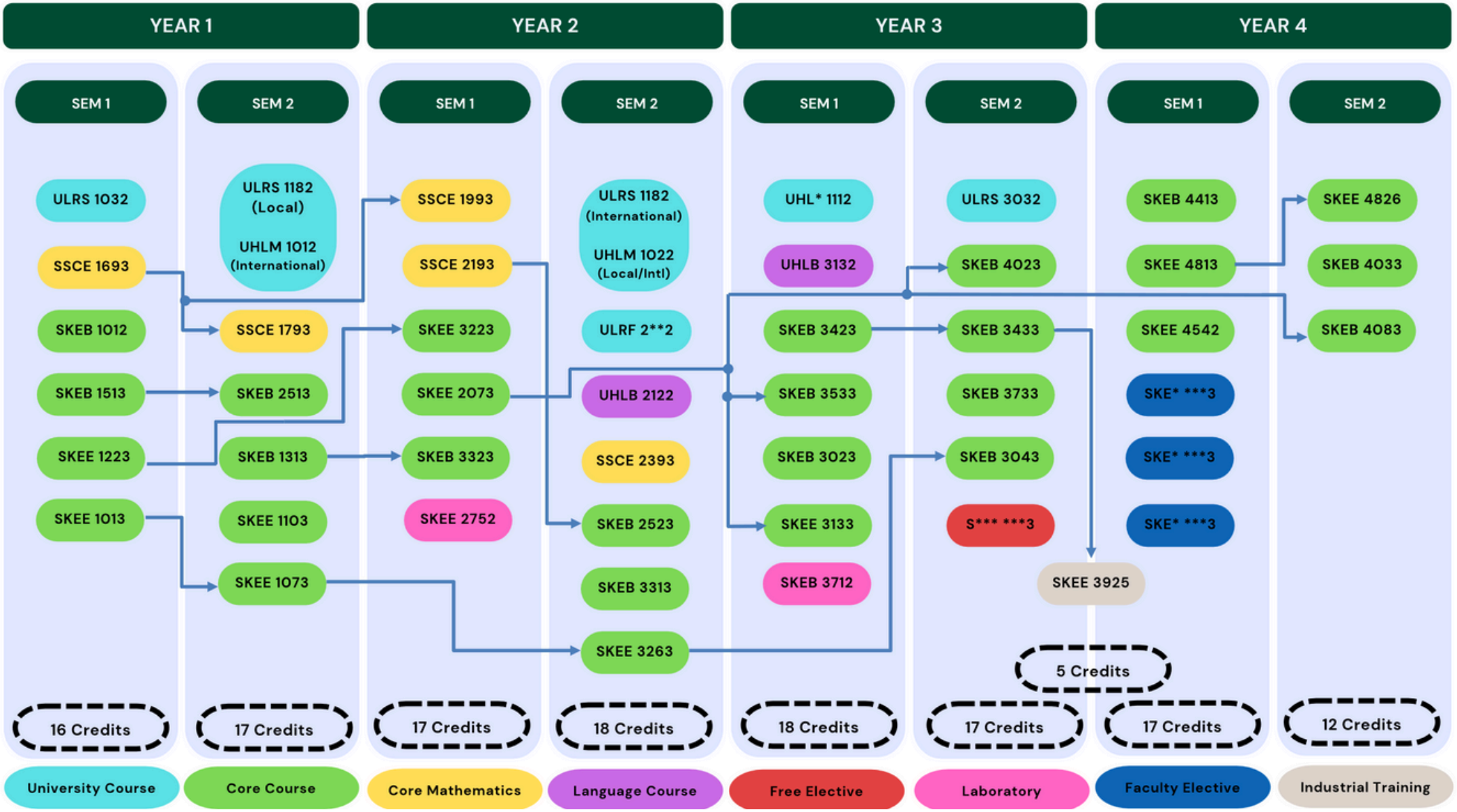
Code	Courses	Credit	Pre-req
SKEB 4043	Biomedical Image Processing	3	SKEB 3023
SKEB 4323	Biomedical Devices	3	
SKEB 4343	Cell and Tissue Engineering	3	
SKEB 4433	Biomedical Instrumentation Management	3	
SKEB 4513	Rehabilitation Engineering	3	
SKEB 4113	Bio-Fabrication	3	
SKEB 4123	Bio-Material Characterization and Analysis	3	SKEB 3313
SKEB 4133	Machining and Testing for Biomedical	3	
SKEB 4163	Object Oriented Programming for Engineers	3	SKEE 1103
SKEL 4543	Biosystem Modelling	3	SKEB 1513
SKEL 4563	Biosensor and Transducers	3	SKEE 2133
SKET 3583	Digital Communication Systems	3	SKEB 3533
SKET 4533	Wireless Communication Systems	3	
SKEL 3613	Semiconductor Material Engineering	3	SKEE 1073
SKEL 4213	Software Engineering	3	SKEE 1103
SKEL 4343	Information Security	3	SKEE 1233
SKEB 3503	Physiology & Introduction to Medicine	3	

AWARD REQUIREMENTS

To graduate, students must:

- Attain a total of not less than 137 credit hours (SKEB)
- Attain a minimum CGPA of 2.0.
- Complete Professional Skills Certificates (PSC).

CURRICULUM FLOWCHART (INTAKE OCT)



SKEBH COURSE MENU (INTAKE MARCH 2025)

SKEBH COURSE MENU
(YEAR 1)

YEAR 1 (SEM 1) : 2024/25-2			
Code	**Courses**	**Credit**	**Pre-req**
SKEE 1103	C Programing for Engineers	3	
SKEB 1313	Statics and Dynamics	3	
SKEB 1513	Human Anatomy and Physiology	3	
SKEE 1013	Electrical Circuit Analysis	3	
SSCE 1693	Engineering Mathematics I	3	
UHMS 1182	Appreciation of Ethics and Civilizations (for Local Students)	2	
UHLM 1012	Malay Language for Communication 2 (for International Students)		
	TOTAL CREDIT HOURS	**17**	

YEAR 1 (SEM 2) : 2025/26-1			
Code	**Courses**	**Credit**	**Pre-req**
SKEB 1012	Introduction to Biomedical Engineering	2	
SKEB 3323	Solid Mechanics	3	SKEB 1313
SKEE 1233	Digital Electronic Systems	3	
SKEE 1073	Electronic Devices and Circuits	3	SKEE 1013
SSCE 1993	Engineering Mathematics II	3	SSCE 1693 (Min D)
ULRS 1032	Integrity and Anti Corruption	2	
	TOTAL CREDIT HOURS	**16**	

SKEBH COURSE MENU
(YEAR 2)

YEAR 2 (SEM 3) : 2025/26-2			
Code	**Courses**	**Credit**	**Pre-req**
SKEB 2513	Basic Rehabilitation	3	SKEB 1513
SKEE 3263	Electronic Systems	3	SKEE 1073
SKEE 2523	Electromagnetic Field Theory	3	SSCE 1993
SSCE 1793	Differential Equations	3	SSCE 1693
ULRF 2**2	Elective of Curricular Service Learning	2	
UHLB 2122	Professional Communication Skills 1	2	
ULRS 1182	Appreciation of Ethics and Civilization (for international students)	2	
ULRS 1022	Philosophy and Current Issues (for local & international students)		
	TOTAL CREDIT HOURS	**18**	

YEAR 2 (SEM 4) : 2026/27-1			
Code	**Courses**	**Credit**	**Pre-req**
SKEB 3423	Clinical Engineering I	3	
SKEE 2752	Electronic Design Laboratory	2	
SSCE 2393	Numerical Methods	3	
SKEE 2073	Signal and Systems	3	
SSCE 2193	Engineering Statistics	3	
UHL* 1112	Foreign Languaage for Communications	2	
UHLB 3123	Professional Communication Skills II	2	
	TOTAL CREDIT HOURS	**18**	

SKEBH COURSE MENU (YEAR 3)

YEAR 3 (SEM 5) : 2026/27-2			
Code	**Courses**	**Credit**	**Pre-req**
SKEB 3433	Clinical Engineering II	3	SKEB 3423
SKEB 3733	Integrated Design Project	3	
SKEB 4023	Biomedical Signal Processing	3	SKEE 2073
SKEB 3043	Instrumentation and Measurement in Biomedical	3	SKEE 3263
ULRS 3023	Entrepreneurship & Innovation	2	
S*** ###3	Free Elective	3	
	TOTAL CREDIT HOURS	**17**	

YEAR 3 (SHORT SEMESTER) : 2026/27-3			
SKEE 3925	Industrial Training	5	Credit earned >=86 credits & SKEB 3433
	TOTAL CREDIT HOURS	**5**	

YEAR 3 (SEM 6) : 2027/28-1			
Code	**Courses**	**Credit**	**Pre-req**
SKEB 3023	Biomedical Imaging	3	
SKEB 3533	Biomedical Communications	3	SKEE 2073
SKEB 3712	Specialized Biomedical Laboratory	2	
SKEE 3223	Microprocessor	3	SKEE 1233
SKEE 3133	System Modelling and Analysis	3	SKEE 2073
SKEB 4813	Methodology of Research and Development	3	
	TOTAL CREDIT HOURS	**17**	

SKEBH COURSE MENU
(YEAR 4)

YEAR 4 (SEM 7) : 2027/28-2			
Code	**Courses**	**Credit**	**Pre-req**
SKEE 4542	Engineering Management Principles	2	
SKEB 3313	Biomedical Materials	3	
SKEB 4413	Biochemistry for Biomedical Engineers	3	
SKE*5**3/4**3	Field Elective 1 /PRISMS Elective 1	3	
SKE*5**3/4**3	Field Elective 2/ PRISM Elective 2	3	
SKE*5**3/4**3	Field Elective 3/ PRISM Elective 3/ Faculty FreeElective	3	
	TOTAL CREDIT HOURS	**17**	

YEAR 4 (SEM 8) : 2028/29-1			
Code	**Courses**	**Credit**	**Pre-req**
SKEE 4826	Final Year Project	6	SKEE 4813
SKEB 4033	Professional Biomedical Engineering Practice	3	
SKEB 4083	Biomedical Artificial Intelligence	3	SKEE 2073
	TOTAL CREDIT HOURS	**12**	

SKEBH COURSE MENU (ELECTIVES)

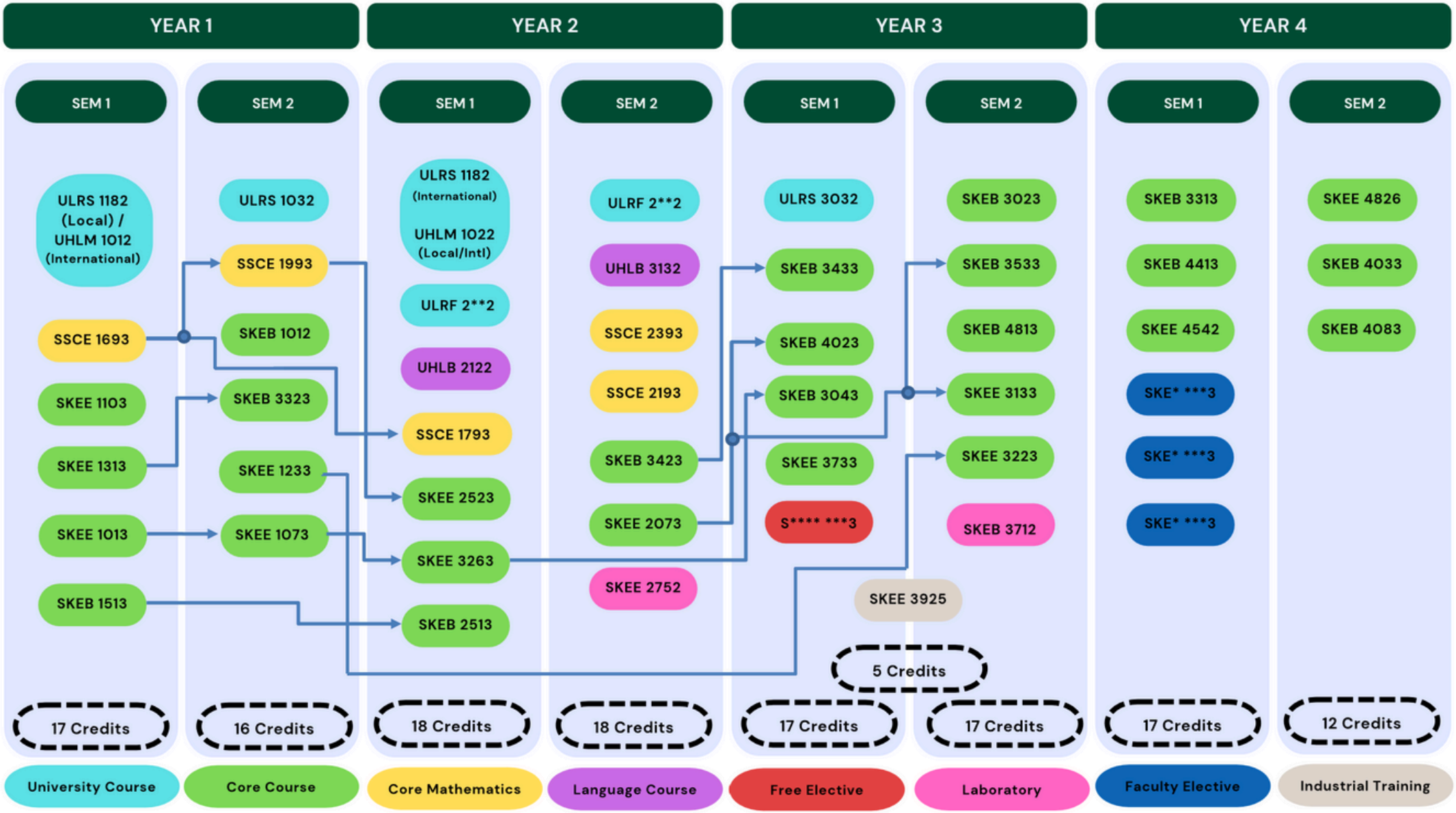
Code	Courses	Credit	Pre-req
SKEB 4043	Biomedical Image Processing	3	SKEB 3023
SKEB 4323	Biomedical Devices	3	
SKEB 4343	Cell and Tissue Engineering	3	
SKEB 4433	Biomedical Instrumentation Management	3	
SKEB 4513	Rehabilitation Engineering	3	
SKEB 4113	Bio-Fabrication	3	
SKEB 4123	Bio-Material Characterization and Analysis	3	SKEB 3313
SKEB 4133	Machining and Testing for Biomedical	3	
SKEB 4163	Object Oriented Programming for Engineers	3	SKEE 1103
SKEL 4543	Biosystem Modelling	3	SKEB 1513
SKEL 4563	Biosensor and Transducers	3	SKEE 2133
SKET 3583	Digital Communication Systems	3	SKEB 3533
SKET 4533	Wireless Communication Systems	3	
SKEL 3613	Semiconductor Material Engineering	3	SKEE 1073
SKEL 4213	Software Engineering	3	SKEE 1103
SKEL 4343	Information Security	3	SKEE 1233
SKEB 3503	Physiology & Introduction to Medicine	3	

AWARD REQUIREMENTS

To graduate, students must:

- Attain a total of not less than 137 credit hours (SKEB)
- Attain a minimum CGPA of 2.0.
- Complete Professional Skills Certificates (PSC).

CURRICULUM FLOWCHART (INTAKE MARCH)



ELECTIVE CLUSTERS

Students are advised to choose elective courses based on elective clusters to ensure a deep understanding of specific areas within the biomedical engineering field.

MEDICAL DEVICE OPERATIONS AND MANAGEMENT

- SKEB 4043 Biomedical Image Processing
- SKEB 4323 Biomedical Device
- SKEB 4433 Biomedical Instrumentation Management
- SKEB 4513 Rehabilitation Engineering
- SKEB 4133 Machining and Testing for Biomedical

BIOMATERIALS AND BIOENGINEERING

- SKEB 4343 Cell and Tissue Engineering
- SKEB 4113 Bio-fabrication
- SKEB 4123 Bio-Material Characterization and Analysis
- SKEL 4543 Biosystem Modelling
- SKEL 4563 Biosensor and Transducers
- SKEB 3503 Physiology & Introduction to Medicine

MEDICAL DEVICE CONNECTIVITY AND INTEGRATION

- SKET 3583 Digital Communication Systems
- SKET 4533 Wireless Communication Systems
- SKEL 4213 Software Engineering
- SKEL 4343 Information Security
- SKEB 4163 Object Oriented Programming for Engineer
- SKEL 3613 Semiconductor Material Engineering

GRADUATION CHECKLIST (1)

It is the responsibility of the students to ensure that all courses are taken and passed. In order to graduate, students must pass all courses in the following checklist. Students who do not complete any of the courses are not eligible to graduate.

NO	CODE	COURSE	CREDIT EARNED (JKD)	CREDIT COUNTED (JKK)	TICK (/) IF PASSED
BIOMEDICAL ENGINEERING COURSES					
1	SKEB 1012	Introduction to Biomedical Engineering	2	2	
2	SKEB 1513	Human Anatomy and Physiology	3	3	
3	SKEE 1013	Electrical Circuit Analysis	3	3	
4	SKEE 1223	Digital Circuit System	3	3	
5	SKEB 2513	Basic Rehabilitation	3	3	
6	SKEE 1103	C Programming for Engineers	3	3	
7	SKEB 1313	Statics and Dynamics	3	3	
8	SKEE 1073	Electronic Devices and Circuits	3	3	
9	SKEE 2073	Signals and Systems	3	3	
10	SKEB 3323	Solid Mechanics	3	3	
11	SKEE 3223	Microprocessor	3	3	
12	SKEE 2752	Electronic Design Laboratory	2	2	
13	SKEE 2523	Electromagnetic Field Theory	3	3	
14	SKEB 3043	Instrumentation and Measurement in Biomedical	3	3	
15	SKEB 3313	Biomedical Materials	3	3	
16	SKEE 3133	System Modelling and Analysis	3	3	
17	SKEB 3423	Clinical Engineering I	3	3	
18	SKEB 3533	Biomedical Communications	3	3	
19	SKEB 3712	Specialized Biomedical Laboratory	2	2	
20	SKEB 3023	Biomedical Imaging	3	3	
21	SKEB 4023	Biomedical Signal Processing	3	3	
22	SKEB 3433	Clinical Engineering II	3	3	
23	SKEE 3263	Electronic Systems	3	3	
24	SKEE 3733	Integrated Design Project	3	3	
25	SKEE 3925	Industrial Training	5	HW	
26	SKEE 4542	Engineering Management Principles	2	2	

GRADUATION CHECKLIST (2)

NO	CODE	COURSE	CREDIT EARNED (JKD)	CREDIT COUNTED (JKK)	TICK (/) IF PASSED
27	SKEE 4813	Methodology of Research and Development	3	3	
28	SKEB 4413	Biochemistry for Biomedical Engineers	3	3	
29	SKE*4**3/5**3	Field Elective 1 /PRISMS Elective 1	3	3	
30	SKE*5**3/4**3	Field Elective 2/ PRISM Elective 2	3	3	
31	SKE*5**3/4**3	Field Elective 3/ PRISM Elective 3/ Faculty Free Elective	3	3	
32	SKEE 4826	Final Year Project	6	6	
33	SKEB 4033	Professional Biomedical Engineering Practice	3	3	
34	SKEB 4083	Biomedical Artificial Intelligence	3	3	
TOTAL CREDIT OF BIOMEDICAL ENGINEERING COURSES (a)			**103**	**98**	
APPLIED SCIENCE / MATHEMATICS / COMPUTER COURSES					
35	SSCE 1693	Engineering Mathematics I	3	3	
36	SSCE 1793	Differential Equations	3	3	
37	SSCE 1993	Engineering Mathematics II	3	3	
38	SSCE 2193	Engineering Statistics	3	3	
39	SSCE 2393	Numerical Methods	3	3	
TOTAL CREDIT OF APPLIED SCIENCE / MATHEMATICS / COMPUTER COURSES (b)			**15**	**15**	
UNIVERSITY GENERAL COURSES					
Cluster 1: Malaysian Core Value					
40	ULRS 1022	Philosophy and Current Issues	2	2	
41	UHMS 1182	Appreciation of Ethics and Civilization	2	2	
42	UHLM 1012	Malay Language Communication	(2)	(2)	
Note:Total credit for cluster 1 courses is 4 creditsInternational students:UHLM 1012 is compulsory for international students; ANDChoose 1 (one) course from 2 (two) options: (ULRS 1022 or UHMS 1182)Malaysian students:ULRS 1022 and UHMS 1182 are compulsory for Malaysian students.					
Cluster 2: Value and Identity					
43	ULRS 1012	Value and Identity	2	2	
Cluster 3: Global Citizen					
44	ULRF 2**2	Elective of Co-Curricular Service Learning	2	2	

GRADUATION CHECKLIST (3)

NO	CODE	COURSE	CREDIT EARNED (JKD)	CREDIT COUNTED (JKK)	TICK (/) IF PASSED
Cluster 4: Communication Skills					
45	UHLB 2122	Professional Communication Skills 1	2	2	
46	UHLB 3132	Professional Communication Skills 2	2	2	
47	UHL* 1112	Foreign Language for Communication	2	2	
Cluster 5: Enterprising Skills					
48	ULRS 3032	Entrepreneurship & Innovation	2	2	
Free Electives					
49	S*** ###3	Free Electives	3	3	
TOTAL CREDIT OFUNIVERSITY GENERAL COURSES + FREE ELECTIVES (c)			19	19	
TOTAL CREDIT TO GRADUATE (a + b + c)			**137**	**132**	

OTHER COMPULSORY COURSES – PROFESSIONAL SKILLS CERTIFICATE (PSC)

Students are required to enrol and pass FIVE (5) PSC courses, to be eligible to graduate. Enrol the PSC courses as follows:

COMPULSORY PSC COURSES (Enrol All 3 Courses)			
1	GLRB0010	Design Thinking for Entrepreneur	
2	GLRM0010	Talent and Competency Management	
3	GLRL0010	English Communication Skills for Graduating Students (ECS)	
ELECTIVE PSC COURSES (Choose Any 2 Courses only)			
1	GLRT0010	Data Analytics for Organization	
2	GLRM0020	Professional Ethics and Integrity	
3	GLRT0020	Construction Measurement (Mechanical & Electrical)	
4	GLRT0030	OSHE for Engineering Industry and Laboratory	
5	GLRT0040	OSHE for Construction Industry and Laboratory Works	
6	GLRT0050	Quality Management for Build Environment and Engineering Professionals	
7	GLRT0060	Safety and Health Officer Introductory Course	
8	GLRT0070	Industrial Machinery and Lubrication	

Or any other elective PSC courses offered by UTM iLeagueInformation on PSC Courses: https://ileague.utm.my/utm-professional-skills-certificate-utm-psc/ Online PSC Registration: https://elearnpsc.utmspace.edu.my/

COURSE APPROVAL
(MORE THAN 18 CREDITS)

21 Credits
Approval by Academic Advisor and Dean

Prof. Dr. Jafri bin Din
Dean
Faculty of Electrical Engineering
jafri@utm.my

20 Credits
Approval by Academic Advisor and Deputy Dean (Academic and Student Affairs)

Prof. Ir. Dr. Muhammad Nadzir Marsono
Deputy Dean
Academic and Student affairs
mnadzir@utm.my

19 Credits
Approval by Academic Advisor and Director

Prof. Ir. Dr. Rubita Sudirman
Director (ECE)
rubita@utm.my

Prof . Ir. Dr. Hazlina Selamat
Director (CMED)
hazlina@utm.my

PM. Ts. Dr. Shahrin Md Ayob
Director (POWER)
e-shahrin@utm.my

PM. Ir. Ts. Dr. Asnida Abd Wahab
Director (BME)
asnida.aw@utm.my

Important : Students are not allowed to take more than 21 credit hours

ACADEMIC PROGRESS

SEMESTER	GPA	CGPA	REMARKS

COURSE SYNOPSIS

CODE	SYNOPSIS
SKEB 1012 Introduction to Biomedical Engineering	This course is specially designed to introduce biomedical engineering and motivate students to understand the fields in biomedical engineering. Sub-fields of Biomedical Engineering are introduced. A mini robot group project in allows student to experience basic knowledge of planning, assembling, design and programming. Visits to existing lab facilities and field trip to healthcare related centers and companies provide a career path comprehension in becoming a biomedical engineer.
SKEB 1513 Human Anatomy & Physiology	Throughout this course, student will learn about human anatomy and physiology in three phases. The first phase will cover anatomical terminology and supporting systems. The second phase will cover major controlling systems. The third phase will cover the digestive, endocrine, and immune systems. Student will also apply your knowledge to laboratory models, experiments, and critical thinking exercises. Ultimately, this course is designed to prepare students for work in the biomedical fields or research. Student will gain both a conceptual and pragmatic understanding of the human body and its normal function, as well as a grasp of the abnormalities that can disrupt the body's homeostasis.
SKEE 1013 Electrical Circuit Analysis	This course introduces students to the basic laws, methods of analysis and theorems for direct current, DC and alternating current, AC circuit, such as Ohms Law, Kirchhoff's Current and Voltage Laws, Mesh and Nodal Analysis and Thevenin's and Norton's Theorems. Based on these, the students are expected to be able to solve for variables in any given DC and AC electric circuits. The students also exposed to the steady-state electrical circuit. Afterwards, the relevant concepts in transient circuit analysis for first and second order circuit are taught to the students. With the knowledge learned, the student would be able to apply the basic laws, theorem and methods of analysis for solving completely with confidence various problems in circuit analysis.

COURSE SYNOPSIS

CODE	SYNOPSIS
SKEE 1233 Digital Electronic Systems	This course teaches the principles of digital systems. From signal concepts and number systems and codes, it proceeds to logic gates, their relationship to Boolean algebra, logic simplification, and the integration of gates to form digital circuits for medium-scale integration and arithmetic. It covers combinational and sequential logic circuits, including finite state machines, emphasizing circuit design and analysis. This course uses an industry-standard engineering software tool to design and simulate digital circuits.
SKEB 2513 Basic Rehabilitation	The course aims to introduce students to basic rehabilitation principles that can be applied within the context of rehabilitation engineering. A principle direction of this course is to equip students with the basic knowledge about some of the most common impairments and the most common medical conditions, disease, injuries, or disorders causing impairment and disability and correlating concepts with clinical scenarios. The course will provide knowledge on the impairment aetiologies, assessment and evaluation procedure, disability rating, functional limitations, and rehabilitation potential. Furthermore, knowledge will be provided about the technology and engineering applications for individuals with impairment and technical solutions for these problems. It will also provide students with skills that are required for effective team-working and effective communication for optimal interdisciplinary care of the disabled person.
SKEE 1103 C Programming for Engineers	This course introduces students to basic programming concepts and problem-solving techniques, with an emphasis on embedded systems. The course begins with an introduction to computer structures, before moving on to C programming concepts (editing, compiling, and debugging). Programs will be modeled with high level programming constructs (sequence, selection, looping) along with design tools (pseudocode and flowchart). Students will apply these ideas to arithmetic expressions, bit manipulations, arrays, strings, pointers, user-defined functions, and basic C library functions. By the end of the course, students should be able to run simple input/output demonstration programs on a single board computer to show their understanding.

COURSE SYNOPSIS

CODE	SYNOPSIS
SKEB 1313 Statics and Dynamics	Statics and dynamics are two fundamental and important mechanical principles to equip undergraduates with the necessary tools to solve biomechanics-related problems. This course covers the concepts and principles related to the physical behaviour of materials under static loads and during motion. Emphasis is placed on the importance of satisfying equilibrium, analysing structure, solving resultant of forces, kinematics and kinetics of rigid bodies.
SKEE 1073 Electronic Devices and Circuits	This course provides introduction to the basic operating principles and applications of discrete electronic devices and circuits. The course content starts with the fundamental solid-state principles and continues the discussions with the constructions and characteristics of diode, Bipolar Junction Transistor (BJT) and Enhancement Metal Oxide Semiconductor Field Effect Transistor (E-MOSFET). The application of diodes focusses on the basic power supply circuits whereas the applications of the transistors focus on the smallsignal amplifier. The course content ends with an introduction to the operating principles of an ideal operational amplifier (op-amp) and discussion about op-amp circuits, performance and applications. To help the students understand the behaviour of the electronic devices and predict the behaviour of the electronic circuits, this course makes use of simulation software. The goal of this course is to develop excellent understanding of the devices operation for students to be applied in analogue circuit design.
SKEE 2073 Signals and Systems	This course introduces the students the fundamental ideas of signals and system analysis. The signal representations in both time and frequency domains and their effects on systems will be explored. Specifically, the topics covered in the course include basic properties of continuous-time and discrete-time signals, the processing of signals by linear time-invariant (LTI) systems, Fourier series, Fourier and Laplace transforms. Important concepts such as impulse response, frequency response and system transfer functions as well as techniques of filtering and filter design, modulation, and sampling, are discussed and illustrated. This course will serve as a central building block for students in studying information processing in many engineering fields such as control systems, digital signal processing, communications, circuit design, etc.

COURSE SYNOPSIS

CODE	SYNOPSIS
SKEB 3323 Solid Mechanics	The course provides students with the knowledge to determine the strength and stiffness of idealisedengineering structures - bars, pins, bolts, shafts, beams, bones and soft tissue. The types of applied loadings are axial forces, bending forces, torsional loads, transverse loads, and combination of theseloads. At the end of the course, students should be able to determine the integrity of idealised engineering structures with respect to their strength and stiffness. Students should be able tocalculate 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 comingfrom research problems, or from real-world biomedical problems.
SKEE 3223 Microprocessor	This course introduces the principles and applications of microprocessors. Topics emphasized are processor architecture, assembly and HLL language and fundamentals of interfacing in a microprocessor-based embedded system. This course emphasizes on understanding the fundamentals of microprocessor operation, writing coherent and error-free assembly and HLL language programs, and designing basic interfacing circuits. With the knowledge learned, the student would be able to design microprocessor-based systems using assembly language and HLL programs completely with confidence.
SKEE 2752 Electronic Design Laboratory	In this course, the students will attend four 2nd year laboratories namely Electrotechnic, Basic Electronic, Digital Electronic and Instrumentation Laboratories. The students will attend a three-hour lab per week. The students are expected to complete 3 experiment topics for each lab in three weeks. In total, the student will perform 12 experiments. All experiments in the laboratories are emphasized on design case for a given complex engineering problem or project. The students will use appropriate software simulation tools to assist them during the design process.

COURSE SYNOPSIS

CODE	SYNOPSIS
SKEE2523 Electromagnetic Field Theory	This course presents several major collective understandings and theories within the area of electrostatic, magnetostatic and electromagnetic fields to the students. The abovementioned electromagnetic field theory is succinctly summarized via the Maxwell's equations. Here, the course is conducted with the assumption that the enrolled students are already equipped with the necessary mathematical foundations including multivariable calculus. Furthermore, they should also possess some familiarity with basic concepts covered in the typical introductory circuit theory course such as resistance, capacitance and inductance to list a few.
SKEE 3263 Electronic Systems	This course covers some topics in functional electronic circuits. The circuits are derived from a diverse electronic circuitry that exist in many electronic instrumentations. The function, the behaviour and the characteristics of the functional circuits are analysed. Design examples are presented to guide students with the necessary knowledge of how to design the functional electronic circuits based on certain predetermined specifications
SKEB 3313 Biomedical Materials	This subject provides an introduction to the fundamentals of 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 describe the chemistry and physic of biomaterials, their biocompatibility and the consequences of implantation of the devices, made of these materials, into the human body. The subject is also designed to expose the students with the failure of materials through fracture, fatigue, wear and corrosion. At the end of the subject, an act covering the cleansing management and disposal of waste biomaterials will be delivered to the students.

COURSE SYNOPSIS

CODE	SYNOPSIS
SKEE 3133 System Modeling and Analysis	This course introduces the students to the fundamental ideas and definitions of control systems, open loop and close loop control systems, process of control system design and representation. Students will be taught how to obtain mathematical models of actual physical systems such as electrical, mechanical and electromechanical systems in transfer function (frequency domain) and state space equations (time domain). Methods of system representation such as block diagram representation and signal flow graphs will be examined. The students will be exposed to technique of analysing control systems performance and stability in time domain. Finally, to simulate the stability and performance of the systems using software tools.
SKEB 3423 Clinical Engineering I	This course introduces students to the concept of healthcare institutions, its functions, scope of services, specialty disciplines of medicine and common medical devices used in those specialty disciplines. They will also be exposed to principles of clinical engineering as a subspecialty of biomedical engineering and clinical enginee's role in supporting healthcare institutions. Other than that, principles of operation of selected medical devices, its maintenance requirements and common problem will also be discussed in the course.
SKEB 3533 Biomedical Communications	This course introduces the students the basic principles of communication in biomedical field. The fundamental concepts of communication in medical and healthcare field will be strongly emphasized. It aims to provide the students with in-depth understanding on the wireless technology and wireless body network. It also provide students with an understanding on the application communications technology in healthcare.

COURSE SYNOPSIS

CODE	SYNOPSIS
SKEB 3712 Specialized Biomedical Laboratory	This 3rd year Specialized Laboratory is a required course for third year students in Bachelor of Biomedical Engineering with Honours degree program. This course involves experiments in many different areas of biomedical engineering such as Bioinstrumentation, Biomechanics and Biomaterials, Medical Imaging, Biomedical Signal Processing and Clinical Engineering. This area will be divided into 3 modules which are Module 1: Bioinstrumentation and Biomedical Signal Processing, Module 2: Clinical Engineering and Medical Imaging and Module 3: Biomechanics and Biomaterial. This laboratory session in conducted as Problem-Based Learning (PBL) approach. The students are grouped into 5-6 students/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 findings.
SKEB 3023 Biomedical Imaging	A course for introducing and exposing students to the world of medical tomography. It focuses on physical, operation and signal formation of medical imaging techniques from various imaging modalities such as MRI, ultrasound, CT-scan, nuclear medicine and X-ray.
SKEB 4023 Biomedical Signal Processing	Manual analysis of biomedical signals has many limitations and is very subjective. Therefore, computer analysis of these signals is essential since it can provide accurate and permanent records of diagnosis as well as quantitative measurement. Hence, this course presents methods of digital signal processing for biomedical signals. The course will discuss the fundamental and current approach of biomedical signal processing. Among biomedical signal processing algorithm covers in this course are: Fourier analysis, Fourier transform, data acquisition, digital filter design and discrete Fourier transform. Furthermore, few current approaches on biomedical signal processing techniques were also introduced: instantaneous energy and frequency, short-time Fourier transform , wavelettransform and time-frequency analysis.

COURSE SYNOPSIS

CODE	SYNOPSIS
SKEB 3433 Clinical Engineering II	This course introduces students to the theories, functions, and principles of operation for active medical devices used in various specialty disciplines within healthcare institutions. It then covers the role and responsibilities of clinical engineers in supporting healthcare technology, including relevant standards and electrical safety maintenance of medical devices. The course also includes practical modules on planned preventive maintenance and basic troubleshooting of medical devices. These modules will detail the appropriate steps to complete tasks for specific devices, including performance testing and verification procedures.
SKEB 3043 Instrumentation and Measurement in Biomedical	This course introduces how electronic circuits and systems are used in the design of biomedical measurement systems and biomedical instrumentation design. The architecture of electronic instruments used to measure physiological parameters, and the use of electrodes and transducers are addressed, as well as the analysis of major process functions integrated in these instruments. Four main focused instruments are ECG, EMG, PPG, and Respiratory.
SKEE 3733 Integrated Design Project	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 an engineering project conducted in a small team (typically three or four students) under the supervision of an academic staff and with optional of industry partner as advisor. Topics supplementing this course that include project management tools and practices, organizational structures, engineering standards as well as the social and environmental responsibility of professional engineers are covered in the Professional Ethics and/or Engineering Management courses offered prior to or concurrent with the course. The project produced from this course needs to address one or more relevant Sustainable Development Goals such as good health and well-being,quality education, industry,innovation and infrastructure depending on the nature of the project.

COURSE SYNOPSIS

CODE	SYNOPSIS
SKEE 3925 Industrial Training	Students will undergo an industrial training lasting for 12 weeks at an approved private, government or semi-government agencies. Placement at the respective agencies will be initiated by the applications from the students. Approval of the application is at the discretion of the Faculty. Undergraduates are expected to acquire hands on experience not only in the engineering aspects of work, but also to other related matters such as administration, accounting, management, safety, etc. during the industrial training period. Industrial Guidance, Independent and Dependent Learning discrete implementation can make this course a work based learning course.
SKEE4542 Engineering Management	Today's technological society is constantly changing and with the change comes a need for the engineer to be able to address the technological societal challenges and opportunities for the future. Engineers are a key element today in the role to maintain technological leadership and a sound economy while the world becomes flatter in today's global economy. To do this the engineer needs to remain alert to changing products, processes, technologies, and opportunities and be prepared for a creative and productive life and position of leadership. This course introduces the engineer to the ways in which principles of management, project management and financial management have been and are applied in the kinds of work they are almost likely to encounter. Today these principles are needed by the engineering manager and those they manage. The basic outline of the course looking at the four main management functions followed by the functions of project management. Finally, the course further discusses on financial management in achieving organization goals and objectives efficiently and effectively.
SKEE 4813 Methodology of Research and Development	This course introduces the scientific method for conducting research and development projects, particularly in electrical engineering (EE). It covers topics such as problem formulation and objective, literature methodology and design, data collection and analysis, research management and ethics. It also emphasizes technical writing skills for scientific publications, research proposal and thesis. The main objective is to equip the students with a solid background of methods to plan and conduct research and development project, which will benefit their undergraduate final year project. The general principles of this course are applicable to other disciplines besides EE.

COURSE SYNOPSIS

CODE	SYNOPSIS
SKEB 4413 Biochemistry for Biomedical Engineers	The course provides fundamental concepts of biochemistry (macromolecules function and properties of living systems) and focuses in the biochemical analysis and techniques of these macromolecules. The importance of biochemistry in medical diagnostic will be highlighted.
SKEE4826 Final Year Project	The Final Year Project (FYP) aims to equip students with the knowledge and skills necessary to conduct research-based projects, perform analysis, and interpret data for complex engineering problems. It emphasizes the application of engineering principles, modern tools, and IT resources to solve complex engineering challenges while considering the limitations involved. Students will learn how to analyze, investigate, and synthesize information effectively to develop innovative solutions. Students are exposed to project management planning and execution. Students will learn how to effectively utilize resources and manage projects to achieve desired outcomes. With these skills, it is hoped that the students will gain knowledge and experience in planning, designing and solving problems systematically. Students will have the necessary skills to solve complex engineering challenges, work effectively in multidisciplinary teams, and deliver successful projects with a strong focus on ethical and professional practices. Thus, when they graduate, they will be ready to work as reliable and productive engineers.
SKEBB 4033 Professional Biomedical Engineering Practice	This course aims to provide students with a comprehensive understanding of the engineering profession, including the roles and responsibilities of engineers, as well as the profound impact their work has on society and humanity, particularly within the realm of biomedical engineering. Students will be introduced to pertinent laws, regulations, standards, and ethical considerations within the field of engineering. The course also delves into the components of EAC accreditation and the Washington Accord. Through an exploration of ethical theories, principles, engineering codes of ethics, laws, and standards, students will analyze various issues and case studies related to biomedical engineering. By acquiring this knowledge, students will gain the ability to apply these principles to real-world scenarios. The course structure involves collaborative group work and projects, culminating in group presentations to the class

COURSE SYNOPSIS

CODE	SYNOPSIS
SKEB 4083 Biomedical Artificial Intelligence	This course introduces students to the fundamentals of strong and weak artificial intelligence (AI). It discusses the theoretical and practical aspects of several approaches in AI. Approaches which emphasize on machine learning such decision trees, regression, artificial neural network and clustering will be discovered in this course. Furthermore, the courses also introduce the students with recent deep learning approach such as Convolutional Neural Network and how to implement this approach in solving real problem. Students will be given problem sets and hands-on simulation in developing a model of cognitive system to effectively solve real world problems.
SKEB 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.
SKEB 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.

COURSE SYNOPSIS

CODE	SYNOPSIS
SKEB 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.
SKEB 4433 Biomedical Instrumentation Management	Medical instrument/equipment management refers to the process of overseeing and coordinating the use, maintenance, and replacement of medical devices and equipment within a healthcare organization. This can include a wide range of equipment, such as patient monitors, x-ray machines, and surgical instruments. Effective medical equipment management is critical to the smooth operation of healthcare facilities and the delivery of high-quality patient care.
SKEB 4513 Rehabilitation Engineering	This course will focus on the principles and application of rehabilitation sciences and 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.

COURSE SYNOPSIS

CODE	SYNOPSIS
SKEB 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.
SKEB 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 biomaterials. 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 biomaterials. Depending on the availability and functionality of instruments, lab visits and demonstrations will be scheduled following the class.
SKEB 4133 Machining and Testing for Biomedical Engineers	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.

COURSE SYNOPSIS

CODE	SYNOPSIS
SKEB 4163 Object Oriented Programming for Engineers	This course discusses how to use the C++ programming language to solve moderate to advanced problems using object oriented programming approach (OOP). It will also covers 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, 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).
SKEL 4543 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 fibres, 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 Octave/SCILAB/MATLAB/Simulink/LabView software.

COURSE SYNOPSIS

CODE	SYNOPSIS
SKEL 4563 Biosensors & Transducers	This course is intended to provide a broad introduction to the field of biosensor and transducer in the bioelectronics industry. Fundamental applications of biosensor theory are discussed, including biorecognition, transduction, and signal acquisition/processing. Design and fabrication of different types of biosensor are explored, ranging from electrochemical to optical systems. Discussions on the current state of the art biosensor technology to enable continuation into advanced/future biosensor and the applications in biomedical, bioenvironmental, food safety, and biosecurity are given.
SKET3583 Digital Communication System	This course introduces the fundamental concepts in digital communication system. Main topics to be covered are information theory, baseband transmission, detection methods, signal space analysis, digital modulation and channel coding. The system tradeoffs in designing a digital communication system will also be discussed.
SKET 4533 Wireless Communication Systems	This course introduces students the concepts and principles of mobile radio as well as satellite communication systems. Topics covered include mobile radio propagation, multiple access, cellular concept, modern wireless communication systems plus operation and subsystems of satellite communication. The course will utilize parts of the learning materials and/or feature invited speaker(s) from the Ericsson Educate initiative.

COURSE SYNOPSIS

CODE	SYNOPSIS
SKEL3613 Semiconductor Material Engineering	This course introduces students to the characteristics, operation, and limitations of semiconductor devices. In order to gain this understanding, it is essential to have a thorough knowledge of the basic physics and operation of the semiconductor material. The goal of this course is to bring together crystal structures, quantum mechanics, quantum theory for solids, semiconductor material physics, and fundamental of pn structures. At the end of the course student should understand the operation of present day and future electronic devices.
SKEL 4213 Software Engineering	This course introduces the theoretical principles and practical aspects large scale software development. The theoretical principles covered include understanding customer requirements, software development process, program design, collaborative development and testing. The practical aspects covered include Linux, Python and version control. Emphasis is given to object-oriented analysis and design (OOAD) as well as the use of UML in the design activities.
SKEL 4343 Information Security	This course covers the basic principles and techniques used to protect information. The area covered begins with description of the various structure of communication systems in practice today, security architecture and models, issues related to legislation and ethics, and physical security. Consequently, the course will cover areas applicable to electronic and communication security with description of the various types of cipher systems followed by its use in authentication. Finally, applications in telecommunication, network and the internet are demonstrated.
SKEB 3503 Physiology and Introduction to Medicine	The course is designed for students with engineering and technical background as an introduction to the basics of physiology and anatomy of the human body system. The course includes discussions on common physiological & anatomical disorders and the relationship among different body systems in maintining homeostasis. The course aims to prepare students for meaningful interaction with medical practitioners when performing medical-related work or collaborative research.

ACADEMIC STAFF

DEPARTMENT OF BIOMEDICAL ENGINEERING AND HEALTH SCIENCES

DIRECTOR

Assoc. Prof. Ir. Dr. Asnida Abd Wahab

PhD (UTM), MEng (Bristol)

asnida.aw@utm.my

FOR: Thermography, Medical Imaging, Image Processing, Assistive Device, Artificial Intelligence

PROGRAM COORDINATOR

Ts. Dr. Aizreena Azaman

PhD (SIT), MEng (UM)

aizreena@utm.my

FOR : Rehabilitation Engineering, Motion Analysis, Biosignal Processing, Bioinstrumentation.

FYP I COORDINATOR

Dr. Mohamad Ikhwan Jamaludin

PhD (Uni. of. Hyogo), MEng (UiTM)

mohamad.ikhwan@utm.my

FOR : Biomaterials, Tissue Engineering, Biofabrication, 3D Printing

FYP II COORDINATOR

Ts. Dr. Raimi Dewan @ Abdul Rahman

PhD (UTM), MEng (UTM), BEng (UTM)

raimi.dar@utm.my

FOR : Telecommunication Engineering, RF and Microwave

ACADEMIC STAFF

DEPARTMENT OF BIOMEDICAL ENGINEERING AND HEALTH SCIENCES

INDUSTRY TR. COORDINATOR
Dr. Aisyah Ahmad Shafi
PhD (UTM), MEng (UTM)
aisyah.as@utm.my
FOR : Biomechanics, Finite Element Analysis, Material Characterization, Textile Engineering

SPACE PROGRAM COORDINATOR
Ts. Dr. Mohd Riduan bin Mohamad
PhD (Strathclyde), MEng (UM)
mohd.riduan@utm.my
FOR : Regenerative Medicine, Biomechanics, Bioelectricity

PRISMS & MASTER TC COORDINATOR
Dr. Siti Ruzita Mahmod
PhD (UTM), MPhil (UTM)
sruzita@utm.my
FOR : Physical Rehabilitation, Rehabilitative Technology, Excercise Biomechanics & Physiology.

PG PROGRAM COORDINATOR
Dr. Izwyn Zulkapri
PhD (UTM)
izwyn@utm.my
FOR : Sport Science, Physical Fitness Assessment, Sport Performance Analysis

ACADEMIC STAFF

DEPARTMENT OF BIOMEDICAL ENGINEERING AND HEALTH SCIENCES

ASSOC. PROFESSOR
PM. Ir. Dr. Maheza Irna M. Salim
PhD (UTM), BBMedEng(UM)
maheza@utm.my
FOR : Clinical Engineering, Medical Imaging, Image Processing.

ASSOC. PROFESSOR
PM. Ir. Dr. Tan Tian Swee
PhD (UTM), MEng (UTM), BEng (UTM)
tantswee@utm.my
FOR : Biomedical image and signal processing, Biomedical instrumentation, Wireless power, AI

ASSOC. PROFESSOR
PM. Dr. Rania Hussein Al-Ashwal
PhD (UTM), MSc (UTM), MBBS(Yemen)
rania@utm.my
FOR : Medicine, Health Science, Anatomy and Biotechnology

ASSOC. PROFESSOR
Assoc. Prof. Dr. Syafiqah Saidin
PhD (UTM), BEng (UTM)
syafiqahs@utm.my
FOR : Biomaterials , Tissue Engineering, Drug Deliver, Actibacterial

ACADEMIC STAFF

DEPARTMENT OF BIOMEDICAL ENGINEERING AND HEALTH SCIENCES

SENIOR LECTURER
Dr. Hau Yuan Wen
PhD (UTM), MEng (UTM), BEng(UTM)
hauyuanwen@utm.my
FOR : IC Design, Biomedical Embedded System Design, FPGA Prototyping, Data Security

SENIOR LECTURER
Ts. Dr. Jaysuman bin Pusppanathan
PhD (UTM), MEng (UTM)
jaysuman@utm.my
FOR : Tomography for biomedical and process industry, Sport Tech

SENIOR LECTURER
Ts. Dr. Muhammad Hanif Ramlee
PhD (UTM), BEng (UTM)
m.hanif@utm.my
FOR : Biomechanics, Biomedical Design, Prosthetic and Orthotics, Biomaterials

SENIOR LECTURER
Ts. Dr. Muhammad Amir bin As'ari
PhD (UTM), MEng (UTM)
amir-asari@utm.my
FOR : Deep Learning, Computer Vision, Artificial Intelligence, Image Processing, Sport Analytics

ACADEMIC STAFF

DEPARTMENT OF BIOMEDICAL ENGINEERING AND HEALTH SCIENCES

SENIOR LECTURER
Dr. Ahmad Zahran Md Khudzari
PhD (Aston), MSc (UTM),BEng (Japan)
zahran.kl@utm.my
FOR : Biofluid Dynamics, Cardiovascular Eng, Biomedical Engineering, Biomechanics

SENIOR LECTURER
Ts. Dr. Mohamad Najeb Jamaludin
PhD (UTM), MEng (UTM), BEng (UTM)
najeb@utm.my
FOR : Biomedical Instrumentation, Embedded Circuit & Systems, Biomedical Signal Processing

SENIOR LECTURER
Dr. Noor Aimie Salleh
PhD (UTM), MEng (UTM), BBEng(UM)
aimie@utm.my
FOR : Biomedical Signal Processing, Electrophysiology, Artificial Intelligence

SENIOR LECTURER
Dr. Norhana Jusoh
PhD (SNU), MEng (UTM), BEng (UTM)
norhana@utm.my
FOR : Biomaterials, Tissue Engineering, Biosensor

ACADEMIC STAFF

DEPARTMENT OF BIOMEDICAL ENGINEERING AND HEALTH SCIENCES

SENIOR LECTURER
Dr. Nurizzati Mohd Daud
PhD (UTM), MEng (UTM)
nurizzati.md@utm.my
FOR : Biomaterials, Tissue Engineering, Drugs Delivery

SENIOR LECTURER
Dr. Norjihada Izzah Ismail
PhD (UTM), BSc (IIUM)
norjihada@utm.my
FOR : Nanomedicine, Biosensors, Phytochemicals, Tissue Engineering, Medical Microbiology

SENIOR LECTURER
Dr. Siti Aisyah Mualif
PhD (USM), MSc (UiTM), BSc (USM)
aisyahmualif@utm.my
FOR : Molecular Biology, Antibody, Antigen Proteins Expression, Bioensor

SENIOR LECTURER
Dr. Mariaulpa Sahalan
PhD (Sydney), MSc (USM)
mariaulpa@utm.my
FOR : Medical Imaging, Image Processing

ACADEMIC STAFF

DEPARTMENT OF BIOMEDICAL ENGINEERING AND HEALTH SCIENCES

SENIOR LECTURER
Dr. Wong Tuck Whye
PhD (UTM), BEng (UTM)
wongtuckwhye@utm.my
FOR : Stimuli Responsive Materials, Soft Robotics, Structural MEchanics

SENIOR LECTURER
Dr. Muhammad Amin Abd Wahab
PhD (UTM), BEng (UTM)
muhamadamin.abdwahab@utm.my
FOR : Ultrasound, Signal Processing, IOT, Embedded System

SENIOR LECTURER
Dr. Mohamad Ikhwan Kori
PhD (UTM), MEng (UTM), BEng(UTP)
mohamadikhwan@utm.my
FOR : Fluid Mechanics, Mechanics of Materials, Artificial Organ and Prosthetics Engineering

SENIOR LECTURER
Dr. Lukman Hakim Ismail
PhD (UTM), MSc (UTM)
lukman@utm.my
FOR : Healthcare Management, Human Factor, Patient Safety, Biomedical Engineering

ACADEMIC STAFF

DEPARTMENT OF BIOMEDICAL ENGINEERING AND HEALTH SCIENCES

SENIOR LECTURER
Dr. Saiful Izwan Abdul Razak
PhD (UTM)
saifulizwan@utm.my
FOR : Nanomaterial, Tissue Engineering, Biomaterial, Polymer

SENIOR LECTURER
Dr. Muhammad Faiz Md Shakhih
M*Sc (UTM), MBBS (Ireland)*
mfaizms@utm.my
FOR : Biosensors, Human Physiology, Biomedical Engineering, Signal Processing

SENIOR LECTURER
Dr. Nadia Shaira Shafii
BEng *(UTM), MSc(UTM), PhD (UTM)*
nadiashaira@utm.my
FOR : Biomedical Engineering, Biomechanic, Fluid Dynamic

SENIOR LECTURER
Dr. Siti Balqis Samdin
BEng *(UTM), PhD (UTM)*
sitibalqissamdin@utm.my
FOR : Biomedical Engineering, Signal Processing, Artificial Intelligence

ACADEMIC STAFF

DEPARTMENT OF BIOMEDICAL ENGINEERING AND HEALTH SCIENCES

SENIOR LECTURER
Mr. Norazmein Abdul Raman
MEng (UTM), BEng (UTM)
norazmein.kl@utm.my
FOR : Mechanical Engineering, Biomechanics

SENIOR LECTURER
Mr. Arief Ruhullah Harris
MEng (UTM), BEng (UTM)
ruhullah@utm.my
FOR : Neural Engineering, Biosignal Processing, Biomedical Instrumentation, Clinical Engineering

SENIOR LECTURER (EQUINE)
Dr. Kamaruzzaman Soeed
PhD (UTM), MSc (UTM)
skamaruzaman@utm.my
FOR : Sport Science, Sport Biomechanics, Exercise Physiology

SENIOR LECTURER (EQUINE)
Dr. Fuziaton Baharudin
PhD (UPM), MSc (Melbourne)
fuziaton@utm.my
FOR : Equine Medicine, Clinical and Reproduction, Equine Parasitology and Equine Alter. Therapy

For more information, kindly contact :

UGFKE
ACADEMIC OFFICE
(UNDERGRADUATE)
FACULTY OF ELECTRICAL ENGINEERING

FKE ACADEMIC OFFICE
UNDERGRADUATE PROGRAM

P19a, Faculty of Electrical Engineering
Universiti Teknologi Malaysia
81310, UTM Johor Bahru
Johor, Malaysia

undergraduate-office@fke.utm.my
ElectricalCircleUTM
https://linktr.ee/ugskeutm
07-5557029 / 5557007 / 5557238

Revision Notes :