



DIPLOMA IN BIOMEDICAL ENGINEERING (T38)

Course Overview

The healthcare industry needs Biomedical Engineers as much as doctors and nurses. You can make your mark in this growing sector by working with your peers to develop the next generation of medical devices for clinical engineering.

You will go through a multi-disciplinary experiential learning journey and have opportunities to acquire specialised skills at the Healthcare Engineering Centre ([HEC](#)), which focuses on the development of BioMEMS (Biomedical Micro-Electro-Mechanical Systems), microfluidics, flexible hybrid electronics for healthcare wearables, smart AI healthcare devices and intelligent wearable healthcare sensors. You will work on research and development as well as prototyping projects under the supervision of a team of skilled research scientists and engineers at the HEC.

In your final year, you can choose to specialise in two of these electives:

- Audiometry and Hearing Devices
- CAD and Additive Manufacturing
- Clinical Laboratory Equipment
- Healthcare Analytics
- Medical Biochemistry
- Patient Monitoring Technology

Join this course and be part of the future-ready MedTech and healthcare workforce!

To download a copy of our 4-page course brochure, click [here](#).

[Watch video](#)

Entry Requirements

To be eligible for consideration for admission, applicants must obtain 26 points or better for the net ELR2B2 aggregate score (i.e. English Language, 2 relevant subjects and best 2 other subjects, including CCA Bonus Points) and meet the minimum entry requirements of this course. CCA cannot be used to meet the minimum entry requirements.

Subject	Grade
English Language (EL1)*	1-7
Mathematics (E or A)	1-6

Any one of the listed subjects[^] 1-6

Any two other subjects, excluding CCA -

2021 Planned Intake 75

Net ELR2B2 aggregate range (2021 JAE) 10 - 13

Note: Applicants should not be suffering from partial or complete colour vision deficiency, uncontrolled epilepsy, profound hearing loss or severe vision impairment.

* SPM / UEC holders must have a minimum of grade 6 for the Bahasa Inggeris (English Language) subject.

[^] List of acceptable subjects: Biology, Biotechnology, Chemistry, Combined Science, Computing/Computer Studies, Design & Technology, Electronics/Fundamentals of Electronics, Physics/Engineering Science, Science (Chemistry, Biology), Science (Physics, Biology), Science (Physics, Chemistry)/Physical Science.

See also the minimum entry requirements for:





- [ITE Certificate Holders](#)
- [International Students](#)

What You'll Learn

YEAR 1

You will receive a firm foundation in fundamental engineering concepts, through lab work, study trips to companies, and hands-on learning opportunities, preparing you for specialisation in the medical and life sciences fields.

TP Fundamentals (TPFun) Subjects

Subject Code	Subject	Credit Units
 ECS1005	Communication & Information Literacy In this subject, you will learn how to conduct research for relevant information and validate information sources. You will also learn to recognise and avoid plagiarism, and follow standard citation and referencing guidelines when presenting information. In the course of learning, you will be required to plan, prepare and present information appropriately in written and oral form. You will also be taught to consider the Message , Audience , Purpose and Strategy (MAPS) when writing and delivering oral presentations.	2 
 ECS1007	Persuasive Communication In this subject, you will be taught how to use persuasive language in written documents. You will be required to use information to your advantage to verbally communicate and convince an audience about your idea, product or service. Skills such as persuasive vocabulary, language features, graphical illustrations, tone and style would also be covered. The Message , Audience , Purpose and Strategy (MAPS) will also be applied when engaging in verbal and written communication.	2 

^	EGS1002	Global Studies	3	^
<p>This subject provides essential skills and knowledge to prepare you for an overseas experience. You will examine the elements of culture and learn the key principles of cross-cultural communication. In addition, you will gain an appreciation and awareness of the political, economic, technological and social landscape to function effectively in a global environment.</p>				
^	EIN1001	Innovation & Entrepreneurship	2	^
<p>The Innovation & Entrepreneurship subject is designed for learners from all disciplines to embrace innovation in either their specialised fields or beyond. You will first learn the Design Thinking framework, where you will develop problem statements and ideate solutions. Next, you will discover the tools for prototyping and innovation, such as 3D printing and laser cutting, at TP's Makerspace+ facility. Finally, you will acquire commercial awareness through the LEAN Startup framework of idea crystallisation, prototype building, customer testing and validation, refinement of business model canvas, and crowdfunding or crowdsourcing avenues.</p>				
^	GCC1001	Current Issues & Critical Thinking	2	^
<p>This subject presents you with a panoramic view of current local and global issues, which may have long term implications for Singapore. You will learn to apply critical thinking tools to examine current issues, support your views with relevant research and up-to-date data, articulate an informed opinion and mature as civic-minded individuals.</p>				
^	LEA1011	Leadership: Essential Attributes & Practice 1	1	^
<p>LEAP 1, 2 and 3 are three fundamental subjects that seek to cultivate in you, the attitude, skills and knowledge for the development of your leadership competencies. This character-based leadership programme enables you to develop your life-skills through establishing personal core values, which will become the foundation for your leadership credibility and influence.</p>				
^	LSW1002	Sports & Wellness	2	^
<p>This subject will help you develop both the physical and technical skills in your chosen sports or fitness activities. Through a structured curriculum that facilitates group participation, practice sessions and mini competitions, you will learn to build lifelong skills such as resilience, leadership, communication and teamwork. Physical activity sessions will be supplemented by health-related topics to provide you with a holistic approach to healthy living.</p>				
^	MCR1001	Career Readiness 1	1	^
<p>This Career Readiness programme comprises three core subjects - Personal Management, Career Preparation and Career Management. It seeks to help you understand your career interests, values, personality and skills for career success. It also equips you with the necessary skills for seeking and securing jobs, and to develop professional work ethics.</p>				

Subject Code	Subject	Credit Units
^ EEE1001	Circuit Analysis This subject provides a good foundation in DC and AC network analysis. You will learn the basic principles of electric circuitry and how to apply circuit theorems to analyse DC and AC networks.	6 ^
^ ESE1006	Computer Programming for Problem Solving This subject covers the process of decomposing a problem into a sequence of smaller abstractions. The abstractions are implemented in software in a structured top-down approach. Software implementation includes the process of designing, writing, testing, and debugging program code.	4 ^
^ EEE1003	Digital Fundamentals 1 This subject provides basic knowledge of digital electronics and circuits. Topics include number systems, operations and codes, logic gates, Boolean algebra and logic simplification, combinational logic, functional blocks, latches and flip-flops.	5 ^
^ EEE1004	Digital Fundamentals 2 This subject builds upon the fundamentals of digital electronics acquired in Digital Fundamentals 1. It introduces the digital concepts of the various building blocks in a computer's digital system. You will acquire the theoretical and practical knowledge of registers, counters, memory devices, and conversions between digital and analogue signals and integrated circuit technologies. Digital troubleshooting techniques are also explored in the laboratory work.	5 ^
^ EEE1002	Electronic Devices & Circuits This subject covers the theory and practical knowledge of electronic devices such as diodes, bipolar junction transistors, field effect transistors and their applications. It also focuses on the fundamentals of operational amplifiers and their applications, and the rudiments of circuit troubleshooting and testing.	6 ^
^ EED1001	Electronic Prototyping This subject introduces you to the use of hand tools and standard laboratory equipment for the construction and testing of electronic prototypes. You will also learn to identify basic electronic components for project work and how to use them to build electronic devices.	3 ^

^	EMA1003	Engineering Mathematics 1	4	^
		This subject teaches pre-calculus techniques required for an engineering course. It trains you in engineering problem-solving approaches using the appropriate mathematical tools. Topics such as simultaneous equations, matrices, trigonometric, exponential and logarithmic functions, complex numbers and vectors will be covered.		
^	EMA1002	Engineering Mathematics 2	4	^
		This subject introduces the basic concepts of calculus and statistical method to test a hypothesis. Basic concepts in calculus include limits, derivatives and integrals. Applications of the derivative and integrals in engineering will be discussed. Basic statistical method in hypothesis testing includes normal distribution, confidence interval of population mean and procedure to test hypothesis for a claim made about a population mean.		
^	ESC1004	Engineering Physics	3	^
		This subject covers a spectrum of fundamental physics laws and concepts applicable to the scope of engineering physics. It covers a few core areas including Mechanics, Energy, Thermal Physics, Electromagnetism, Waves & Optics and Materials. This subject provides a foundation for a further in depth study of the various engineering disciplines.		

YEAR 2

Here, you will deepen your engineering skills, pick up fundamental knowledge of the life sciences, and learn how engineering is used to further the development of technology in the medical and life sciences fields.

TP Fundamentals (TPFun) Subjects

	Subject Code	Subject	Credit Units	
^	ECS1006	Workplace Communication	2	^
		In this subject, you will be taught how to conduct effective meetings while applying team communication strategies and the skills for documenting meeting notes. You will be required to write clear emails, using the appropriate format, language, tone and style for an audience. You will also be taught to communicate appropriately in and for an organisation when using various platforms. In all aspects, the principles of applying M essage, A udience, P urpose and S trategy (MAPS) will be covered.		
^	EGS1003	Managing Diversity at Work*	3	^
		This subject explores the concepts of identity, diversity and inclusion at the workplace. It examines the relationship between identity and diversity, the benefits and challenges of diversity and the strategies that promote inclusion and inspire collaboration in a diverse workplace. Examples of the elements of diversity covered in this subject include nationality, generation, ethnicity and gender. A one week residential stay is mandatory for this subject.		

^	EGS1004	Global Citizenship & Community Development*	3	^
<p>Students will examine the meaning and responsibilities of being a Global Citizen, in order to contribute towards a more equitable and sustainable world.? In addition, students will learn how sustainable solutions can support community development, and, execute and critique a community action plan that addresses the needs of a specific community/cause.</p>				
^	EGS1005	Expressions of Culture*	3	^
<p>This subject provides a platform for an understanding of culture and heritage through modes of expression. Students will be introduced to global and local cultures via everyday objects, places and human behaviour seen through time and space. Students will explore issues and challenges in culture and heritage sustainability in community, national and global contexts.</p>				
^	LEA1012	Leadership: Essential Attributes & Practice 2	1	^
<p>LEAP 1, 2 and 3 are three fundamental subjects that seek to cultivate in you, the attitude, skills and knowledge for the development of your leadership competencies. This character-based leadership programme enables you to develop your life-skills through establishing personal core values, which will become the foundation for your leadership credibility and influence.</p>				
^	MCR1002	Career Readiness 2	1	^
<p>This Career Readiness programme comprises three core subjects – Personal Management, Career Preparation and Career Management. It seeks to help you understand your career interests, values, personality and skills for career success. It also equips you with the necessary skills for seeking and securing jobs, and to develop professional work ethics.</p>				
^	TGL1001	Guided Learning	3	^
<p>The subject introduces students to the concepts and process of self-directed learning in a chosen area of inquiry. The process focusses on four stages: planning, performing, monitoring and reflecting. Students get to plan their individual learning project, refine and execute the learning plan, as well as monitor and reflect on their learning progress and project. The learning will be captured and showcased through a curated portfolio. The self-directed learning project will broaden and/or deepen a student's knowledge and skills.</p>				

**Students must choose to take either one of these three subjects or TGL1001 Guided Learning.*

Subject Code	Subject	Credit Units
ESC1003	<p>Chemistry</p> <p>This subject provides the students with an understanding of the fundamentals of chemistry concepts and applications useful in the bioengineering field. Topics covered include the principles, theories and applications of physical, inorganic and organic chemistry, ranging from atomic structure and electron configuration, stoichiometry, the periodic table, chemical bonding, equilibria, electrochemistry, and thermochemistry to topics of organic chemistry covering the hydrocarbons, haloalkanes, the hydroxy, carbonyl and carboxylic acids compounds. Essential practical sessions on chemical experimentation are also covered.</p>	4
ESE1008	<p>Data Visualisation & Analytics</p> <p>This subject covers the data analytics lifecycle, including gathering, cleaning, processing and visualising of data. Exploratory data analysis methods, descriptive and predictive analytics, and the presentation of insights, will also be covered.</p>	3
EMA2003	<p>Engineering Mathematics 3</p> <p>This subject introduces Ordinary Differential Equations (ODE). In particular, it focuses on the formulation of engineering problems into first and second order differential equations. Some techniques in solving ODE and the applications of ODE will be discussed, including the use of Laplace Transforms and the calculation of Fourier series.</p>	4
EBS1004	<p>Human Anatomy & Physiology</p> <p>This subject provides you with a basic understanding of human anatomy and physiology. Topics covered include the anatomy of the organs and organ systems and their functions.</p>	4
EMD2002	<p>Medical Devices</p> <p>This subject discusses the fundamentals of medical devices generally used in hospitals, such as the electrocardiograph, electroencephalograph, electromyograph, therapeutic devices, as well as life-saving and support devices. The essential principles of safety and reliability of medical devices are also covered.</p>	4
EMD2001	<p>Medical Electronics</p> <p>This subject introduces fundamental instrumentation theories for biomedical applications and design requirements for the measurement of bio-signals. Topics include electrodes and transducers, bio-potential measurements, amplifier basics, as well as differential and instrumentation amplifiers. Filter designs, noise and electromagnetic interference issues are also discussed.</p>	4

^	EBI3008	Medical Imaging & Informatics	4	^
<p>This subject will cover Medical Imaging techniques and Health Information Systems with the implementation of IT in the healthcare setting. This covers decision-making in patient care, clinical workflow, network infrastructures, standards and interoperability issues, and patient data privacy and security.</p>				
^	EMC3006	Microcontroller Applications	5	^
<p>This subject provides you with working knowledge on microcontroller architecture, the features and characteristics of the internal peripherals in the microcontroller, such as interrupts, Timer and PWM, in order to design and implement an embedded system that involves hardware and software interfacing. The subject also covers the features of evolving microcontrollers that support Internet of Things (IoT) applications.</p>				





YEAR 3

You can specialise by choosing an elective in Audiometry & Hearing Devices, Clinical Laboratory Equipment, or Medical Biochemistry. Together with the Major Project and internship, you will be ready for an exciting and lucrative career upon graduation.





TP Fundamentals (TPFun) Subjects

Subject Code	Subject	Credit Units		
^	ESI3001	Student Internship Programme	12	^
<p>This structured programme is designed to link your learning with the real work environment. You will be placed in organisation(s) with opportunities to apply the concepts and skills acquired in the course of your study. Besides reinforcing technical concepts and mastering of skills in areas that you have been trained, the practical training will enable you to build important skills such as problem-solving, communication, teamwork, and to cultivate good attitude and a strong work ethic.</p>				
^	LEA1013	Leadership: Essential Attributes & Practice 3	1	^
<p>LEAP 1, 2 and 3 are three fundamental subjects that seek to cultivate in you, the attitude, skills and knowledge for the development of your leadership competencies. This character-based leadership programme enables you to develop your life-skills through establishing personal core values, which will become the foundation for your leadership credibility and influence.</p>				
^	MCR1003	Career Readiness 3	1	^
<p>This Career Readiness programme comprises three core subjects – Personal Management, Career Preparation and Career Management. It seeks to help you understand your career interests, values, personality and skills for career success. It also equips you with the necessary skills for seeking and securing jobs, and to develop professional work ethics.</p>				

Core Subjects

Subject Code	Subject	Credit Units
 EMP3002	Major Project <p>In this subject, you will work in teams to integrate and apply your skills and knowledge to implement your projects in a practical work-and-learn environment. Besides research, design, analytics, project management, communication and problem solving skills, the emphasis will also be on innovation, teamwork and self-learning.</p>	8 
 EMF2003	Medical Device Manufacturing Practices <p>This subject provides the fundamental knowledge of, and introduces good manufacturing practices in, the design and manufacturing of medical devices and pharmaceuticals. It covers design control, equipment maintenance, contamination prevention, qualification and validation, non-conformance handling as well as technical documentation.</p>	3 

Elective Subjects

Subject Code	Subject	Credit Units
 EED3014	Advanced Skills Practices <p>This subject provides opportunities for you to integrate and apply your knowledge for high level competitions or projects in practical learning situations. The project or skills training can involve substantial work related to either a high level industrial program or an end-user product, as well as advanced training to develop technical abilities to execute specific tasks competitively. It could also involve the development, evaluation of workable designs and implementation of ideas related to an innovative product suitable for manufacturing, or an improvement to existing products or processes. You may be required to work on software, hardware, or a combination of both hardware and software.</p>	8 
 EBI3004	Audiometry & Hearing Devices# <p>This subject focuses on the hearing health sector in biomedicine. It exposes you to the science of hearing assessment and technologies available to remediate hearing loss. You will study the properties of sound, the physiology of hearing and the causes of hearing impairment; and you will be equipped with the skills to screen for hearing impairment. You will also learn about the underlying technologies behind digital hearing aids.</p>	4 











^	EME2012	CAD & Additive Manufacturing#	4	^
<p>Additive Manufacturing, also commonly known as 3D Printing, is becoming an important manufacturing technique in advanced manufacturing that complements existing manufacturing processes. In this subject, the main topics covered include principles and development of Additive Manufacturing, design guidelines for Additive Manufacturing (ISO/ASTM 52911-2), design of support structures, generalised process chain, process selection guidelines, pre-processing software, post-processing methods and laser-based powder bed.</p>				
^	EBS3004	Clinical Laboratory Equipment#	4	^
<p>This subject focuses on important aspects of clinical laboratory and instruments widely used in clinical laboratories. Topics include centrifuges, automated analysers, separation techniques, bioreactors, mass spectrometry and clinical trials. Essential insights to clinical laboratory practices are also given.</p>				
^	EBS3009	Healthcare Analytics#	4	^
<p>This subject covers the statistical techniques for biomedical data analysis and the decision-making process using machine-learning algorithms. The topics covered include techniques for data analysis and machine learning for decision-making. You will gain hands-on Python programming experience by applying the statistical techniques on biomedical datasets to facilitate effective data-driven decisions through machine learning algorithms.</p>				
^	EBS2004	Medical Biochemistry#	4	^
<p>This subject covers biochemical and molecular exchanges that occur within the human body in the context of medicine, usually in terms of drug interactions or cellular responses to diseases. It includes Biochemistry, which investigates the constituents of biological systems, their properties and their significance to biological science, as well as Molecular Genetics, which studies DNA structure, DNA replication, DNA transcription & translation and DNA mutations. Connections will also be made between the two areas of study.</p>				
^	EMD2005	Patient Monitoring Technology#	4	^
<p>This subject provides an understanding of the fundamental principles and applications of the biomedical instrumentation systems commonly used in the healthcare sector. Patient monitoring tools will be used to reinforce the learning of physiological signal analysis techniques.</p>				

#Students to choose two of these elective subjects

Special Electives

Students can opt to take Special Electives when offered. These optional subjects, taken in addition to the diploma elective subjects, aim to stretch the students' potential to enable them meet their aspirations.

Special Electives

Subject Code	Subject	Credit Units
 EED3009	Special Project 1 <p>The focus of this subject is on the application of students' existing domain knowledge to develop a deliverable. The subject will introduce new skills and knowledge specific to the project, as and when required.</p>	2 
 EED3010	Special Project 2 <p>This subject provides opportunities for students to apply the acquired knowledge and skills, along with their fundamental and in-depth knowledge from different subjects to designing, developing, and implementing a well-engineered project solution.</p>	2 
 EED3011	Higher Engineering Skills 1 <p>Higher Engineering Skills 1 and 2 aim to impart some special design and hands-on skills that allow you to acquire knowledge and skills that are not normally incorporated into a diploma programme. These Special Elective subjects will equip you with the skills and knowledge to participate in competitions and enable you to tackle real challenges.</p>	2 
 EED3012	Higher Engineering Skills 2 <p>Higher Engineering Skills 1 and 2 aim to impart some special design and hands-on skills that allow you to acquire knowledge and skills that are not normally incorporated into a diploma programme. These Special Elective subjects will equip you with the skills and knowledge to participate in competitions and enable you to tackle real challenges.</p>	2 
 EMA3001	Higher Engineering Mathematics <p>The subject introduces mathematical concepts and techniques used in advanced engineering courses. You will learn topics in calculus such as limits and continuity, infinite series, improper integrals, multiple integrals, higher order differential equations, 2D and 3D analytic geometry, and partial differentiation.</p>	4 

GRADUATION REQUIREMENTS

Cumulative Grade Point Average	min 1.0
TP Fundamentals Subjects	36 credit units
Diploma Core Subjects	83 credit units
Diploma Elective Subjects	min 8 credit units
Total Credit Units Completed	min 127 credit units