Al-Farahidi University **جـامعـة الفـراهيـدي**

First Cycle – bachelor's degree (B.Sc.)

Medical Instrumentation Engineering Techniques

بكالوريوس - هندسة تقنيات الأجهزة الطبية - الدورة الأولى

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1. Mission & Vision Statement

Vision Statement

The academic staff of the Medical Instrumentation Engineering Techniques (MIET)/ Medical Technical College/ Al-Farahidi University believes that providing high-quality technical education that makes the targeted return from the education process more efficient and distinguished. Developing technical capabilities, critical thinking skills, social and personal skills, and work values in an ever-changing environment in the medical healthcare system, as well as in their careers in companies of medical instrumentation dealing with different services, demonstrating general knowledge of medical devices categories and principal of operation and maintenance. Small class sizes within the MIE program foster a close working relationship between academic staff and students in an informal and nurturing atmosphere that is a technical leader and innovator in providing high-quality educational programs and services, in a highly competitive global high-tech environment.

Mission Statement

The Program aims to provide all students with fundamental knowledge of medical instrumentation technology. As well as a deeper understanding of a selected focus area within the Medical Instruments and Techniques. The curriculum and advising have been designed to prepare graduates for their professional future. Whether they choose to work as an efficient engineering staff that can cover engineering maintenance and problem-solving for vital medical devices or to pursue advanced degrees in Medical Instrumentation Engineering Techniques. The MIET program also provides the necessary fundamental knowledge of Medical Instruments and Techniques to support researchers in developing and creating new biomedical equipment or tools that follow the future medical and healthcare needs. Further, rehabilitation of distinguished and innovative competencies scientifically, skilfully and behaviourally in the field of medical equipment technology and keeping pace with the corresponding

departments in international universities by providing community services and offering the latest study programs to create an advanced academic environment.

2. Program Specification

Program code:	BSc. – MIET	**ECTS**	240
Duration:	4 levels, 8 Semesters	**Method of Attendance:**	Full Time

MIET program is designed to provide students with the skills to improve themselves by preparing them for a career in medical instrumentation. Students will learn how to administer and support medical instrumentation technology and design. The curriculum consists of an integrated set of courses in mathematics, medical physics and chemistry, fundamentals of electric and electronic circuits, and medical instrumentations. Students will have the opportunity to know the principles of computer applications and they will be prepared for careers in companies of medical instrumentation dealing with the services, demonstrating general knowledge of medical devices categories and principles of operation. Moreover, the students will learn the various components of medical equipment.

Level 1 exposes students to the fundamentals of MIET, suitable for progression in engineering fundamentals. Program-specific core topics are covered at Level 2 preparing for research-led subject specialist modules at Levels 3 and 4. MIET graduates are therefore trained to appreciate how research informs teaching, according to the University and School Mission statements.

At Levels 2, 3 and 4 MIET students understand the subject area and the professional fields of engineering mathematics, anatomy and physiology, electronic circuits, computer programming, medical instrumentations, electrical machines, digital electronics, English language, biomedical signal processing, medical communication systems, biomedical transducers and sensors, control systems, artificial limbs, elective subjects, medical laser systems, power electronics, and professional ethics which can be obtained during the course of study.

The research ethics is developed and fostered from the start via practical, which are either embedded in lecture modules or taught in dedicated practical modules, research seminars and tutorials. There is a compulsory field course in Level 1, which students must pass in order to progress into Level 2, and optional field courses in Levels 2, 3 and 4. At Level 4 all students carry out an independent research project.

3. Program Goals

A. To provide the MIET graduates with scientific and practical skills that enable them to diagnose malfunctions resulting in medical devices.
B. To have graduate students who could familiarize themselves with the various parts of medical devices and keep abreast of the development that occurs in their technologies.
C. To give the graduate the ability to have detailed knowledge of all modern technologies in the field of medical device engineering.
D. To provide graduates with sufficient skills to make the necessary updates regarding medical devices.
E. The MITE department seeks to achieve quality standards according to the available capabilities.

4. Learning Outcomes

Students who complete the MIET program will have a strong foundation in medical instrumentation, with various employment options and occupations in mind. Graduates are knowledgeable and skilled in creating, designing, testing, and maintaining medical devices and equipment. Additionally, they can pinpoint the crucial role that medical technology developments have played in developing the modern healthcare system. They can use information, the internet, and communication technologies to gather accurate and pertinent information for reports, presentations, etc., that satisfy academic criteria. They possess the ability to interact in a second language. Additionally, they possess the capacity to communicate both verbally and in writing with various audiences. Moreover, the capacity for open-minded, interactive communication with non-experts.

Outcome 1

Understanding of allied knowledge

Graduates will be able to show a thorough understanding of the market's requirements for knowledge, skills, and expertise. They are also aware of how the market and technological advancement are moving.

Outcome 2

Oral and Written Communication

Graduates will be able to formally communicate the medical device troubleshooting results using oral and written communication skills.

Outcome 3

Technical and cognitive skills

Graduates can design circuits for medical equipment based on specific criteria and develop applications to view or control the outcomes.

Outcome 4

Critical thinking and analytical skills

Graduates will be able to identify emerging problems and try to solve them with approaches based on logical and critical thinking using modelling, designing, and forecasting.

Outcome 5

Appropriate research tools and techniques

Graduates will be capable of carrying out various scientific applications using fundamental research procedures. The graduate can adapt and acquire new skills to produce the desired results.

Outcome 6

Communication and IT skills

Graduates can share information with the technical team to find the optimal solution. Additionally, they can use the internet, communication, and information technologies. Graduates can read and comprehend user manuals and directions for various medical equipment. They communicate with non-experts showing awareness of diverse informational levels and different perspectives with various medical terms in English.

Outcome 7

Group/team leadership

Graduates will be self-motivated, cooperate effectively with other professionals in different disciplines, backgrounds, and interests to solve problems, work lucidly in confusing situations under pressure, and demonstrate knowledge of and commitment to following safety procedures for themselves and others.

Outcome 8

Own professional development

Graduates can make decisions, plan, problem-solving, and stay updated professionally.

5. Academic Staff

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6. Credits, Grading and GPA

Credits

Al-Farahidi University – Medical Technical College – Department of Medical Instrumentation Engineering Techniques is following the Bologna process with the European Credit Transfer System (ECTS) credit system. The total degree program number of ECTS is 240, 30 ECTS per semester. 1 ECTS is equivalent to 30 hr. of student workload, including structured and unstructured workload.

Grading

Before the evaluation, the results are divided into two subgroups: pass and fail. Therefore, the results are independent of the students who failed a course. The grading system is defined as follows:

Grading Scheme – مخطط الدرجات				
Group	**Grade**	**التقدير**	**Marks (%)**	**Definition**
Success	A - Excellent	امتياز	90 - 100	Outstanding Performance
Group (50 - 100)	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب – قيد المعالجة	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note: The number of decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.				

Calculation of the Cumulative Grade Point Average (CGPA)

The CGPA is calculated by the summation of each module score multiplied by its ECTS, all are divided by the program's total ECTS.

CGPA of a 4-year B.Sc. degree:

CGPA = [(1st module score * ECTS) + (2nd module score * ECTS) + ...] / 240

7. Curriculum Module

Semester 1 | 30 ECTS | 1 ECTS = 30 hr.

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
FMIT1101	Fundamental of Electrical Engineering	102	108	7.00	C	
FMIT1102	Computer Applications (IC3)	88	92	6.00	B	
FMIT1103	Differential Mathematics	73	77	5.00	B	
FMIT1104	Engineering Drawing	59	91	5.00	B	
FMIT1105	Human rights and Democracy	59	61	4.00	S	
FMIT1106	English Language (beginner)	45	45	3.00	S	

Semester 2 | 30 ECTS | 1 ECTS = 30 hr.

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
FMIT1201	Medical Physics	60	120	6.00	B	
FMIT1202	Medical Chemistry	60	120	6.00	B	
FMIT1203	Mechanics	45	105	5.00	B	
FMIT1204	Integral Mathematics	73	77	5.00	B	**FMIT1103**
FMIT1205	Engineering Workshops	60	90	5.00	B	
FMIT1206	Arabic Language	45	45	3.00	S	

Semester 3 | 30 ECTS | 1 ECTS = 30 hr.

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
FMIT2101	Laboratory Medical Instrumentation I	74	106	6.00	C	
FMIT2102	Electronics Circuits I	74	106	6.00	C	**FMIT1101**
FMIT2103	Electrical Machines	74	76	5.00	C	**FMIT1101**
FMIT2104	Engineering Mathematics	73	77	5.00	B	**FMIT1204**
FMIT2105	Anatomy & Physiology	74	76	5.00	B	
FMIT2106	Computer Programming and Applications (MATLAB-beginner)	46	44	3.00	B	

Semester 4 | 30 ECTS | 1 ECTS = 30 hr.

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
FMIT2201	Laboratory Medical Instrumentation II	74	106	6.00	C	**FMIT2101**
FMIT2202	Electronic Circuits II	74	106	6.00	C	**FMIT2102**
FMIT2203	Digital Electronics	74	76	5.00	C	**FMIT2102**
FMIT2204	Clinical Chemistry Instrumentation	60	90	5.00	C	
FMIT2205	Biomedical Transducers and Sensors	60	90	5.00	C	**FMIT1101**
FMIT2206	English Language (intermediate)	45	45	3.00	B	**FMIT1106**

Semester 5 | 30 ECTS | 1 ECTS = 30 hr.

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
FMIT3101	Medical Diagnostic Instrumentation I	74	136	7.00	C	**FMIT2105**
FMIT3102	Microprocessor	88	92	6.00	C	**FMIT2203**
FMIT3103	Electromagnetic Fields	74	106	6.00	C	**FMIT2104**
FMIT3104	Signals and systems	60	60	4.00	C	**FMIT2104**
FMIT3105	Computer Programming and Applications (C++ programming)	60	60	4.00	B	
FMIT3106	English Language (Advanced)	45	45	3.00	B	**FMIT2206**

Semester 6 | 30 ECTS | 1 ECTS = 30 hr.

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
FMIT3201	Medical Diagnostic Instrumentation II	74	136	7.00	C	**FMIT3101**
FMIT3202	Medical Electronic Systems	74	106	6.00	C	**FMIT2202**
FMIT3203	Medical Communication systems	60	120	6.00	C	**FMIT3104**
FMIT3204	Power Electronics	74	76	5.00	C	**FMIT2102**
FMIT3205	Project I	30	60	3.00	C	
FMIT3206	Project Management	45	45	3.00	S	

Semester 7 | 30 ECTS | 1 ECTS = 30 hr.

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
FMIT4101	Medical Therapeutic Instrumentation I	74	136	7.00	C	**FMIT2105**
FMIT4102	Medical Laser Systems	74	76	5.00	C	**FMIT2105**
FMIT4103	Control Systems	74	76	5.00	C	**FMIT2104**
FMIT4104	Project II	44	106	5.00	C	**FMIT3205**
FMIT4105	Biomedical Signal Processing	60	60	4.00	C	**FMIT3104**
FMIT4106	Elective I	60	60	4.00	E	

Semester 8 | 30 ECTS | 1 ECTS = 30 hr.

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
FMIT4201	Medical Therapeutic Instrumentation II	74	136	7.00	C	**FMIT4101**
FMIT4202	Engineering of Radiation Instrumentation	74	106	6.00	C	
FMIT4203	Artificial Limbs	88	92	6.00	C	**FMIT4103**
FMIT4204	Elective II	60	60	4.00	E	
FMIT4205	Elective III	60	60	4.00	E	
FMIT4206	Professional Ethics	45	45	3.00	S	

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