

## Al-Mansour University College

كلية المنصور الجامعة



### *First Cycle – Bachelor's Degree (B.Sc.) - Medical Instrumentation Engineering Techniques*

بكالوريوس - هندسة تقنيات الاجهزة الطبية (الدورة الاولى)



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### 1. Mission & Vision Statement

#### *Vision Statement*

This department tries to qualify those who are scientifically creative in terms of the skills in the field of the technology of medical instrumentation in a way that enables it to identify itself with its counterparts in well-established world universities. This will be accomplished through making services available to the community. In this respect, the most recent programs are available to create a well-advanced academic environment.

#### *Mission Statement*

Allowing the student to learn at every stage of study the most crucial study programs and the skills related to the various scientific and practical sectors show the importance of this specialization.

#### *Objectives*

these aims may be summarized as follows:

1. Giving the student the scientific and applied skills enables him/her to pin down the faults of the medical instrumentation.
2. Graduation students can be well-acquainted with the various parts of medical instrumentation and technological developments.
3. Endowing the graduate with the ability to know fully and in detail the recent technologies in the field of medical instrumentation engineering.
4. Offering students the necessary skills to modernize medical instrumentation.
5. Vertically expanding to start a program for higher studies to allow the student to have an MA and PhD.
6. Following the available capabilities, the department acquires quality standards.

## 2. Program Specification

<b>Programme code:</b>	BSc-MIE	<b>ECTS</b>	240
<b>Duration:</b>	4 levels, 8 Semesters	<b>Method of Attendance:</b>	Full Time

MIE 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 the 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, 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 principal of operation. Moreover, the students will learn the various components of medical equipment.

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

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

The research ethos is developed and fostered from the start via practical's, 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 Goal**

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

### **4. Student Learning Outcomes**

Students who complete the MIE 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 modeling, 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**

#### ***Communications 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

Noor Kadhim Meftin| PH.D. in Computer Science/Expert Systems, Data Hiding | Lecturer  
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## 6. Credits, Grading and GPA

### *Credits*

Middle Technical University 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 hrs 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
<b>Success Group (50 - 100)</b>	A - Excellent	امتياز	90 - 100	Outstanding Performance
	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
<b>Fail Group (0 - 49)</b>	FX – Fail	راسب - قيد المعالجة	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				
Number 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)*

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

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

$$\text{CGPA} = [ (1^{\text{st}} \text{ module score} \times \text{ECTS}) + (2^{\text{nd}} \text{ module score} \times \text{ECTS}) + \dots ] / 240$$



## 7. Curriculum/Modules

Semester 1 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
MIE11102	Fundamentals of Electrical Engineering (DC)	79	71	6.00	C	
MIE11004	Computer Applications (IC3)	49	26	3.00	B	
MIE11205	Differential Mathematics	78	47	5.00	S	
MIE11206	Engineering Drawing	63	62	5.00	S	
MUC11001	Democracy and Human Rights	33	17	2.00	B	
MUC11003	English Language I	33	17	2.00	B	
MIE11207	Medical Chemistry	94	81	7.00	S	

Semester 2 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
MIE12101	Fundamentals of Electrical Engineering (AC)	79	71	6.00	C	MIET1101
MIE12203	Medical Physics	64	61	5.00	S	
MIE12204	Mechanics	48	52	4.00	S	
MIE12205	Integral Mathematics	78	47	5.00	S	MIET1103
MIE12206	Engineering Workshops	63	62	5.00	S	
MIE12207	Computer Programming and Applications I	49	26	3.00	S	
MUC12002	Arabic Language	33	17	2.00	B	

**Semester 3 | 30 ECTS | 1 ECTS = 25 hrs**

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
<b>MIE21101</b>	Laboratory Medical Instrumentation I	94	81	7.00	C	
<b>MIE21102</b>	Electronics Circuits I	79	71	6.00	C	MIET1201
<b>MIE21103</b>	Electrical Machines	79	71	6.00	C	MIET1201
<b>MIE21204</b>	Engineering Mathematics	78	47	5.00	S	MIET1204
<b>MIE21205</b>	Anatomy & Physiology	64	36	4.00	S	
<b>MUC 21004</b>	The crimes of the Ba'ath Regiem in Iraq	33	17	2.00	B	

**Semester 4 | 30 ECTS | 1 ECTS = 25 hrs**

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
<b>MIE22101</b>	Laboratory Medical Instrumentation II	94	81	7.00	C	MIET2101
<b>MIE22102</b>	Electronics Circuits II	79	71	6.00	C	MIET2102
<b>MIE22103</b>	Digital Electronics	79	46	5.00	C	MIET2102
<b>MIE22104</b>	Clinical Chemistry Instrumentation	64	61	5.00	C	
<b>MIE22105</b>	Biomedical Transducers and Sensors	64	61	5.00	C	MIET1201
<b>MUC22003</b>	English Language II	33	17	2.00	B	MIET1106

**Semester 5 | 30 ECTS | 1 ECTS = 25 hrs**

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
MIE31101	Medical Diagnostic Instrumentation I	79	96	7.00	C	MIET2105
MIE31102	Microprocessor	94	56	6.00	C	MIET2203
MIE31103	Electromagnetic Fields	79	46	5.00	C	MIET2104
MIE31104	Signals and Systems	64	61	5.00	C	MIET2104
MIE31205	Computer Programming and Applications II	64	36	4.00	S	
MIE31206	Project Management	48	27	3.00	S	

**Semester 6 | 30 ECTS | 1 ECTS = 25 hrs**

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
MIE32101	Medical Diagnostic Instrumentation II	79	96	7.00	C	MIET3101
MIE32102	Medical Electronic Systems	79	71	6.00	C	MIET2202
MIE32103	Medical Communication Systems	64	61	5.00	C	MIET3104
MIE32104	Power Electronics	79	46	5.00	C	MIET2202
MIE32205	Project I	33	42	3.00	S	
MIE32206	Advanced Computer Programming	79	21	4.00	S	

**Semester 7 | 30 ECTS | 1 ECTS = 25 hrs**

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
MIE41101	Medical Therapeutic Instrumentation I	79	96	7.00	C	MIET2105
MIE41102	Medical Laser Systems	79	46	5.00	C	MIET2105
MIE41103	Control Systems	79	46	5.00	C	MIET2104
MIE41104	Biomedical Signal Processing	64	36	4.00	C	MIET3104

<b>MIE41105</b>	Project II	48	77	5.00	C	MIET3205
<b>MIE413XX</b>	Elective I	64	36	4.00	E	

**Semester 8 | 30 ECTS | 1 ECTS = 25 hrs**

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
<b>MIE42101</b>	Medical Therapeutic Instrumentation II	79	96	7.00	C	MIET4101
<b>MIE42102</b>	Engineering of Radiation Instrumentation	79	71	6.00	C	
<b>MIE42103</b>	Artificial Limbs and Robotics	94	56	6.00	C	MIET4103
<b>MIE423XX</b>	Elective II	64	36	4.00	E	
<b>MIE423XX</b>	Elective III	64	36	4.00	E	
<b>MUC42005</b>	Professional Ethics	48	27	3.00	B	

**Electives | 30 ECTS | 1 ECTS = 25 hrs**

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
<b>MIE41306</b>	Microcontrollers	64	36	4.00	E	MIET3105
<b>MIE41307</b>	Artificial Neural Engineering	64	36	4.00	E	MIET1206, MIET3102
<b>MIE42305</b>	Programmable Logic Devices	64	36	4.00	E	MIET2203
<b>MIE42306</b>	Biomedical Sensors Networks	64	36	4.00	E	MIET3203
<b>MIE42307</b>	Biomedical Image Processing	64	36	4.00	E	MIET4104
<b>MIE42308</b>	Statistics for Biomedical Engineering	64	36	4.00	E	MIET2104

