الجامعة التقنية الشمالية

Northern Technical University

الكلية التقنية الهندسية الموصل

Technical Engineering College of Mosul

بكالوريوس هندسة تقنيات الأجهزة الطبية

Bachelor's degree in Medical Instrumentation Techniques Engineering

Undergraduate Degree Program Catalogue

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1. Vision and Mission Statements

Vision Statement

To be a leading department in the field of Medical Instrumentation Techniques Engineering, specializing in the design and development of innovative and high-quality medical devices by closely integrating engineering sciences with medical knowledge. We aim to achieve scientific and technological advancements to improve healthcare and facilitate patient diagnosis and treatment.

Mission Statement

The department of medical instrumentation engineering techniques trains its students on the design, development, and maintenance of modern medical devices used in the healthcare field. The department strives to enhance its students' skills and provide them with the necessary knowledge to keep up with the latest advancements in this field, as it plays a crucial role in improving the quality of healthcare in the health and medical institutions.

The department offers courses in areas such as medical engineering, medical electronics, medical imaging, biomedical devices, control and automation, engineering design, industrial design, advanced manufacturing, and other related fields. Additionally, the department employs the latest teaching techniques and methods, providing a supportive learning environment that encourages students to be creative and innovative.

2. Program Specification

Program Code	BTech Med Inst Eng	ECTS	240
Duration	4 levels, 8 Semesters	Method of Attendance	Full Time

The specification of medical instrumentation techniques engineering programme defines the knowledge and skills needed for a career installing, calibrating, and maintaining medical instruments. This programme emphasises the development of technical expertise in the medical device sector, new medical techniques, hospital administration, and medical device maintenance. Typically, the programme consists of classroom lectures, practical training, and on-site work.

Additionally, the programme emphasises the development of technical skills such as electrical circuit design, computer-aided design, microcontroller programming, estimation, and medical project management. The programme aims to provide graduates with the skills necessary to work as medical instrument engineers, team leaders of medical engineering teams, medical device inspectors, cost estimators, and other technical positions in the medical engineering field.

3. Program (Objectives) Goals

Medical Instrumentation Techniques Engineering is a modern field centered around the design and development of medical devices and tools used in treatment, diagnosis, monitoring, and medical analysis. It is one of the most essential disciplines

that provides technical and technological support to medical institutions and healthcare centers.

Key Objectives of the Department of Medical Instrumentation Techniques Engineering:

1. **Design and Development:** Designing and developing modern medical devices and tools that enhance the quality of healthcare and provide optimal diagnosis and treatment for patients.
2. **Training and Qualification:** Training and equipping medical technicians with the skills and knowledge needed to operate, maintain, and manage modern medical devices effectively and safely.
3. **Collaboration:** Collaborating with physicians and healthcare institutions to provide the necessary technical and technological support for the efficient and correct operation of medical devices.
4. **Research and Development:** Engaging in continuous research and development in the field of medical instrumentation techniques to improve performance, efficiency, and overall safety of medical devices.
5. **Compliance and Safety:** Adhering to health and technical standards and regulations applicable in medical practices to ensure patient safety and effective treatment outcomes.

4. Program Student Learning Outcomes

Medical instrumentation techniques engineering program's unique goals and objectives that have an impact on the learning results for its students. The program student learning outcomes are:

1. **Knowledge of medical materials and methods:** Students can be able to demonstrate a strong understanding of medical materials and methods, including their properties, advantages, and limitations.
2. **Knowledge of medical devices:** Students can be able to demonstrate a strong understanding of using , calibrating, maintenance of medical devices.
3. **Ability to read and interpret blueprints:** Students should be able to read and interpret service manual catloge, as well including elevations, sections, and details.
4. **Communication and teamwork:** Students should be able to effectively communicate with medical staff, clients, patients and end user of medical devices, in addition to work collaboratively in a team environment.
5. **Safety:** students will be aware of safety in the medical sectors, such as the hazards of high electrical voltage, and potential hazards on a job site,such as, contacts with patients, and the spread of viruses, and risks of some medical devices such as radiation instruments.

5. Academic Staff

Name	Degree	Postion	General specialize	Prersize specialize	Academic email
Mohammed Sabah Jarjees	PhD	Assistant Professor	Medical Instrumentation Engineering	Biomedical Engineering	mohammed.s.jarjees@ntu.edu.iq
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Entisar Younis Abduljabar	Master	Lecturer	Medical instrumentation engineering	Medical instrumentation engineering	entisar.al-iraqi1979@ntu.edu.iq
Layth Taha Khudhuir	Master	Assistant Lecturer	Science in Mathematics	Mathematics Pure	Layth.t.k@ntu.edu.iq

6. Credits, Grading and Grade Point Averag

Credits in the medical istruemnation techniques engineering department are based on Bologna process with the European Credit Transfer System (ECTS). The total degree program number of ECTS is 240, 30 ECTS per semester. 1 ECTS is equivalent to 25 student workloads, including structured and unstructured workload.

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

GRADING SCHEME			
Group	**Grade**	**Marks %**	**Definition**
Success Group (50-100)	Excellent	90-100	Outstanding Performance
	Very Good	80-89	Above Average with Some Errors
	Good	70-79	Sound Work with Notable Errors
	Satisfactory	60-69	Fair But with Major Shortcomings
	Sufficient	50-59	Work Meets Minimum Criteria
Fail Group (0-49)	FX-Fail	45-49	More Work Required But Credit Awarded
	F-Fail	0-44	Considerable Amount of Work Required
NB 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 Grade Point Average (GPA)

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

GPA of 4-year B.tech. degrees:

GPA = [(1st module score × ECTS) + (2nd module score × ECTS) + ……] / 240

7. Modules and Curriculum

Level	First	Semester	First		Bachelor's Degree in Medical Instrumentation Techniques
Module Code	Module Name in English	ECTS	Theoretical Hour/Week	Practical Hour/Week	
MIE 101	Direct Current Circuit Analysis تحليل دوائر التيار المستمر	8	4	4	
MIE 102	Physics الفيزياء	8	4	3	
MIE 103	Mathematics الرياضيات	6	6	0	
MIE 110	Engineering Drawing الرسم الهندسي	4	1	3	
NTU101	English Language اللغة الانكليزية	2	2	0	
NTU100	Democracy and Human Rights الديمقراطية وحقوق الانسان	2	2	0	
Total		30	20	10	

Level	First	Semester	Second		Bachelor's Degree in Medical Instrumentation
Module Code	Module Name in English	ECTS	Theoretical Hour/Week	Practical Hour/Week	
MIE 107	Alternating Current Circuit Analysis تحليل دوائر التيار المتناوب	8	4	4	
MIE 108	Mechanics الميكانيك	4	4	0	
MIE 109	Medical Physics الفيزياء الطبية	7	4	3	
NTU102	Computer الحاسوب	3	1	2	
MIE 111	Chemistry الكيمياء	6	3	3	
NTU103	Arabic Language اللغة العربية	2	2	0	
Total		30	18	12	

Level	Second	Semester	First		Bachelor's Degree in Medical Instrumentation Techniques
Module Code	Module Name in English	ECTS	Theoretical Hour/Week	Practical Hour/Week	
MIE 201	Medical Laboratory Instrumentation الاجهزة الطبية المختبرية	7	4	3	
MIE 202	Programming Languages اللغات البرمجية	3	1	2	
MIE 203	Principles of Electronic Circuits مبادئ الدوائر الالكترونية	6	3	3	
MIE209	Clinical Chemistry Techniques تقنيات الكيمياء السريرية	6	3	3	
MIE 205	Anatomy and Physiology التشريح والفسلجة	4	2	2	
NTU201	English language اللغة الانكليزية	2	2	0	
NTU200	The crimes of the Baath regime in Iraq جرائم نظام البعث في العراق	2	2	0	
Total		30	17	13	

Level	Second	Semester	Second		Bachelor's Degree in Medical Instrumentation Techniques Engineering
Module Code	Module Name in English	ECTS	Theoretical Hour/Week	Practical Hour/Week	
MIE 207	Logic Circuits الدوائر الرقمية	6	3	3	
MIE 208	Measurements and Medical Transducers محولات وقياسات طبية	6	3	3	
MIE 204	Engineering Mathematics الرياضيات الهندسية	6	6	0	
NTU202	Computers الحاسوب	3	1	2	
MIE 211	Electronic Circuits الدوائر الالكترونية	7	4	3	
NTU203	Arabic Language اللغة العربية	2	2	0	
Total		30	19	11	

Level	Third	Semester	First		Bachelor's Degree in Medical Instrumentation Techniques Engineering
Module Code	Module Name in English	ECTS	Theoretical Hour/Week	Practical Hour/Week	
MIE 301	Medical Diagnostic Instrumentation	7	4	3	
MIE 302	Power Electronics	4	2	2	
MIE 303	Signal Processing	6	3	3	
MIE 304	Fundamentals of Communication Engineering	6	3	3	
MIE 305	English Language 3	3	3	0	
MIE 306	Computer Applications	4	1	3	
Total		30	16	14	

Level	Third	Semester	Second		Bachelor's Degree in Medical Instrumentation Techniques Engineering
Module Code	Module Name in English	ECTS	Theoretical Hour/Week	Practical Hour/Week	
MIE 307	Medical Electronic Systems	6	3	3	
MIE 308	Medical Communication Systems	6	3	3	
MIE 309	Microprocessors	4	2	2	
MIE 310	Digital Signal Processing	6	3	3	
MIE 311	Electrical Technology	4	2	2	
MIE 313	Proffisional Ethics	2	2	-	
MIE 312	Systematic Training 2	2	0	2	
Total		30	15	15	

Level	Forth	Semester	First		Bachelor's Degree in Medical Instrumentation Techniques Engineering
Module Code	Module Name in English	ECTS	Theoretical Hour/Week	Practical Hour/Week	
MIE 401	Medical Therapeutic Instrumentation	7	4	3	
MIE 402	Medical Laser Systems	6	4	2	
MIE 403	Digital Image Processing	6	3	3	
MIE 404	Research Methodology	3	3	0	
MIE 405	Engineering Management	4	4	0	
MIE 406	Object Oriented Programing	4	1	3	
Total		30	19	11	

Level	Forth	Semester	Second		Bachelor's Degree in Medical Instrumentation Techniques Engineering
Module Code	Module Name in English	ECTS	Theoretical Hour/Week	Practical Hour/Week	
MIE 407	Radiation Engineering in Medical Applications	7	4	3	
MIE 408	Artificial Intelligence	6	2	4	
MIE 409	Control Systems	6	3	3	
MIE 410	English Language 4	3	3	0	
MIE 411	Project	8	0	6	
Total		30	12	16	

Contact Information

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