Ministry of higher education and scientific research,

scientific supervision and evaluation authority

Department of quality assurance and academic

accreditation, accreditation section



Academic Program and Course Description Guide

2025

Academic Program Description Form

University Name: Northern Technical University

College / Institute: Polytechnic Hawija College

Scientific Department: Department of Medical Device Maintenance Techniques

Name of the Academic or Vocational Program: Polytechnic System

1. Diploma in Medical Device Maintenance Techniques
2. Bachelor's Degree in Medical Device Maintenance Techniques

Final Degree Name:

1. Diploma in Medical Device Maintenance Techniques
2. Bachelor's Degree in Medical Device Maintenance Techniques

Study System: Bologna Process

Description Preparation Date: 1/9/2025
File Completion Date: 1/7/2026

Assistant Dean for Scientific Affairs

Name: Dr. Mohammed Ali Faris
Signature:
Date: 1/7/2026

Department Head

Name: M. Qutaiba Khalaf Khalil
Signature:
Date: 1/7/2026

Quality Assurance and University Performance Division

Name of Director of the Quality Assurance and University Performance Division:
M. M. Ahmed Abdul Khalaf
Date: 1/7/2026
Signature:

Approval of the Dean:

Course Information			
Course delivery mechanism	DC circuit analysis		Course Name
theoretical☒ Online lectures☐ laboratory☒ (solving exercises) Review☐ Practical training☐ seminar☐	Essential(C)		Course type
	MDET101		Course code
	8		ECTS units
	123		Number of hours per semester
1	semester	1	Academic level
Hawija Polytechnic College	College	Medical Device Engineering Technologies	The department responsible for the course
mohmdahmed-haw@ntu.edu.iq	Email	Mohammed Ahmed Khalaf	Course Coordinator
Master's	Academic qualifications of the course coordinator	Assistant teacher	Academic title of course coordinator
mohmdahmed-haw@ntu.edu.iq	Email	Mohammed Ahmed Khalaf	Course Instructor
engkutaibakk@ntu.edu.iq	Email	Qutaiba Khalaf Khalil	Scientific reference name
0.1	version	2025/9/1	Date of approval by the review committee

Academic Course Description Template

Relationship with other courses			
	semester	nothing	Introductory course
	semester	nothing	Joint (concurrent) course

Course objectives , learning outcomes, and guidelines with a brief description	
1. To provide students with the basic concepts of DC circuits, their components, .and their importance in engineering and medical applications 2. Introducing students to the basic laws and theories used in the analysis of DC .circuits, such as Ohm's law, Kirchhoff's laws, and circuit simplification theories 3. Developing students' ability to analyze electrical circuits containing resistors .and voltage and current sources using different analysis methods 4. Enabling students to calculate voltage, current, power, and energy in DC circuits .and to interpret the results correctly 5. To equip students with practical skills in using basic electrical measuring devices, such as multimeters and power supplies, to conduct DC circuit .experiments 6. Developing students' ability to link theoretical analysis with practical results, verify the accuracy of measurements, and analyze the reasons for any .differences 7. Preparing students to study subsequent courses in electronics, electrical measurements, and medical device systems that rely on the basic principles of .DC circuits 8. Enhance analytical thinking and engineering problem-solving skills by applying .the basic principles of DC circuit analysis in real-world applications	Course objectives
1. LO1 Explanation of the basic principles of DC circuits, including voltage, : .current, resistance, power and electrical energy 2. LO2 Applying Ohm's Law and Kirchhoff's Laws in the analysis of simple and : .complex DC circuits 3. LO3 DC circuit analysis using circuit analysis theories, such as the : superposition principle, Thevenin's theorem, Norton's theorem, and the .maximum power transfer theory 4. LO4 Calculating the values of voltage, current, resistance, power, and energy, : .and interpreting the results accurately 5. LO5 Use basic electrical measuring devices, such as multimeters and power : supplies, to measure electrical variables in DC circuits while adhering to safety .procedures 6. LO6 Perform laboratory experiments on DC circuits, compare practical results : .with theoretical results, and analyze the reasons for any differences 7. LO7 Employing analytical thinking and problem-solving skills in analyzing : and designing basic DC circuits relevant to engineering applications and .medical devices 8. LO8 Adherence to professional practices, work ethics, and safety procedures : .within the laboratory during the execution of electrical experiments	Learning outcomes for the subject
1. The basic principles of DC circuits include the basic electrical quantities, the .components of the circuits, and Ohm's law 2. Analysis of DC circuits using Kirchhoff's laws and methods of node and loop .analysis	Guidelines

3. Circuit analysis theories, including Thevenin's theory, Norton's theory, the .superposition principle, and the maximum power transfer theory 4. Electrical measurements and laboratory experiments related to DC circuits .using measuring devices and verification of practical results 5. .DC circuit applications in electrical and electronic systems and medical devices	
This fifteen-week course combines theoretical and practical aspects through classroom lectures and an independent laboratory, aiming to equip students with the fundamental knowledge and skills in DC circuit analysis. The course covers basic laws, circuit analysis methods, simplification theories, and the use of electrical measuring instruments, with laboratory applications that reinforce theoretical understanding and develop analytical and problem-solving skills. The semester concludes with a three-hour written final exam to assess the achievement of .learning outcomes	Semester description

Teaching and learning strategies	
1. Interactive lectures to explain the basic concepts and theories of DC circuit analysis. 2. Practical applications and laboratory experiments to develop practical skills in circuit analysis and the use of electrical measuring devices. 3. Solving problems and practical exercises to promote analytical thinking and the application of laws and theories in different engineering situations. 4. Cooperative learning and classroom discussions to develop communication skills, teamwork, and the exchange of ideas. 5. Self-learning through homework, guided readings, and the use of electronic educational resources to support continuous learning.	**Strategies**

Student's academic workload			
8.2	Student's regular weekly study load (hours/week)	123	The student's assigned workload during the semester (hours/ (season
5.4	Irregular weekly study load for the student (hours/week)	82	Irregular course load assigned to the student during the semester (hours/semester)
205			Total course load assigned to the student during the semester (hours/semester)

Course Material Assessment

Related Learning Outcomes(LOs)	Week	Weight (degrees)	Time / Number		
and 8 ,4 ,1	3.9	10% (10)	2	Short tests	Formative assessment
and 6 ,5 ,3 ,2	2.6	10% (10)	2	Duties	
everyone	continuous	10% (10)	1	Laboratory work	
and 7 ,5 ,3	11	10% (10)	1	Reports	
and 6 ,4 ,3 ,2 ,1	6	10% (10)	2h	Midterm exam	Final evaluation
everyone	16	50% (50)	3h	Final exam	
		100% (100)	Overall assessment		

Weekly theoretical curriculum	
covered materials	**Week**
Introduction to DC circuits, basic electrical quantities, and Ohm's law.	**1**
Connecting resistors in series and parallel and analyzing simple circuits.	**2**
Kirchhoff's laws of current and voltage and their applications.	**3**
Circuit analysis using the NodalAnalysis method.	**4**
Circuit analysis using theMesh Analysis method.	**5**
Midterm exam.	**6**
The principle of superposition(Superposition Theorem).	**7**
Theorem.	**8**
Norton Theorem.	**9**
Voltage and current source conversions.	**10**
Power Transfer Theorem.	**11**

Power, energy, and efficiency in DC circuits.	**12**
Analysis of circuits containing reliable sources and advanced applications.	**13**
Applications of DC circuits in electrical and electronic systems and medical devices.	**14**
A comprehensive review of the course and solving various applied problems.	**15**
Final exam	**16**

Practical weekly curriculum	
covered materials	**Week**
Learn about the electrical circuit laboratory, safety procedures, and learn about measuring devices and the continuous power supply.	**1**
Using a multimeter to measure voltage, current, and resistance.	**2**
Practically verifying Ohm's law.	**3**
Studying the connection of resistors in series and parallel and measuring electrical values.	**4**
Applying Kirchhoff's laws to direct current circuits.	**5**
Circuit analysis using the NodalAnalysis method.	**6**
Circuit analysis using theMesh Analysis method.	**7**
Practically verifying the principle of superposition(Superposition Theorem).	**8**
Finding and practically verifyingthe thevenin equivalent .	**9**
Finding and practically verifyingthe Norton equivalent .	**10**
Applying voltage and current source conversions to different circuits.	**11**
Verification of theMaximum Power Transfer Theorem.	**12**

Measuring power and energy in DC circuits.	**13**
Implementing an integrated circuit and applying different analysis methods to it, and comparing the theoretical results with the practical ones.	**14**
Practical applications of DC circuits in electronic systems and medical devices and preparation of the final laboratory report.	**15**

Learning and teaching resources

Is it available in ?the library	Textual source	
Yes	Nilsson, J. W., & Riedel, S. A., Electrical Circuits, 11th Edition, Pearson, 2019 .	Required text sources
Yes	Alexander, C.K., & Sadiku, M.N.O., Fundamentals of Electrical Circuits, 7th Edition, McGraw-Hill, 2021 .	Suggested text sources
• IEEE Xplore Digital Library (https://ieeexplore.ieee.org) • All About Circuits (https://www.allaboutcircuits.com) • Electronics Tutorials (https://www.electronics-tutorials.ws)		Websites

Grade chart

Definition	Grades (%)	Appreciation	Degree	The group
Outstanding performance	100-90	privilege	**A**	**Success Group(50-100)**
Above-average performance with some errors	89-80	very good	**B**	
Good performance with some noticeable errors	79-70	good	**C**	
Acceptable performance with significant shortcomings	69-60	middle	**D**	
Performance that meets the minimum requirements for success	59-50	acceptable	**E**	
Meeting certain requirements is necessary .to achieve the minimum success threshold	49-45	Accepted by decision	**FX**	**Failure group(0-49)**
It requires a great deal of work to .accomplish	44-0	Precipitate	**F**	

				-:note

Grades containing decimal places are rounded up to the nearest whole number. If the decimal is 0.5 or is greater, the grade is rounded up; if it is less than 0.5, it is rounded down. For example, a grade of 54.5 rounded up to 55, while a grade of 54.4 is rounded up to 54. The university has a policy of not awarding passing grades close to the passing grade. Therefore, the only adjustment made to grades awarded by the .grader is automatic rounding according to the rule mentioned above, without any other modifications

Course Information

Course delivery mechanism	Physics		Course Name
theoretical☒ Online lectures☐ laboratory☒ (solving exercises) Review☐ Practical training☐ Seminar☐	Essential(C)		Course type
	MDET10 2		Course code
	6		ECTS units
	78		Number of hours per semester
1	semester	1	Academic level
Hawija Polytechnic College	College	Medical Device Engineering Technologies	The department responsible for the course
husniyah_hwj@ntu.edu.iq	Email	Hassania Jassim Abdullah	Course Coordinator
Master's	Academic qualifications of the course coordinator	teacher	Academic title of course coordinator
husniyah_hwj@ntu.edu.iq	Email	Hassania Jassim Abdullah	Course Instructor
engkutaibakk@ntu.edu.iq	Email	Qutaiba Khalaf Khalil	Scientific reference name
0.1	version	2025/9/1	Date of approval by the review committee

Relationship with other courses			
	semester	nothing	Introductory course
	semester	nothing	Joint (concurrent) course

Course objectives , learning outcomes, and guidelines with a brief description	
1. To provide students with the basic concepts and principles in physics that form .the basis for understanding natural phenomena and engineering applications 2. Developing students' ability to interpret physical phenomena using basic .scientific laws and theories 3. To equip students with the skills necessary to analyze physical problems and .apply physical principles in engineering fields 4. Introducing students to the basic concepts of mechanics, heat, waves, sound, light, electricity and magnetism in a manner appropriate to the requirements of .the specialization 5. Developing practical skills in conducting physical experiments, using .laboratory measuring devices, analyzing and interpreting results 6. Enhancing scientific thinking and logical reasoning, and linking theoretical .aspects with practical applications 7. Preparing students to study subsequent engineering courses that rely on physical principles, particularly courses in electronics, measurements, and medical .devices 8. Establishing a culture of commitment to occupational safety procedures and .work ethics within scientific laboratories	Course objectives
1. LO1 Explanation of basic concepts and principles in physics and interpretation : .of natural phenomena based on physical laws 2. LO2 Applying physical laws and equations to solve problems related to : .mechanics, heat, waves, light, electricity and magnetism 3. LO3 Analyzing physical problems and interpreting results using appropriate : .scientific and mathematical methods 4. LO4 Using physical units, measurement systems and their conversions : .accurately in calculations and practical applications 5. LO5 Use basic measuring devices and laboratory equipment to conduct : .physical experiments while adhering to safety procedures 6. LO6 Conducting laboratory experiments, collecting data, analyzing results, : .comparing them to theoretical values, and writing scientific reports	Learning outcomes for the subject

7. LO7 Employing physical principles in interpreting engineering applications : .related to medical device engineering technologies 8. LO8 Demonstrate scientific thinking skills, teamwork, and commitment to : .professional practices while carrying out theoretical and practical activities	
1. The fundamentals of physics, including physical quantities, systems of units, .measurements and errors 2. Principles of mechanics and heat, including motion, forces, work, energy, and .thermal properties of matter 3. .Waves, sound, and light, their properties and basic applications 4. Electricity and magnetism, including the electric field, electric current, .magnetic field and the basic principles of electromagnetism 5. Laboratory experiments and engineering applications, using physical measuring devices and linking physical principles to their applications in engineering and .medical devices	Guidelines
This fifteen-week course, worth**6 European Credit Transfer and Accumulation System(ECTS) units** includes theoretical lectures and practical applications in a , dedicated laboratory. Its aim is to equip students with fundamental concepts and principles of physics and develop their skills in analyzing physical phenomena and applying scientific laws to engineering fields. The course focuses on the study of mechanics, heat, waves, light, electricity, and magnetism, alongside conducting laboratory experiments and using physical measuring instruments to analyze results and relate them to practical applications. This supports students' understanding of subsequent engineering courses, particularly in the field of biomedical engineering technologies. The course concludes with a three-hour written final examination to assess students' achievement of the targeted learning outcomes.	Semester description

Teaching and learning strategies	
1. Interactive lectures to explain basic physical concepts and laws and link them to .engineering applications 2. Laboratory experiments to develop practical skills in conducting physical .measurements, using laboratory equipment, and analyzing results 3. Solving problems and practical exercises to enhance scientific thinking skills and .apply physical laws in practical situations 4. Cooperative learning and classroom discussions to develop communication skills, .teamwork, and the exchange of scientific ideas 5. Self-learning through homework, guided readings, and the use of electronic .educational resources to support continuous learning	**Strategies**

Student's academic workload			
5.2	Student's regular weekly study load (hours/week)	78	The student's assigned workload during the semester (hours/ (season
4.3	Irregular weekly study load for the student (hours/week)	65	Irregular course load assigned to the student during the semester (hours/semester)
143			Total course load assigned to the student during the semester (hours/semester)

Course Material Assessment					
Related Learning Outcomes(LOs)	Week	Weight (degrees)	Time / Number		
and 4 ,2 ,1	4,8,10	10% (10)	3	Short tests	Formative assessment
and 6 ,5 ,3 ,2	2,6,13	10% (10)	1	Duties	
everyone	continuous	10% (10)	1	My work is in .the laboratory	
and 7 ,5 ,3	3, 5, 9	10% (10)	4	Reports	
and 8 ,7 ,4 ,2 ,1	7	10% (10)	2h	Midterm exam	Final evaluation
everyone	16	50% (50)	3h	Final exam	
		100% (100)	Overall assessment		

Weekly theoretical curriculum	
covered materials	**Week**
Introduction to physics, physical quantities, systems of units, and measurements.	**1**
Motion in a straight line, speed, and acceleration.	**2**
Newton's laws of motion and their applications.	**3**

Work, energy, power, and conservation of energy.	**4**
The physical properties of the material, temperature, and thermal expansion.	**5**
Midterm exam.	**6**
Heat, heat capacity, and heat transfer.	**7**
Vibratory motion, waves and their properties.	**8**
Sound, its characteristics and applications.	**9**
Light, reflection, refraction, and lenses.	**10**
Static electricity, electric charge, and Coulomb's law.	**11**
Electric field, electric potential, and electric capacitance.	**12**
Electric current, resistance, and Ohm's law.	**13**
Magnetism, magnetic field, and electromagnetic induction.	**14**
A comprehensive review of the course and solving various applied problems.	**15**
.End-of-term exam	**16**

Practical weekly curriculum	
covered materials	**Week**
Familiarization with the physics laboratory, safety procedures, and basic measuring instruments.	**1**
Physical measurements, use of measuring instruments, and calculation of experimental errors.	**2**
Studying motion in a straight line and calculating speed and acceleration practically.	**3**
Verifying Newton's laws using laboratory experiments.	**4**

Measuring work, energy, and power in mechanical systems.	**5**
Studying the thermal expansion of materials.	**6**
Measuring heat capacity and heat transfer.	**7**
Studying vibrational motion and wave properties.	**8**
Measuring the speed of sound and studying its properties.	**9**
Studying the reflection and refraction of light using lenses and mirrors.	**10**
Studying static electricity and Coulomb's law.	**11**
Measuring voltage, current, and resistance in simple electrical circuits.	**12**
Studying the magnetic field using magnets and coils.	**13**
Applications of electromagnetic induction using laboratory experiments.	**14**
Conducting a comprehensive physics experiment, analyzing the results, and preparing the final laboratory report.	**15**

Learning and teaching resources		
Is it available in ?the library	Textual source	
Yes	Halliday, D., Resnick, R., & Walker, J., *Fundamentals of Physics* , 12th Edition, Wiley, 2022.	Required text sources
Yes	Serway, RA, & Jewett, JW, *Physics for Scientists and Engineers* , 10th Edition, Cengage Learning, 2019.	Suggested text sources
• HyperPhysics – Georgia State University (http://hyperphysics.phy-astr.gsu.edu) • The Physics Classroom (https://www.physicsclassroom.com) • MIT OpenCourseWare – Physics (https://ocw.mit.edu)		Websites

Grade chart				
Definition	**Grades (%)**	**Appreciation**	**Degree**	**The group**
Outstanding performance	100-90	privilege	**A**	**Success Group(50-100)**
Above-average performance with some errors	89-80	very good	**B**	
Good performance with some noticeable errors	79-70	good	**C**	
Acceptable performance with significant shortcomings	69-60	middle	**D**	
Performance that meets the minimum requirements for success	59-50	acceptable	**E**	
Meeting certain requirements is necessary .to achieve the minimum passing grade	49-45	Accepted by decision	**FX**	**Failure group(0-49)**
It requires a great deal of work to .accomplish	44-0	Precipitate	**F**	
			-:note	
Grades containing decimal places are rounded up to the nearest whole number. If the decimal is 0.5 or greater, the grade is rounded up; if it is less than 0.5, it is rounded down. For example, a grade of 54.5 is rounded up to 55, while a grade of 54.4 is rounded up to 54. The university has a policy of not awarding passing grades close to the passing grade. Therefore, the only adjustment made to grades awarded by the .grader is automatic rounding according to the rule mentioned above, without any other modifications				

Course Information		
Course delivery mechanism	mathematics	Course Name
theoretical☒ Online lectures☐ laboratory☐ (solving exercises) Review☒ Practical training☐ seminar☐	Essential(C)	Course type
	MDET10 3	Course code
	6	ECTS units
	93	Number of hours per semester

1	semester	1	Academic level
Hawija Polytechnic College	College	Medical Device Engineering Technologies	The department responsible for the course
firashussain-haw@ntu.edu.iq	Email	Firas Hussein Merie	Course Coordinator
Master's	Academic qualifications of the course coordinator	Assistant teacher	Academic title of course coordinator
firashussain-haw@ntu.edu.iq	Email	Firas Hussein Merie	Course Instructor
Muneef_hwj@ntu.edu.iq	Email	Munif Abdullah Ahmed	Scientific reference name
0.1	version	2025/9/1	Date of approval by the review committee

Relationship with other courses

	semester	nothing	Introductory course
	semester	nothing	Joint (concurrent) course

Course objectives , learning outcomes, and guidelines with a brief description

1. To provide students with the basic concepts and principles in mathematics .necessary for studying scientific and engineering courses 2. Developing students' ability to use mathematical methods in analyzing .problems and finding appropriate solutions 3. To equip students with basic skills in algebra, functions, trigonometry, calculus .and their applications 4. Developing skills in logical thinking, mathematical analysis, and reasoning in .problem-solving 5. To enable students to employ mathematical concepts in interpreting and .analyzing scientific and engineering phenomena 6. Preparing students to study subsequent courses that are based on mathematical .principles 7. Encouraging students to use appropriate mathematical methods and tools in .performing calculations and analyzing results accurately 8. Enhancing self-learning skills, accuracy, and scientific methodology in .addressing mathematical problems	Course objectives

1. LO1 Explanation of the basic concepts and principles in algebra, functions, : .trigonometry, and calculus 2. LO2 Applying mathematical rules and methods to solve mathematical : .problems and equations 3. LO3 Analyzing functions, representing them graphically, and interpreting their : .properties using appropriate mathematical methods 4. LO4 Using differential and integral calculus in solving mathematical problems : .and basic scientific applications 5. LO5 Employing mathematical concepts in analyzing scientific and : .engineering problems and finding appropriate solutions 6. LO6 Using mathematical symbols and formulas accurately and performing : .calculations according to correct mathematical principles 7. LO7 Developing logical thinking, analysis, and deduction skills in dealing : .with mathematical problems 8. LO8 Demonstrate accuracy and adherence to the scientific method when : .solving mathematical problems and presenting the results	Learning outcomes for the subject
1. The fundamentals of mathematics, including algebra, functions, equations, and .trigonometry 2. .Differentiation, including limits, derivatives, and their applications 3. Integration, including indefinite and definite integration and its basic .applications 4. Equations and mathematical applications, using mathematical methods to solve .problems 5. Scientific and engineering applications of mathematical concepts in problem .analysis	Guidelines
This fifteen-week course, comprising six European Credit Transfer and) Accumulation SystemECTS units, includes four hours of lectures per week and (two hours of practice exercises per week. Its aim is to equip students with fundamental mathematical concepts and principles, and to develop their skills in mathematical analysis and problem-solving using appropriate mathematical methods. The course focuses on algebra, functions, trigonometry, calculus, and their applications. Practice exercises are used to reinforce understanding, develop logical reasoning skills, and apply mathematical concepts to scientific and engineering problems. The course concludes with a three-hour written final .examination to assess students' achievement of the learning outcomes	Semester description

Teaching and learning strategies	
1. .Interactive lectures to explain basic mathematical concepts, theories, and methods 2. Exercise solving sessions to develop mathematical analysis skills and apply concepts .in solving various problems 3. Solving applied problems to promote logical thinking, mathematical reasoning, and .linking concepts to scientific applications 4. Classroom discussions and collaborative learning to exchange ideas and develop .communication and teamwork skills in problem-solving 5. Self-learning through homework, guided readings, and the use of electronic .educational resources to support continuous learning	**Strategies**

Student's academic workload			
6.2	Student's regular weekly study load (hours/week)	93	The student's assigned workload during the semester (hours/ (season
4.3	Irregular weekly study load for the student (hours/week)	65	Irregular course load assigned to the student during the semester (hours/semester)
158			Total course load assigned to the student during the semester (hours/semester)

Course Material Assessment					
Related Learning Outcomes(LOs)	Week	Weight (degrees)	Time / Number		
and 4 ,2 ,1	3, 8, 10, 12	20% (20)	4	Short tests	Formative assessment
and 6 ,5 ,3 ,2	2,6,10	15% (15)	3	Duties	
				My work is in .the laboratory	
and 7 ,5 ,3	9	5% (5)	1	Reports	
and 8 ,4 ,2	7	10% (10)	2h	Midterm exam	Final evaluation
everyone	16	50% (50)	3h	Final exam	
		100% (100)	Overall assessment		

Weekly theoretical curriculum	
covered materials	**Week**
Review of the basics of algebra, sets, and number systems.	**1**
Functions, their types, and their graphical representation.	**2**
Trigonometry and basic trigonometric identities.	**3**
Limits and continuity of functions.	**4**
Differentiation and rules of derivation.	**5**
Midterm exam.	**6**
Applications of differential calculus.	**7**
Indefinite integrals and integration rules.	**8**
Definite integration and its applications.	**9**
Exponential and logarithmic functions.	**10**
Complex numbers and polar representation.	**11**
Matrices and determinants.	**12**
Solving systems of linear equations using matrices.	**13**
Vectors and their basic applications.	**14**
A comprehensive review of the course and solving various applied problems.	**15**
The final exam.	**16**

Learning and teaching resources		
Is it available in ?the library	Textual source	
Yes	Anton, H., Bivens, I., & Davis, S., Calculus: Early Transcendentals, 11th Edition, Wiley, 2016 .	Required text sources
Yes	Stewart, J., Calculus: Early Transcendentals, 9th Edition, Cengage Learning, 2021 .	Suggested text sources
• MIT OpenCourseWare – Mathematics (https://ocw.mit.edu) • Khan Academy – Mathematics (https://www.khanacademy.org/math) • Paul's Online Math Notes (https://tutorial.math.lamar.edu)		Websites

Grade chart				
Definition	**Grades (%)**	**Appreciation**	**Degree**	**The group**
Outstanding performance	100-90	privilege	**A**	**Success Group(50-100)**
Above-average performance with some errors	89-80	very good	**B**	
Good performance with some noticeable errors	79-70	good	**C**	
Acceptable performance with significant shortcomings	69-60	middle	**D**	
Performance that meets the minimum requirements for success	59-50	acceptable	**E**	
Meeting certain requirements is necessary .to achieve the minimum passing grade	49-45	Accepted by decision	**FX**	**Failure group(0-49)**
It requires a great deal of work to .accomplish	44-0	Precipitate	**F**	
			-:note	
Grades containing decimal places are rounded up to the nearest whole number. If the decimal is 0.5 or greater, the grade is rounded up; if it is less than 0.5, it is rounded down. For example, a grade of 54.5 is rounded up to 55, while a grade of 54.4 is rounded up to 54. The university has a policy of not awarding passing grades close to the passing grade. Therefore, the only adjustment made to grades awarded by the .grader is automatic rounding according to the rule mentioned above, without any other modifications				

Course Information			
Course delivery mechanism		Anatomy and Physiology	Course Name
theoretical☒ Online lectures☐ laboratory☒ (solving exercises) Review☐ Practical training☐ seminar☒		Essential(C)	Course type
		MDET10 4	Course code
		6	ECTS units
		64	Number of hours per semester
1	semester	1	Academic level
Hawija Polytechnic College	College	Medical Device Engineering Technologies	The department responsible for the course
wisamjasim111-haw@ntu.edu.iq	Email	Wissam Jassim Mohammed	Course Coordinator
PhD	Academic qualifications of the course coordinator	teacher	Academic title of course coordinator
wisamjasim111-haw@ntu.edu.iq	Email	Wissam Jassim Mohammed	Course Instructor
engkutaibakk@ntu.edu.iq	Email	Qutaiba Khalaf Khalil	Scientific reference name
0.1	version	2025/9/1	Date of approval by the review committee

Relationship with other courses			
	semester	nothing	Introductory course
	semester	nothing	Joint (concurrent) course

Course objectives , learning outcomes, and guidelines with a brief description	
1. To provide students with the basic concepts of human anatomy and the .functions of its various systems 2. Introducing students to the anatomical structure of the main organs and systems .and the functional relationships between them 3. Developing students' ability to interpret the normal physiological functions of .different body systems 4. To provide students with the basic knowledge that enables them to understand .the medical and engineering principles related to medical devices 5. Developing skills to link the anatomical structure and physiological function of .organs 6. .Preparing students to study subsequent related medical and engineering courses 7. Enhancing observation and scientific analysis skills when studying the human .body 8. Establishing a commitment to work ethics and safety within medical .laboratories	Course objectives
1. LO1 Explanation of the basic anatomical structure of the human body and its : .various systems 2. LO2 Explanation of the normal physiological functions of the major systems : .in the human body 3. LO3 Differentiating between the components of different tissues and organs : .and their functions 4. LO4 Analyzing the relationship between the anatomical structure and : .physiological function of organs 5. LO5 Using anatomical models and educational tools to identify parts of the : .human body 6. LO6 Performing laboratory activities related to anatomy and physiology, : .recording observations, and analyzing results 7. LO7 Employing basic concepts in anatomy and physiology to understand : .medical and engineering applications 8. LO8 Compliance with safety procedures and professional practices during the : .execution of laboratory activities	Learning outcomes for the subject
1. Fundamentals of anatomy, physiology, and structural organization of the human .body 2. .The skeletal, muscular, and nervous systems 3. .The circulatory system and the respiratory system 4. .The digestive system, the urinary system, and the endocrine system 5. .Laboratory applications, anatomical models, and medical applications	Guidelines
This fifteen-week course, comprising six European Credit Transfer and Supervision)ECTS units, includes theoretical lectures and practical applications in a (dedicated laboratory. Its aim is to provide students with fundamental knowledge of human anatomy and the functions of its various systems, and to develop their understanding of the relationship between anatomical structure and the	Semester description

physiological function of organs and vital systems. The course focuses on the study of the major systems of the human body, utilizing anatomical models and laboratory activities to enhance understanding and connect theoretical concepts to medical and engineering applications. The course concludes with a three-hour written final examination to assess students' achievement of the targeted learning .outcomes	

Teaching and learning strategies	
1. .Interactive lectures to explain the basic concepts in anatomy and physiology 2. Laboratory experiments and the use of anatomical models to develop practical skills .and understanding of body structures 3. Classroom discussions and simple case studies to link theoretical concepts to .medical applications 4. .Collaborative learning through group activities and scientific demonstrations 5. .Self-learning using scientific references and electronic educational media	**Strategies**

Student's academic workload			
4.2	Student's regular weekly study load (hours/week)	64	The student's assigned workload during the semester (hours/ (season
4.3	Irregular weekly study load for the student (hours/week)	75	Irregular course load assigned to the student during the semester (hours/semester)
139			Total course load assigned to the student during the semester (hours/semester)

Course Material Assessment				
Related Learning Outcomes(LOs)	Week	Weight (degrees)	Time / Number	

and 4 ,3 ,2	4.10	10% (10)	2	Short tests	Formative assessment
and 5 4	6	5% (5)	1	Duties	
everyone	continuous	15% (15)	1	Laboratory work	
and 7 ,5 ,4	3, 5, 9 , 13	10% (10)	4	Reports	
and 8 ,7 ,4 ,2 ,1	7	10% (10)	2h	Midterm exam	Final evaluation
everyone	16	50% (50)	3h	Final exam	
		100% (100)	Overall assessment		

Weekly theoretical curriculum	
covered materials	**Week**
Introduction to the anatomy, physiology and structural organization of the human body.	**1**
The cell, tissues, and body membranes.	**2**
The skeletal system.	**3**
The muscular system.	**4**
The nervous system.	**5**
Midterm exam.	**6**
The circulatory system, heart, and blood vessels.	**7**
The respiratory system.	**8**
The digestive system.	**9**
The urinary system.	**10**
The endocrine system.	**11**
The reproductive system.	**12**

Special sensory organs.	**13**
Integration of body systems and internal balance(homeostasis).	**14**
A comprehensive review of the course.	**15**
The final exam.	**16**

Practical weekly curriculum	
covered materials	**Week**
Familiarization with the anatomy and physiology laboratory and safety procedures.	**1**
Studying cells and tissues using models and educational slides.	**2**
Identifying the bones of the skeleton.	**3**
Studying the major muscles in the human body.	**4**
Identifying the components of the nervous system using anatomical models.	**5**
Studying the anatomy of the heart and blood vessels.	**6**
Studying the respiratory system using anatomical models.	**7**
Study of the organs of the digestive system.	**8**
Study of the urinary system.	**9**
Study of the endocrine glands.	**10**
Study of the reproductive system.	**11**
Identifying the special sense organs.	**12**
Measuring some basic physiological indicators (pulse, blood pressure, respiratory rate).	**13**

Linking physiological changes to the functions of body systems.	**14**
A comprehensive practical review and use of anatomical models.	**15**

Learning and teaching resources		
Is it available in ?the library	Textual source	
Yes	Tortora, G. J., & Derrickson, B., Principles of Anatomy and Physiology, 16th Edition, Wiley, 2021 .	Required text sources
Yes	Marieb, E.N., & Hoehn, K., Human Anatomy & Physiology, 12th Edition, Pearson, 2023 .	Suggested text sources
• Visible Body (https://www.visiblebody.com) • TeachMeAnatomy (https://teachmeanatomy.info) • MedlinePlus – Anatomy (https://medlineplus.gov/anatomy.html)		Websites

Grade chart				
Definition	**Grades (%)**	**Appreciation**	**Degree**	**The group**
Outstanding performance	100-90	privilege	**A**	**Success Group(50-100)**
Above-average performance with some errors	89-80	very good	**B**	
Good performance with some noticeable errors	79-70	good	**C**	
Acceptable performance with significant shortcomings	69-60	middle	**D**	
Performance that meets the minimum requirements for success	59-50	acceptable	**E**	
Meeting certain requirements is necessary .to achieve the minimum passing grade	49-45	Accepted by decision	**FX**	**Failure group(0-49)**
It requires a great deal of work to .accomplish	44-0	Precipitate	**F**	

	-:note
Grades containing decimal places are rounded up to the nearest whole number. If the decimal is 0.5 or is greater, the grade is rounded up; if it is less than 0.5, it is rounded down. For example, a grade of 54.5 rounded up to 55, while a grade of 54.4 is rounded up to 54. The university has a policy of not awarding passing grades close to the passing grade. Therefore, the only adjustment made to grades awarded by the .grader is automatic rounding according to the rule mentioned above, without any other modifications	

Course Information			
Course delivery mechanism	English language		Course Name
theoretical☒ Online lectures☐ laboratory☐ (solving exercises) Review☐ Practical training☐ seminar☒	Sand(S)		Course type
	NTU101		Course code
	2		ECTS units
	34		Number of hours per semester
1	semester	1	Academic level
Hawija Polytechnic College	College	Medical Device Engineering Technologies	The department responsible for the course
engkutaibakk@ntu.edu.iq	Email	Qutaiba Khalaf Khalil	Course Coordinator
Master's	Academic qualifications of the course coordinator	teacher	Academic title of course coordinator
engkutaibakk@ntu.edu.iq	Email	Qutaiba Khalaf Khalil	Course Instructor
Muneef_hwj@ntu.edu.iq	Email	Munif Abdullah Ahmed	Scientific reference name
0.1	version	2025/9/1	Date of approval by the review committee

Relationship with other courses

	semester	nothing	Introductory course
	semester	nothing	Joint (concurrent) course

Course objectives , learning outcomes, and guidelines with a brief description	
1. Developing students' skills in using the English language in listening, speaking, .reading, and writing 2. To equip students with the basic vocabulary and linguistic structures necessary .for academic communication 3. Developing reading, comprehension, and understanding skills for general and .academic texts 4. Developing students' ability to write sentences and short paragraphs in English .correctly 5. Enhancing oral communication skills through classroom activities and .discussions 6. .Developing skills in using English grammar rules in different contexts 7. Encouraging students to learn independently and to utilize electronic .educational resources to develop their language skills 8. Preparing students to use the English language in studying subsequent academic .courses	Course objectives
1. LO1 To learn and correctly use basic vocabulary and structures in the English : .language 2. LO2 Understanding simple English texts and extracting the main ideas from : .them 3. LO3 .Applying basic English grammar rules in speaking and writing : 4. LO4 .Writing short sentences and paragraphs using correct linguistic structures : 5. LO5 Using appropriate vocabulary and expressions in everyday and academic : .communication situations 6. LO6 .Developing listening and speaking skills through classroom activities : 7. LO7 Employing reading and writing skills in completing academic activities : .and assignments 8. LO8 Demonstrate the ability to learn independently and develop language : .skills using various educational resources	Learning outcomes for the subject
1. The basics of the English language, including vocabulary, structures, and basic .grammar 2. .Reading and comprehension skills for general and academic texts 3. .Writing skills, and the ability to formulate short sentences and paragraphs 4. .Listening and speaking skills in different communication situations	Guidelines

5. .Language applications and classroom activities to develop communication skills	
) European Credit Transfer Units two This fifteen-week course, comprisingECTS includes lectures designed to develop fundamental English language skills, ,(including listening, speaking, reading, and writing, while also enhancing the use of grammar and vocabulary in academic and everyday contexts. The course focuses on developing students' ability to comprehend texts, communicate effectively, and write grammatically correct sentences and paragraphs, while encouraging self-directed learning and the use of modern educational resources. The course concludes with a three-hour written final examination to assess students' .achievement of the targeted learning outcomes	Semester description

Teaching and learning strategies	
1. .Interactive lectures to explain basic vocabulary, grammar, and language skills 2. .Classroom activities to develop reading, writing, listening, and speaking skills 3. Discussions and collaborative work to enhance communication skills and language .use in different situations 4. Solve language exercises to apply grammar and vocabulary and improve language .performance 5. Self-learning through homework, guided readings, and the use of electronic .educational resources	**Strategies**

Student's academic workload			
2.2	Student's regular weekly study load (hours/week)	34	The student's assigned workload during the semester (hours/ (season
0.6	Irregular weekly study load for the student (hours/week)	10	Irregular course load assigned to the student during the semester (hours/semester)
44			Total course load assigned to the student during the semester (hours/semester)

Course Material Assessment					
Related Learning Outcomes(LOs)	Week	Weight (degrees)	Time / Number		
and 4 ,2 ,1	3,8,12	20% (20)	3	Short tests	Formative assessment
and 6 ,5 ,3 ,2	2,6,10	15% (15)	3	Duties	
				My work is in .the laboratory	
and 7 ,5 ,3	9	5% (5)	1	Reports	
and 8 ,4 ,2	7	10% (10)	2h	Midterm exam	Final evaluation
everyone	16	50% (50)	3h	Final exam	
		100% (100)	Overall assessment		

Weekly theoretical curriculum	
covered materials	**Week**
Course introduction, introductions, and a review of the basics of the English language.	**1**
Speech.	**2**
Basic tenses(Simple Present & Present Continuous).	**3**
Past tenses(Simple Past & Past Continuous).	**4**
Future Forms.	**5**
Midterm exam.	**6**
Nouns, pronouns, adjectives, and adverbs.	**7**
Verbs.	**8**
Prepositions and conjunctions.	**9**

Reading and comprehension skills.	**10**
Writing skills and the ability to formulate sentences and paragraphs.	**11**
Developing common vocabulary and expressions.	**12**
Listening and speaking skills.	**13**
Language applications and short conversations.	**14**
A comprehensive review of the course.	**15**
The final exam.	**16**

Learning and teaching resources		
Is it available in ?the library	Textual source	
Yes	Murphy, R., English Grammar in Use, 5th Edition, Cambridge University Press, 2019 .	Required text sources
Yes	Oxenden, C., Latham-Koenig, C., & Lambert, J., English File: Elementary, 4th Edition, Oxford University Press, 2019 .	Suggested text sources
• Cambridge English (https://www.cambridgeenglish.org) • British Council – LearnEnglish (https://learnenglish.britishcouncil.org) • BBC Learning English (https://www.bbc.co.uk/learningenglish)		Websites

Grade chart				
Definition	**Grades (%)**	**Appreciation**	**Degree**	**The group**
Outstanding performance	100-90	privilege	**A**	**Success Group(50-100)**
Above-average performance with some errors	89-80	very good	**B**	
Good performance with some noticeable errors	79-70	good	**C**	

Acceptable performance with significant shortcomings	69-60	middle	**D**	
Performance that meets the minimum requirements for success	59-50	acceptable	**E**	
Meeting certain requirements is necessary .to achieve the minimum success threshold	49-45	Accepted by decision	**FX**	**Failure group(0-49)**
It requires a great deal of work to .accomplish	44-0	Precipitate	**F**	
			-:note	
Grades containing decimal places are rounded up to the nearest whole number. If the decimal is 0.5 or greater, the grade is rounded up; if it is less than 0.5, it is rounded down. For example, a grade of 54.5 is rounded up to 55, while a grade of 54.4 is rounded up to 54. The university has a policy of not awarding passing grades close to the passing grade. Therefore, the only adjustment made to grades awarded by the .grader is automatic rounding according to the rule mentioned above, without any other modifications				

Course Information			
Course delivery mechanism	Democracy and human rights		Course Name
theoretical☒ Online lectures☐ laboratory☐ (solving exercises) Review☐ Practical training☐ seminar☐	Sand(S)		Course type
	NTU100		Course code
	2		ECTS units
	33		Number of hours per semester
1	semester	1	Academic level
Hawija Polytechnic College	College	Medical Device Engineering Technologies	The department responsible for the course
	Email	Ammar Khalil Ahmed	Course Coordinator
Master's	Academic qualifications of the course coordinator	Assistant teacher	Academic title of course coordinator

	Email	Ammar Khalil Ahmed	Course Instructor
mohammedyaseen_hwj@ntu.edu.iq	Email	Mohammed Yassin Mohammed	Scientific reference name
0.1	version	2025/9/1	Date of approval by the review committee

Relationship with other courses			
	semester	nothing	Introductory course
	semester	nothing	Joint (concurrent) course

Course objectives , learning outcomes, and guidelines with a brief description	
1. Introducing students to the concepts of democracy and human rights and their importance in building society and the rule of law. 2. Developing students' awareness of the basic principles of democracy, the values of citizenship and community participation. 3. To provide students with knowledge of the fundamental rights and freedoms guaranteed by international conventions and national legislation. 4. Promoting a culture of respect for diversity and tolerance, and rejecting discrimination and violence. 5. Developing students' ability to analyze issues related to human rights and democracy objectively. 6. Establishing the principles of social responsibility and commitment to ethical and professional values. 7. Encouraging students to participate positively in community service and promoting a culture of dialogue. 8. Preparing students to understand the relationship between human rights, sustainable development, and social stability.	Course objectives
1. LO1 Explanation of the basic concepts of democracy, human rights and citizenship : 2. LO2 Distinction of fundamental rights and freedoms contained in international conventions and national legislation : 3. LO3 Interpretation of democratic principles and mechanisms for participation in public life :	Learning outcomes for the subject

4. LO4 .Analyzing human rights issues in light of legal and ethical principles : 5. LO5 Employing the concepts of democracy and human rights in everyday and : .academic situations 6. LO6 Participating in discussions and activities that promote a culture of : .dialogue and respect for other opinions 7. LO7 Demonstrating commitment to the values of citizenship, social : .responsibility and respect for diversity 8. LO8 Applying human rights principles and ethics in the university and : .community environment	
1. .Concepts of democracy, human rights, and citizenship 2. .The basic principles of democracy and mechanisms of political participation 3. Fundamental rights and freedoms in international conventions and the Iraqi .constitution 4. .A culture of tolerance, equality, the rule of law, and social responsibility 5. .Contemporary applications and issues in democracy and human rights	Guidelines
) This fifteen-week course, comprising two European Credit Transfer UnitsECTS includes theoretical lectures designed to introduce students to the concepts of ,(democracy, human rights, and citizenship. It aims to cultivate their awareness of the importance of respecting fundamental rights and freedoms and to instill the values of justice, equality, and the rule of law. The course focuses on studying democratic principles, relevant international conventions, and national legislation, while also promoting a culture of dialogue, tolerance, and social responsibility. This contributes to preparing students to participate positively in society. The course concludes with a three-hour written final examination to assess the extent to which .students have achieved the targeted learning outcomes	Semester description

Teaching and learning strategies	
1. .Interactive lectures to explain the concepts of democracy and human rights 2. Classroom discussions to promote a culture of dialogue and respect for other .opinions 3. Studying contemporary cases and topics to develop critical thinking and analyze .societal issues 4. .Collaborative learning through group activities and presentations 5. Self-learning through guided readings, assignments, and the use of electronic .resources	**Strategies**

Student's academic workload			
2.2	Student's regular weekly study load (hours/week)	33	The student's assigned workload during the semester (hours/

			(season
1.3	Irregular weekly study load for the student (hours/week)	20	Irregular course load assigned to the student during the semester (hours/semester)
53			Total course load assigned to the student during the semester (hours/semester)

Course Material Assessment

Related Learning Outcomes(LOs)	Week	Weight (degrees)	Time / Number		
and 4 ,2 ,1	5.12	15% (15)	2	Short tests	Formative assessment
and 6 ,5 ,3	5	10% (10)	1	Duties	
				My work is in .the laboratory	
and 7 ,5 ,3	9	15% (15)	1	Reports	
and 8 ,4 ,2	7	10% (10)	2h	Midterm exam	Final evaluation
everyone	16	50% (50)	3h	Final exam	
		100% (100)	Overall assessment		

Weekly theoretical curriculum

covered materials	Week
An introduction to democracy and human rights.	**1**
The concept of democracy, its origins and development.	**2**

Principles and forms of democracy.	**3**
The concept of human rights and its characteristics.	**4**
International human rights conventions and declarations.	**5**
Midterm exam.	**6**
Civil and political rights.	**7**
Economic, social, and cultural rights.	**8**
The rights of women, children, and vulnerable groups.	**9**
Citizenship and social responsibility.	**10**
The Iraqi Constitution and Human Rights.	**11**
The rule of law and the independence of the judiciary.	**12**
Tolerance, acceptance of others, and rejection of discrimination.	**13**
Contemporary challenges to democracy and human rights.	**14**
A comprehensive review of the course.	**15**
The final exam.	**16**

Learning and teaching resources		
Is it available in the library?	Textual source	
Yes	Lectures of the Iraqi Ministry of Higher Education and Scientific Research on Democracy and Human Rights (Approved Edition).	Required text sources
Yes	United Nations, Universal Declaration of Human Rights.	Suggested text sources

• United Nations Human Rights(OHCHR) website: https://www.ohchr.org • United Nations Development Programme(UNDP) website: https://www.undp.org • Website of the Office of the High Commissioner for Human Rights in Iraq: https://www.ihchr.iq	Websites

Grade chart

Definition	Grades (%)	Appreciation	Degree	The group
Outstanding performance	100-90	privilege	**A**	**Success Group(50-100)**
Above-average performance with some errors	89-80	very good	**B**	
Good performance with some noticeable errors	79-70	good	**C**	
Acceptable performance with significant shortcomings	69-60	middle	**D**	
Performance that meets the minimum requirements for success	59-50	acceptable	**E**	
Meeting certain requirements is necessary .to achieve the minimum passing grade	49-45	Accepted by decision	**FX**	**Failure group(0-49)**
It requires a great deal of work to .accomplish	44-0	Precipitate	**F**	
			-:note	

Grades containing decimal places are rounded up to the nearest whole number. If the decimal is 0.5 or greater, the grade is rounded up; if it is less than 0.5, it is rounded down. For example, a grade of 54.5 is rounded up to 55, while a grade of 54.4 is rounded up to 54. The university has a policy of not awarding passing grades close to the passing grade. Therefore, the only adjustment made to grades awarded by the .grader is automatic rounding according to the rule mentioned above, without any other modifications

Course Information

Course delivery mechanism	AC circuit analysis	Course Name

theoretical☒ Online lectures☐ laboratory☒ (solving exercises) Review☒ Practical training☐ Seminar☐	Essential(C)		Course type
	MDET105		Course code
	7		ECTS units
	108		Number of hours per semester
2	semester	1	Academic level
Hawija Polytechnic College	College	Medical Device Engineering Technologies	The department responsible for the course
mohmdahmed-haw@ntu.edu.iq	Email	Mohammed Ahmed Khalaf	Course Coordinator
Master's	Academic qualifications of the course coordinator	Assistant teacher	Academic title of course coordinator
mohmdahmed-haw@ntu.edu.iq	Email	Mohammed Ahmed Khalaf	Course Instructor
engkutaibakk@ntu.edu.iq	Email	Qutaiba Khalaf Khalil	Scientific reference name
0.1	version	2025/9/1	Date of approval by the review committee

Relationship with other courses

	semester	nothing	Introductory course
	semester	nothing	Joint (concurrent) course

Course objectives , learning outcomes, and guidelines with a brief description

1. To provide students with the basic concepts of alternating current circuits and .their importance in electrical and electronic applications 2. Introducing students to the properties of sinusoidal signals Complex numbers .are used in the analysis of alternating current circuits 3. Developing students' ability to analyze resistor, inductor, capacitor, and .composite circuits using different analysis methods	Course objectives

4. To provide students with knowledge of the concepts of impedance, .conductivity, resonance, and power in alternating current circuits 5. Developing practical skills in using measuring instruments, signal generators, .and oscilloscopes in analyzing alternating current circuits 6. To enhance students' ability to link theoretical analysis with practical results .and interpret them 7. Preparing students to study advanced courses in electronics, measurements, and .medical devices 8. Developing analytical thinking skills and solving engineering problems related .to alternating current circuits	
1. LO1 Explanation of the basic principles of alternating current circuits and : .characterization of sinusoidal signal characteristics 2. LO2 Application of complex numbers and fuzuls in the analysis of alternating : .current circuits 3. LO3 Analysis of :R ,RL ,RC andRLC circuits using the laws and theories of .circuit analysis 4. LO4 Calculation of impedance, phase angle, active power, reactive power, : .apparent power, and power factor 5. LO5 Using measuring instruments, an oscilloscope, and a signal generator to : .perform laboratory experiments 6. LO6 Comparing the practical results with the theoretical results and analyzing : .the reasons for any differences 7. LO7 Employing the principles of alternating current circuits in the analysis of : .electrical and electronic applications 8. LO8 Compliance with safety procedures and professional practices during the : .execution of laboratory experiments	Learning outcomes for the subject
1. .Fundamentals of alternating current circuits and sinusoidal signals 2. Analysis ofR ,RL ,RC andRLC circuits .using complex numbers 3. .Power in alternating current circuits, resonance, and power factor 4. Electrical measurements and laboratory experiments using measuring .instruments and oscilloscopes 5. Applications of alternating current circuits in electrical and electronic systems .and medical devices	Guidelines
This fifteen-week course, comprising7 ECTS credits , includes theoretical lectures and practical applications in a dedicated laboratory. Its aim is to equip students with the fundamental concepts and skills in AC circuit analysis, develop their ability to use complex numbers in electrical circuit analysis, and study the characteristics of RLC circuits including electrical power, resonance, and power factor. The course , also incorporates laboratory applications using measuring instruments, oscilloscopes, and signal generators to verify theoretical results and connect them to practical applications. The course concludes with a three-hour written final .examination to assess students' achievement of the targeted learning outcomes	Semester description

Teaching and learning strategies	
1. Interactive lectures to explain the concepts and theories of alternating current circuit .analysis 2. Laboratory experiments to develop practical skills in the use of measuring .instruments, oscilloscopes, and circuit analysis 3. Solving problems and practical exercises to enhance mathematical and geometric .analysis skills 4. Cooperative learning and classroom discussions to develop communication and .teamwork skills 5. Self-learning through assignments, guided readings, and the use of electronic .educational resources	**Strategies**

Student's academic workload			
7.2	Student's regular weekly study load (hours/week)	108	The student's assigned workload during the semester (hours/ (season
4.3	Irregular weekly study load for the student (hours/week)	65	Irregular course load assigned to the student during the semester (hours/semester)
173			Total course load assigned to the student during the semester (hours/semester)

Course Material Assessment					
Related Learning Outcomes(LOs)	Week	Weight (degrees)	Time / Number		
and 8 ,4 ,1	3.9	10% (10)	2	Short tests	Formative assessment
and 6 ,5 ,3 ,2	2.6	10% (10)	2	Duties	
everyone	continuous	10% (10)	1	My work is in .the laboratory	
and 7 ,5 ,3	11	10% (10)	1	Reports	
and 6 ,4 ,3 ,2 ,1	6	10% (10)	2h	Midterm exam	Final

everyone	16	50% (50)	3h	Final exam	evaluation
		100% (100)	Overall assessment		

Weekly theoretical curriculum	
covered materials	**Week**
Introduction to alternating current circuits, sinusoidal signals, and effective and average values.	**1**
Puzzles and complex numbers in the analysis of alternating current circuits.	**2**
(R) circuits in alternating current.	**3**
Analysis of resistor and inductor(RL) circuits.	**4**
Analysis of resistor and capacitor(RC) circuits.	**5**
Midterm exam.	**6**
Analysis of resistor, inductor, and capacitor(RLC) circuits, respectively.	**7**
parallelRLC circuits.	**8**
Resonance in alternating current circuits.	**9**
Effective power, reactive power, apparent power, and power factor.	**10**
Improving the power factor.	**11**
Theories of alternating current circuit analysis and their applications.	**12**
Applications of alternating current circuits in electrical and electronic systems.	**13**
Applications of alternating current circuits in medical devices.	**14**
A comprehensive review of the course.	**15**

The final exam.	**16**

Practical weekly curriculum	
covered materials	**Week**
Learn about the AC circuit laboratory, safety procedures, and measuring devices.	**1**
Using a signal generator and oscilloscope to measure sinusoidal signals.	**2**
Studying the characteristics of resistance(R) circuits.	**3**
Study ofRL circuits and measurement of phase angle.	**4**
RC circuits and measuring phase difference.	**5**
RLC circuits in series.	**6**
parallelRLC circuits.	**7**
Investigating the resonance phenomenon.	**8**
Measuring impedance in alternating current circuits.	**9**
Power measurement and power factor.	**10**
Improving the power factor using capacitors.	**11**
Using an oscilloscope to analyze electrical signals.	**12**
Performing integrated experiments on alternating current circuits.	**13**
Practical applications in electronic circuits and medical devices.	**14**
A comprehensive process review and preparation of the final laboratory report.	**15**

Learning and teaching resources		
Is it available in ?the library	Textual source	
Yes	Nilsson, J. W., & Riedel, S. A., Electrical Circuits, 11th Edition, Pearson, 2019 .	Required text sources
Yes	Alexander, C.K., & Sadiku, M.N.O., Fundamentals of Electrical Circuits, 7th Edition, McGraw-Hill, 2021 .	Suggested text sources
• IEEE Xplore Digital Library (https://ieeexplore.ieee.org) • All About Circuits (https://www.allaboutcircuits.com) • Electronics Tutorials (https://www.electronics-tutorials.ws)		Websites

Grade chart				
Definition	**Grades (%)**	**Appreciation**	**Degree**	**The group**
Outstanding performance	100-90	privilege	**A**	**Success Group(50-100)**
Above-average performance with some errors	89-80	very good	**B**	
Good performance with some noticeable errors	79-70	good	**C**	
Acceptable performance with significant shortcomings	69-60	middle	**D**	
Performance that meets the minimum requirements for success	59-50	acceptable	**E**	
Meeting certain requirements is necessary .to achieve the minimum passing grade	49-45	Accepted by decision	**FX**	**Failure group(0-49)**
It requires a great deal of work to .accomplish	44-0	Precipitate	**F**	
			-:note	
Grades containing decimal places are rounded up to the nearest whole number. If the decimal is 0.5 or greater, the grade is rounded up; if it is less than 0.5, it is rounded down. For example, a grade of 54.5 is rounded up to 55, while a grade of 54.4 is rounded up to 54. The university has a policy of not awarding passing grades close to the passing grade. Therefore, the only adjustment made to grades awarded by the .grader is automatic rounding according to the rule mentioned above, without any other modifications				

Course Information			
Course delivery mechanism		Mechanics	Course Name
theoretical☒ Online lectures☐ laboratory☐ (solving exercises) Review☒ Practical training☐ Seminar☐		Essential(C)	Course type
		MDET10 6	Course code
		6	ECTS units
		93	Number of hours per semester
2	semester	1	Academic level
Hawija Polytechnic College	College	Medical Device Engineering Technologies	The department responsible for the course
firashussain-haw@ntu.edu.iq	Email	Firas Hussein Mar'i	Course Coordinator
Master's	Academic qualifications of the course coordinator	Assistant teacher	Academic title of course coordinator
firashussain-haw@ntu.edu.iq	Email	Firas Hussein Mar'i	Course Instructor
Muneef_hwj@ntu.edu.iq	Email	Munif Abdullah Ahmed	Scientific reference name
0.1	version	2025/9/1	Date of approval by the review committee

Relationship with other courses			
	semester	nothing	Introductory course
	semester	nothing	Joint (concurrent) course

Course objectives , learning outcomes, and guidelines with a brief description	
1. To provide students with the basic concepts and principles of mechanics and its .applications 2. Introducing students to the laws of motion and the forces acting on bodies and .analyzing them 3. Developing students' ability to apply the principles of statics and dynamics in .solving problems 4. To equip students with the skills necessary to analyze motion using appropriate .mathematical relationships 5. Enhancing analytical thinking and scientific reasoning skills in the study of .mechanical systems 6. Developing students' ability to interpret mechanical phenomena and link them .to engineering applications 7. Preparing students to study subsequent engineering courses that are based on .the principles of mechanics 8. Encouraging students to use scientific methods in analyzing mechanical .problems	Course objectives
1. LO1 .Explanation of the basic concepts in mechanics and laws of motion : 2. LO2 .Applying Newton's laws in analyzing the motion of objects : 3. LO3 Analyzing problems of statics and dynamics using appropriate : .mathematical principles 4. LO4 Calculation of displacement, speed, acceleration, and forces acting on : .mechanical systems 5. LO5 Explaining the concepts of work, energy, power, momentum, and : .conservation of energy 6. LO6 Employing mechanical principles in the analysis of scientific and : .engineering problems 7. LO7 .Using mathematical methods to solve mechanical problems accurately : 8. LO8 Demonstrate logical thinking and scientific analysis skills in addressing : .mechanical issues	Learning outcomes for the subject
1. .Fundamentals of mechanics, physical quantities, and motion 2. .Newton's laws, statics, and dynamics 3. .Work, energy, power, and momentum 4. .Basic circular and oscillatory motion 5. .Engineering applications of mechanical principles	Guidelines
This fifteen-week course, comprising six European Credit Transfer and Supervision)ECTS units, includes theoretical lectures designed to provide students with (fundamental concepts in mechanics and develop their skills in analyzing the motion of objects and the forces acting upon them using physical and mathematical principles and laws. The course focuses on the study of statics, dynamics, work, energy, power, momentum, and circular motion, incorporating practical applications and problems to enhance understanding and develop analytical and	Semester description

problem-solving skills. The course concludes with a three-hour written final .examination to assess students' achievement of the targeted learning outcomes	

Teaching and learning strategies	
1. .Interactive lectures to explain the basic concepts and laws in mechanics 2. Solving problems and practical exercises to develop analytical skills and apply .mechanical principles 3. .Classroom discussions to promote scientific thinking and logical reasoning 4. .Cooperative learning through group activities and problem-solving 5. Self-learning through homework, guided readings, and the use of electronic .educational resources	**Strategies**

Student's academic workload			
6.2	Student's regular weekly study load (hours/week)	93	The student's assigned workload during the semester (hours/ (season
3.6	Irregular weekly study load for the student (hours/week)	55	Irregular course load assigned to the student during the semester (hours/semester)
148			Total course load assigned to the student during the semester (hours/semester)

Course Material Assessment					
Related Learning Outcomes(LOs)	Week	Weight (degrees)	Time / Number		
and 4 ,2 ,1	3, 8, 10, 12	20% (20)	4	Short tests	Formative assessment
and 6 ,5 ,3 ,2	2,6,10	15% (15)	3	Duties	
				My work is in	

				.the laboratory	
and 7 ,5 ,3	9	5% (5)	1	Reports	
and 8 ,4 ,2	7	10% (10)	2h	Midterm exam	Final evaluation
everyone	16	50% (50)	3h	Final exam	
		100% (100)	Overall assessment		

Weekly theoretical curriculum	
covered materials	**Week**
Introduction to mechanics, physical quantities, and systems of units.	**1**
Motion in one dimension: displacement, velocity, and acceleration.	**2**
Motion in two dimensions and projectile motion.	**3**
Newton's laws of motion and their applications.	**4**
Friction and its engineering applications.	**5**
Midterm exam.	**6**
Work, energy, and power.	**7**
Conservation of mechanical energy.	**8**
Momentum and collisions.	**9**
Circular motion and centripetal force.	**10**
Simple oscillatory motion.	**11**
Fundamentals of statics and equilibrium.	**12**
Center of mass and moment of force.	**13**

Applications of mechanics in engineering systems.	**14**
A comprehensive review of the course.	**15**
The final exam.	**16**

Learning and teaching resources		
Is it available in ?the library	Textual source	
Yes	Halliday, D., Resnick, R., & Walker, J., *Fundamentals of Physics* , 12th Edition, Wiley, 2022 (Mechanics Chapters).	Required text sources
Yes	Beer, F.P., & Johnston, E.R., *Vector Mechanics for Engineers: Statics and Dynamics* , 12th Edition, McGraw-Hill, 2024.	Suggested text sources
• MIT OpenCourseWare – Classical Mechanics (https://ocw.mit.edu) • Khan Academy – Physics (https://www.khanacademy.org/science/physics) • HyperPhysics (http://hyperphysics.phy-astr.gsu.edu)		Websites

Grade chart				
Definition	**Grades (%)**	**Appreciation**	**Degree**	**The group**
Outstanding performance	100-90	privilege	**A**	**Success Group(50-100)**
Above-average performance with some errors	89-80	very good	**B**	
Good performance with some noticeable errors	79-70	good	**C**	
Acceptable performance with significant shortcomings	69-60	middle	**D**	
Performance that meets the minimum requirements for success	59-50	acceptable	**E**	
Meeting certain requirements is necessary .to achieve the minimum passing grade	49-45	Accepted by decision	**FX**	**Failure group(0-49)**
It requires a great deal of work to .accomplish	44-0	Precipitate	**F**	

				-:note

Grades containing decimal places are rounded up to the nearest whole number. If the decimal is 0.5 or is greater, the grade is rounded up; if it is less than 0.5, it is rounded down. For example, a grade of 54.5 rounded up to 55, while a grade of 54.4 is rounded up to 54. The university has a policy of not awarding passing grades close to the passing grade. Therefore, the only adjustment made to grades awarded by the .grader is automatic rounding according to the rule mentioned above, without any other modifications

Course Information			
Course delivery mechanism	Medical laboratory equipment		Course Name
theoretical☒ Online lectures☐ laboratory☒ (solving exercises) Review☐ Practical training☐ Seminar☒	substantial(C)		Course type
	NTU107		Course code
	6		ECTS units
	94		Number of hours per semester
2	semester	1	Academic level
Hawija Polytechnic College	College	Medical Device Engineering Technologies	The department responsible for the course
engkutaibakk@ntu.edu.iq	Email	Qutaiba Khalaf Khalil	Course Coordinator
Master's	Academic qualifications of the course coordinator	teacher	Academic title of course coordinator
engkutaibakk@ntu.edu.iq	Email	Qutaiba Khalaf Khalil	Course Instructor
Muneef_hwj@ntu.edu.iq	Email	Munif Abdullah Ahmed	Scientific reference name
0.1	version	2025/9/1	Date of approval by the review committee

Relationship with other courses

	semester	nothing	Introductory course
	semester	nothing	Joint (concurrent) course

Course objectives , learning outcomes, and guidelines with a brief description	
1. To provide students with the basic concepts of medical laboratory equipment .and its uses in medical laboratories 2. Introducing students to the principles of operation of laboratory medical .equipment and its basic components 3. Developing students' ability to distinguish between types of laboratory medical .equipment and their functions 4. To equip students with the basic skills in operating laboratory medical .equipment according to technical instructions 5. Developing skills in handling calibration procedures and basic preventive .maintenance of laboratory equipment 6. Enhancing students' ability to interpret laboratory measurement results related .to equipment performance 7. Establishing the principles of biosafety and electrical safety when handling .medical devices 8. Preparing students to study advanced specialized courses in medical device .engineering and maintenance	Course objectives
1. LO1 Explanation of the operating principles of laboratory medical devices and : .their basic components 2. LO2 Classification of laboratory medical devices according to their areas of : .use and functions 3. LO3 Explanation of the mechanism of operation of basic laboratory equipment : .and methods of operating it 4. LO4 Operating basic laboratory medical equipment according to standard : .operating procedures 5. LO5 Implementing biosafety and electrical safety procedures during the use of : .laboratory equipment 6. LO6 Performing simple inspection, calibration, and preventive maintenance : .procedures for laboratory equipment 7. LO7 Analysis of measurement results and evaluation of the operational : .performance of laboratory equipment 8. LO8 Preparing concise technical reports that document operating, inspection : .and maintenance procedures	Learning outcomes for the subject

1. .Introduction to laboratory medical equipment and its applications 2. .Principles of operation of laboratory equipment and its basic components 3. Operating, calibrating, and performing preventive maintenance on laboratory .medical equipment 4. .Biosafety, electrical safety, and quality control in laboratories 5. .Practical applications on basic laboratory medical devices	Guidelines
This fifteen-week course, comprising six European Credit Transfer and Supervision)ECTS units, includes lectures and practical applications in a dedicated (laboratory. Its aim is to provide students with a fundamental understanding of medical laboratory equipment and develop their skills in identifying its components, operating principles, and operating according to standard operating procedures. The course focuses on common laboratory equipment, calibration and preventive maintenance procedures, quality control, and biosafety and electrical safety. It also incorporates practical laboratory experiments that reinforce the application of theoretical knowledge and connect it to real-world practice. The course concludes with a three-hour written examination to assess students' .achievement of the learning outcomes	Semester description

Teaching and learning strategies	
1. Interactive lectures to explain the principles of operation of laboratory medical .equipment 2. Practical training in the laboratory to develop skills in operating, calibrating, and .performing preventive maintenance on equipment 3. Practical demonstrations and case studies to link theoretical concepts with .laboratory applications 4. Cooperative learning through group activities and the implementation of practical .experiments 5. Self-learning through assignments, reading operating manuals, and using electronic .educational resources	**Strategies**

Student's academic workload			
3.7	Student's regular weekly study load (hours/week)	94	The student's assigned workload during the semester (hours/

			(season
2.2	Irregular weekly study load for the student (hours/week)	55	Irregular course load assigned to the student during the semester (hours/semester)
149			Total course load assigned to the student during the semester (hours/semester)

Course Material Assessment

Related Learning Outcomes(LOs)	Week	Weight (degrees)	Time / Number		
and 4 ,2 ,1	3, 12	10% (10)	2	Short tests	Formative assessment
and 6 ,5 ,3 ,2	6.10	10% (10)	2	Duties	
everyone	continuous	10%(10)	1	My work is in .the laboratory	
and 7 ,5 ,3	9	10% (10)	1	Reports	
1,2,3,4,7,8	7	10% (10)	2h	Midterm exam	Final evaluation
everyone	16	50% (50)	3h	Final exam	
		100% (100)	Overall assessment		

Weekly theoretical curriculum

covered materials	Week
Introduction to laboratory medical equipment and its importance in medical laboratories.	**1**
Classification of laboratory medical equipment and its operating principles.	**2**
Volume, mass and mixing measuring devices(Pipettes, Balances, Mixers).	**3**
Centrifuges.	**4**
Medicalmicroscopes.	**5**

Midterm exam.	**6**
meters.	**7**
Spectrophotometers.	**8**
Blood analysis devices(Hematology Analyzers).	**9**
Clinical ChemistryAnalyzers.	**10**
Gas and electrolyte analyzers.	**11**
Principles of calibration and quality control in medical laboratories.	**12**
Preventive maintenance and basic troubleshooting.	**13**
Biosafety and electrical safety in medical laboratories.	**14**
A comprehensive review of the course.	**15**
The final exam.	**16**

Practical weekly curriculum	
covered materials	**Week**
Familiarization with the medical device laboratory and safety procedures.	**1**
Identifying the components of laboratory medical equipment and how to operate them.	**2**
Training on the use of micropipes and electronic balances.	**3**
Operation of a centrifuge and its practical applications.	**4**
Using a medical microscope and examining microscopic slides.	**5**
Training on the use of apH meter.	**6**

Operating the spectrophotometer.	**7**
Familiarization with blood analysis equipment and basic operating procedures.	**8**
Understanding clinical chemistry equipment and how it works.	**9**
Performing basic calibration procedures for some laboratory equipment.	**10**
Quality control applications using standard samples.	**11**
Performing periodic preventive maintenance on laboratory equipment.	**12**
Diagnosing minor faults and initial troubleshooting procedures.	**13**
Implementing biosafety and electrical safety procedures within the laboratory.	**14**
Conducting a comprehensive practical experiment and preparing a laboratory report.	**15**

Learning and teaching resources		
Is it available in ?the library	Textual source	
Yes	Khandpur, R.S., *Handbook of Biomedical Instrumentation* , 4th Edition, McGraw-Hill Education, 2020.	Required text sources
Yes	Cromwell, L., Weibell, F. J., & Pfeiffer, E. A., *Biomedical Instrumentation and Measurements* , 2nd Edition, Pearson.	Suggested text sources
• World Health Organization (WHO) – Medical Devices (https://www.who.int/health-topics/medical-devices) • MedTech Europe (https://www.medtecheurope.org) • US Food and Drug Administration (FDA) – Medical Devices (https://www.fda.gov/medical-devices)		Websites

Grade chart

Definition	Grades (%)	Appreciation	Degree	The group
Outstanding performance	100-90	privilege	**A**	**Success Group(50-100)**
Above-average performance with some errors	89-80	very good	**B**	
Good performance with some noticeable errors	79-70	good	**C**	
Acceptable performance with significant shortcomings	69-60	middle	**D**	
Performance that meets the minimum requirements for success	59-50	acceptable	**E**	
Meeting certain requirements is necessary .to achieve the minimum passing grade	49-45	Accepted by decision	**FX**	**Failure group(0-49)**
It requires a great deal of work to .accomplish	44-0	Precipitate	**F**	
			-:note	
Grades containing decimal places are rounded up to the nearest whole number. If the decimal is 0.5 or greater, the grade is rounded up; if it is less than 0.5, it is rounded down. For example, a grade of 54.5 is rounded up to 55, while a grade of 54.4 is rounded up to 54. The university has a policy of not awarding passing grades close to the passing grade. Therefore, the only adjustment made to grades awarded by the .grader is automatic rounding according to the rule mentioned above, without any other modifications				

Course Information			
Course delivery mechanism	Engineering drawing		Course Name
theoretical☐ Online lectures☐ laboratory☒ (solving exercises) Review☐ Practical training☐ Seminar☐	substantial(C)		Course type
	NTU108		Course code
	6		ECTS units
	93		Number of hours per semester
2	semester	1	Academic level

Hawija Polytechnic College	College	Medical Device Engineering Technologies	The department responsible for the course
Majidahm_hwj@ntu.edu.iq	Email	Majed Ahmed Khalaf	Course Coordinator
Master's	Academic qualifications of the course coordinator	teacher	Academic title of course coordinator
Majidahm_hwj@ntu.edu.iq	Email	Majed Ahmed Khalaf	Course Instructor
Muneef_hwj@ntu.edu.iq	Email	Munif Abdullah Ahmed	Scientific reference name
0.1	version	2025/9/1	Date of approval by the review committee

Relationship with other courses			
	semester	nothing	Introductory course
	semester	nothing	Joint (concurrent) course

Course objectives , learning outcomes, and guidelines with a brief description	
1. To equip students with the basic skills in engineering drawing according to .approved technical standards and specifications 2. Introducing students to the principles of engineering drawing, engineering .projections, perspectives, and sections 3. Developing students' ability to read and prepare engineering drawings .accurately 4. Training students on how to use the drawing and editing tools and commands in AutoCAD software . 5. Developing skills in preparing two-dimensional engineering drawings and adding dimensions and standard symbols usingAutoCAD . 6. Enhancing accuracy, organization, and adherence to technical standards in the .preparation of engineering drawings 7. Developing skills in geometric visualization and converting three-dimensional .objects into two-dimensional drawings and vice versa 8. Preparing students to use engineering software in subsequent specialized .courses	Course objectives

1. LO1 Using the tools and work environment in :AutoCAD software to create .engineering drawings 2. LO2 Preparing two-dimensional engineering drawings according to technical : standards usingAutoCAD . 3. LO3 Applying the principles of geometric projection and drawing different : landscapes usingAutoCAD . 4. LO4 Drawing geometric sections and perspectives, and adding dimensions and : .standard symbols 5. LO5 Use drawing commands, editing, layer management, and drawing : .settings efficiently 6. LO6 Reading engineering drawings, interpreting their contents, and making : .the necessary modifications to them 7. LO7 Preparing and printing engineering drawings using :AutoCAD according .to standard specifications 8. LO8 Commitment to accuracy, technical standards and work ethics during the : .preparation of engineering drawings	Learning outcomes for the subject
1. .Fundamentals of engineering drawing and principles of engineering projection 2. AutoCAD .software and drawing and editing commands 3. .Preparing engineering drawings, dimensions, symbols, and layers 4. .Drawing sections and perspectives and preparing engineering drawings 5. .Printing and producing drawings according to technical standards	Guidelines
) This fifteen-week course, comprising six European Credit Transfer and AccuCAD ECTS units, includes practical applications in the computer lab using (AutoCAD software Its aim is to equip students with the fundamental skills to prepare and . interpret engineering drawings according to established technical standards. The course focuses on familiarizing students with the software environment, using drawing and editing commands, creating two-dimensional engineering drawings, drawing projections, views, and sections, adding dimensions and standard symbols, and preparing and printing engineering drawings. This contributes to developing students' accuracy, visualization skills, and proficiency in using modern engineering software, preparing them to use engineering design applications in subsequent specialized courses. The course concludes with a final practical exam to .assess students' achievement of the targeted learning outcomes	Semester description

Teaching and learning strategies

1. Practical training usingAutoCAD software .to develop engineering drawing skills 2. .Live demonstrations to explain the program's commands, tools, and applications 3. Individual applications for preparing engineering drawings and plans using AutoCAD . 4. Cooperative learning through the implementation of practical exercises and projects .and discussion of the results 5. AutoCAD . tutorials	**Strategies**

Student's academic workload			
3.7	Student's regular weekly study load (hours/week)	93	The student's assigned workload during the semester (hours/ (season
2.2	Irregular weekly study load for the student (hours/week)	55	Irregular course load assigned to the student during the semester (hours/semester)
148			Total course load assigned to the student during the semester (hours/semester)

Course Material Assessment

Related Learning Outcomes(LOs)	Week	Weight (degrees)	Time / Number		
and 4 ,2 ,1	3,8,12	10% (10)	3	Short tests	Formative assessment
and 6 ,5 ,3	2,6,10	15% (15)	3	Duties	
everyone	continuous	15% (15)	1	My work is in .the laboratory	
				Reports	
2,3,4,7,8	7	10% (10)	2h	Midterm exam	Final evaluation
everyone	16	50% (50)	3h	Final exam	
		100% (100)	Overall assessment		

Practical weekly curriculum

covered materials	Week
Familiarization with theAutoCAD software interface and basic drawing settings.	1
Basic drawing commands(Line, Circle, Arc, Rectangle, Polygon).	2
Editing commands(Move, Copy, Rotate, Mirror, Trim, Extend, Offset).	3
Layers, font types, and object properties.	4
Precision tools(Object Snap, Ortho, Polar Tracking, Grid).	5
Midterm practical exam.	6
Drawing geometric projections usingAutoCAD.	7
Adding dimensionsand text.	8
Drawing geometric sections.	9
Perspective drawing(Isometric Drawing).	10
Creating blocksand managing libraries.	11
Layouts& Plotting.	12
Preparing a complete engineering drawing usingAutoCAD.	13
Advanced applications in engineering drawing usingAutoCAD.	14
Review the process and finalize the project.	15
The final practical exam.	16

Learning and teaching resources		
Is it available in	Textual source	

?the library		
Yes	Tickoo, S., *AutoCAD 2025 for Engineers and Designers* , CADCIM Technologies, 2025.	Required text sources
Yes	Giesecke, F.E., et al., *Technical Drawing with Engineering Graphics* , 16th Edition, Pearson, 2020.	Suggested text sources
• Autodesk Learn (https://www.autodesk.com/learn) • Autodesk Design Academy (https://academy.autodesk.com) • Autodesk Education (https://www.autodesk.com/education)		Websites

Grade chart

Definition	Grades (%)	Appreciation	Degree	The group
Outstanding performance	100-90	privilege	**A**	**Success Group(50-100)**
Above-average performance with some errors	89-80	very good	**B**	
Good performance with some noticeable errors	79-70	good	**C**	
Acceptable performance with significant shortcomings	69-60	middle	**D**	
Performance that meets the minimum requirements for success	59-50	acceptable	**E**	
Meeting certain requirements is necessary .to achieve the minimum passing grade	49-45	Accepted by decision	**FX**	**Failure group(0-49)**
It requires a great deal of work to .accomplish	44-0	Precipitate	**F**	
			-:note	

Grades containing decimal places are rounded up to the nearest whole number. If the decimal is 0.5 or greater, the grade is rounded up; if it is less than 0.5, it is rounded down. For example, a grade of 54.5 is rounded up to 55, while a grade of 54.4 is rounded up to 54. The university has a policy of not awarding passing grades close to the passing grade. Therefore, the only adjustment made to grades awarded by the .grader is automatic rounding according to the rule mentioned above, without any other modifications

Course Information			
Course delivery mechanism	computer		Course Name
theoretical☒ Online lectures☐ laboratory☒ (solving exercises) Review☐ Practical training☐ Seminar☐	essential(B)		Course type
	NTU102		Course code
	3		ECTS units
	48		Number of hours per semester
2	semester	1	Academic level
Hawija Polytechnic College	College	Medical Device Engineering Technologies	The department responsible for the course
engkutaibakk@ntu.edu.iq	Email	Qutaiba Khalaf Khalil	Course Coordinator
Master's	Academic qualifications of the course coordinator	teacher	Academic title of course coordinator
	Email	Inas Faiq	Course Instructor
Muneef_hwj@ntu.edu.iq	Email	Munif Abdullah Ahmed	Scientific reference name
0.1	version	2025/9/1	Date of approval by the review committee

Relationship with other courses			
	semester	nothing	Introductory course
	semester	nothing	Joint (concurrent) course

Course objectives , learning outcomes, and guidelines with a brief description

1. To provide students with the basic concepts of computer and information .technology and their importance in academic and engineering fields 2. Introducing students to the hardware and software components of a computer, .their functions, and how they work 3. To provide students with basic knowledge of operating systems and how to .manage computer resources 4. Developing skills in using the operating system and managing files and folders .correctly 5. Introducing students to the basics of computer networks, the internet, and .digital communication concepts 6. .Promoting awareness of information security principles and safe computer use 7. Developing basic skills in diagnosing and dealing with simple computer .problems 8. Preparing students to use computers efficiently in subsequent specialized .courses	Course objectives
1. LO1 Explanation of the basic concepts of computers and information : .technology and their areas of application 2. LO2 Distinguishing between the hardware and software components of a : .computer and the function of each 3. LO3 .Using the operating system and managing files and folders efficiently : 4. LO4 Explanation of the operating principles of input, output, processing, and : .storage units 5. LO5 Employing computer networking and internet fundamentals in an : .academic work environment 6. LO6 Applying the principles of information security and data protection while : .using a computer 7. LO7 Performing basic procedures for diagnosing and troubleshooting simple : .computer problems 8. LO8 .Commitment to the ethics of using computers and digital technologies :	Learning outcomes for the subject
1. Fundamentals of computer science and information technology and their .development 2. .Computer hardware and software components and their functions 3. .Operating systems and file and folder management 4. .Fundamentals of computer networks, the internet, and information security 5. .Basic computer applications in the academic and engineering environment	Guidelines
) This fifteen-week course, comprising 3 European Credit Transfer and Supervision ECTS units, includes theoretical lectures and practical applications in the (computer lab. Its aim is to provide students with a foundational understanding of computer and information technology concepts, including hardware and software components and their operation. Students will develop skills in using operating systems and managing files and folders, as well as an introduction to the basics of computer networks, the internet, and information security. The course also includes practical applications of operating system usage and interaction with the computer environment, contributing to the development of essential digital skills necessary for subsequent specialized courses. The course concludes with a three-hour written	Semester description

.final examination to assess students' achievement of the targeted learning outcomes	

Teaching and learning strategies	
1. .Interactive lectures to explain the basics of computer and information technology 2. Practical training in the computer lab to learn about computer components and how .to use the operating system 3. Practical applications for developing skills in managing files and folders and dealing .with the computer environment 4. Classroom discussions and collaborative learning to enhance understanding of .computer and information technology concepts 5. Self-learning through carrying out practical activities and utilizing electronic .educational resources	**Strategies**

Student's academic workload			
1.9	Student's regular weekly study load (hours/week)	48	The student's assigned workload during the semester (hours/ (season
1	Irregular weekly study load for the student (hours/week)	25	Irregular course load assigned to the student during the semester (hours/semester)
73			Total course load assigned to the student during the semester (hours/semester)

Course Material Assessment					
Related Learning Outcomes(LOs)	Week	Weight (degrees)	Time / Number		
2,4,7	3, 6, 12	15% (15)	3	Short tests	Formative

1,3,5	4	5% (5)	1	Duties	assessment
everyone	continuous	10% (10)	1	My work is in .the laboratory	
6.8	9	10% (10)	1	Reports	
1,2, 4,7,8	7	10% (10)	2h	Midterm exam	Final evaluation
everyone	16	50% (50)	3h	Final exam	
		100% (100)	Overall assessment		

Weekly theoretical curriculum	
covered materials	**Week**
Introduction to computers, information technology and its development.	**1**
Computer hardware components.	**2**
software components and their types.	**3**
Input and output units, central processing units, and storage media.	**4**
Operating systems: concept, types, and basic functions.	**5**
Midterm exam.	**6**
File, folder, and file system management.	**7**
Memory, storage media, and data storage technologies.	**8**
Fundamentals of computer networks and their components.	**9**
Internet and basic electronic services.	**10**
Information security, cyber threats, and methods of protection.	**11**
Basic computer maintenance and troubleshooting of minor faults.	**12**

Computer applications in scientific and engineering fields.	**13**
Modern trends in computer technologies.	**14**
A comprehensive review of the course.	**15**
The final exam.	**16**

Practical weekly curriculum	
covered materials	**Week**
Familiarization with the computer lab and safety procedures.	**1**
Identifying the internal and external components of a computer.	**2**
Turning on the computer and interacting with the operating system interface.	**3**
Managing, creating, and organizing files and folders.	**4**
Using storage media and performing copying, moving, deleting, and restoring operations.	**5**
Operating system settings and user management.	**6**
Installing and removing programs and managing applications.	**7**
Using system utilities and device management tools(Device Manager and system tools).	**8**
Network settings and internet connection.	**9**
Using internet browsers, managing downloads, and basic settings.	**10**
Practical applications in information security, data protection, and malware prevention.	**11**
Use basic maintenance tools and clean the system.	**12**
Diagnosing simple software malfunctions and initial troubleshooting procedures.	**13**

Integrated applications for managing the operating system and computer environment.	**14**
A comprehensive process review and implementation of a fully integrated practical application.	**15**

Learning and teaching resources		
Is it available in ?the library	Textual source	
Yes	Norton, P., *Introduction to Computers* , 8th Edition, McGraw-Hill Education.	Required text sources
Yes	Morley, D., & Parker, C.S., *Understanding Computers: Today and Tomorrow* , Cengage Learning, Latest Edition.	Suggested text sources
• Microsoft Learn – https://learn.microsoft.com • Cisco Networking Academy – https://www.netacad.com • Intel® Digital Readiness – https://www.intel.com/content/www/us/en/education.html		Websites

Grade chart

Definition	Grades (%)	Appreciation	Degree	The group
Outstanding performance	100-90	privilege	**A**	**Success Group(50-100)**
Above-average performance with some errors	89-80	very good	**B**	
Good performance with some noticeable errors	79-70	good	**C**	
Acceptable performance with significant shortcomings	69-60	middle	**D**	
Performance that meets the minimum requirements for success	59-50	acceptable	**E**	
Meeting certain requirements is necessary .to achieve the minimum passing grade	49-45	Accepted by decision	**FX**	**Failure group(0-49)**
It requires a great deal of work to .accomplish	44-0	Precipitate	**F**	

				-:note

Grades containing decimal places are rounded up to the nearest whole number. If the decimal is 0.5 or is greater, the grade is rounded up; if it is less than 0.5, it is rounded down. For example, a grade of 54.5 rounded up to 55, while a grade of 54.4 is rounded up to 54. The university has a policy of not awarding passing grades close to the passing grade. Therefore, the only adjustment made to grades awarded by the .grader is automatic rounding according to the rule mentioned above, without any other modifications

Course Information			
Course delivery mechanism	Arabic		Course Name
theoretical☒ Online lectures☐ laboratory☐ (solving exercises) Review☐ Practical training☐ Seminar☐	essential(B)		Course type
	NTU103		Course code
	2		ECTS units
	33		Number of hours per semester
2	semester	1	Academic level
Hawija Polytechnic College	College	Medical Device Engineering Technologies	The department responsible for the course
Hiwa-haw@ntu.edu.iq	Email	Hiwa Kamal Tawfiq	Course Coordinator
Master's	Academic qualifications of the course coordinator	teacher	Academic title of course coordinator
Hiwa-haw@ntu.edu.iq	Email	Hiwa Kamal Tawfiq	Course Instructor
Muneef_hwj@ntu.edu.iq	Email	Munif Abdullah Ahmed	Scientific reference name
0.1	version	2025/9/1	Date of approval by the review committee

Relationship with other courses

	semester	nothing	Introductory course
	semester	nothing	Joint (concurrent) course

Course objectives , learning outcomes, and guidelines with a brief description	
1. Developing students' skills in using standard Arabic correctly in writing and .expression 2. .Enhancing students' ability to read, understand, and analyze Arabic texts 3. .To equip students with the basic rules of grammar, spelling, and punctuation 4. Developing academic writing skills and the ability to draft reports and research .papers correctly 5. Enriching students' vocabulary and developing their oral and written expression .skills 6. Enhancing the integrity of language style and the ability to communicate .effectively in the university environment 7. Introducing students to the basics of the Arabic language in academic and .professional contexts 8. Reinforcing the importance of the Arabic language as the language of science, .culture and national identity	Course objectives
1. LO1 .Using Standard Arabic correctly in oral and written communication : 2. LO2 .Applying grammar, spelling, and punctuation rules in academic writing : 3. LO3 .Analyzing Arabic texts and extracting the main ideas from them : 4. LO4 .Writing academic reports and essays in a clear and organized manner : 5. LO5 Employing appropriate vocabulary and linguistic structures in scientific : .expression 6. LO6 Developing reading, comprehension and understanding skills for : .different texts 7. LO7 .Adherence to academic writing styles and linguistic documentation ethics : 8. LO8 Demonstrate the ability to communicate effectively in a university : .environment	Learning outcomes for the subject
1. .The basics of the Arabic language and its grammar 2. .Grammar, spelling, and punctuation 3. .Reading, comprehension, and analytical skills 4. .Academic writing and language expression skills 5. .Language applications in the university environment	Guidelines
) This fifteen-week course, comprising two European CreditsECTS includes ,(theoretical lectures designed to develop students' skills in using Modern Standard Arabic for reading, writing, and expression. It also aims to enhance their ability to	Semester description

apply grammar, spelling, and punctuation rules in academic writing. The course focuses on developing text comprehension skills, the ability to write scientific reports and essays, and effective communication skills, thereby contributing to the improvement of students' language proficiency and supporting their performance in various university courses. The course concludes with a three-hour written final examination to assess the extent to which students have achieved the targeted .learning outcomes	

Teaching and learning strategies	
1. .Interactive lectures to explain grammar rules and basic concepts 2. .Classroom discussions to develop dialogue and expression skills in standard Arabic 3. .Analyzing texts and language activities to enhance reading and comprehension skills 4. .Writing exercises to develop academic expression and writing skills 5. .Self-learning through guided readings and language assignments	**Strategies**

Student's academic workload			
1.3	Student's regular weekly study load (hours/week)	33	The student's assigned workload during the semester (hours/ (season
0.8	Irregular weekly study load for the student (hours/week)	20	Irregular course load assigned to the student during the semester (hours/semester)
53			Total course load assigned to the student during the semester (hours/semester)

Course Material Assessment					
Related Learning Outcomes(LOs)	Week	Weight (degrees)	Time / Number		
1,3,4	3, 12	15% (15)	2	Short tests	Formative

2,5,6	4, 9	15% (15)	2	Duties	assessment
				My work is in .the laboratory	
7.8	10	10% (10)	1	Reports	
1, 2, 3, 4	6	10% (10)	2h	Midterm exam	Final evaluation
everyone	16	50% (50)	3h	Final exam	
		100% (100)	Overall assessment		

Weekly theoretical curriculum	
covered materials	**Week**
An introduction to the Arabic language and its importance in university education.	**1**
Nominal sentences and verbal sentences.	**2**
Nouns in the nominative case.	**3**
Accusative nouns.	**4**
Prepositions, additions, and dependents.	**5**
Midterm exam.	**6**
Common spelling rules.	**7**
Punctuation marks and the principles of their use.	**8**
Reading, comprehension, and understanding skills.	**9**
Summarizing skills and extracting main ideas.	**10**
Principles of academic writing and report drafting.	**11**
Common linguistic errors and how to correct them.	**12**

Written and oral expression skills.	**13**
Linguistic applications on selected scientific and literary texts.	**14**
A comprehensive review of the course.	**15**
The final exam.	**16**

Learning and teaching resources		
Is it available in ?the library	Textual source	
Yes	Ministry of Higher Education and Scientific Research, Arabic Language for University Students (Approved Curriculum).	Required text sources
Yes	Mustafa Al-Ghalayini, compiler of Arabic lessons.	Suggested text sources
• :Waqfeya platform for Arabic bookshttps://waqfeya.net • :Arabic Language Academyhttps://www.arabicacademy.org.eg • The Comprehensive Library: https://shamela.ws		Websites

Grade chart

Definition	Grades (%)	Appreciation	Degree	The group
Outstanding performance	100-90	privilege	**A**	**Success Group(50-100)**
Above-average performance with some errors	89-80	very good	**B**	
Good performance with some noticeable errors	79-70	good	**C**	
Acceptable performance with significant shortcomings	69-60	middle	**D**	
Performance that meets the minimum requirements for success	59-50	acceptable	**E**	
Meeting certain requirements is necessary .to achieve the minimum passing grade	49-45	Accepted by decision	**FX**	**Failure group(0-49)**

It requires a great deal of work to .accomplish	44-0	Precipitate	**F**	
			-:note	

Grades containing decimal places are rounded up to the nearest whole number. If the decimal is 0.5 or is greater, the grade is rounded up; if it is less than 0.5, it is rounded down. For example, a grade of 54.5 rounded up to 55, while a grade of 54.4 is rounded up to 54. The university has a policy of not awarding passing grades close to the passing grade. Therefore, the only adjustment made to grades awarded by the .grader is automatic rounding according to the rule mentioned above, without any other modifications

Ministry Of Higher Education And Scientific Research,

Scientific Supervision And Evaluation Authority

Department Of Quality Assurance And Academic

Accreditation, Accreditation Section

Academic Program and Course Description Guide

2025/2026

The Introduction:

The educational program is a coordinated and organized package of courses that includes procedures and experiences organized into course vocabulary. Its main purpose is to build and refine the skills of graduates, making them qualified to meet the requirements of the labor market. It is reviewed and evaluated annually through internal or external audit procedures and programs, .such as the external examiner program

The academic program description provides a brief summary of the program's main features and courses, indicating the skills that students are working to acquire based on the academic program's objectives. The importance of this description is evident in that it represents the cornerstone for obtaining program accreditation, and it is written by the teaching staff under the .supervision of the scientific committees in the academic departments

This second edition of the guide includes a description of the academic program after updating the vocabulary and paragraphs of the previous guide in light of the developments and changes in the educational system in Iraq, which included a description of the academic program in its traditional form (annual, semester system), as well as adopting the generalized academic program description according to the Department of Studies' letter T M3/2906 dated 3/5/2023 with regard .to programs that adopt the Bologna Process as the basis for their work

In this regard, we cannot but emphasize the importance of writing descriptions of academic .programs and courses to ensure the smooth running of the educational process

Concepts and terminology :

Academic Program Description: The academic program description provides a concise summary of its vision, mission, and objectives, including an accurate description of the targeted .learning outcomes according to specific learning strategies

Course description: This provides a concise summary of the course's key features and expected learning outcomes, demonstrating whether the student has made the most of the available learning .opportunities. It is derived from the program description

Program Vision: An ambitious vision for the future of the academic program to be a sophisticated, .inspiring, motivating, realistic and applicable program

Program Mission: Briefly outlines the goals and activities necessary to achieve them, and .identifies the program's development paths and directions

Program objectives: These are statements that describe what the academic program intends to .achieve within a specific time period and are measurable and observable

Curriculum structure: All courses/study materials included in the academic program according to the approved learning system (courses), whether they are required by (Ministry, University, .College and Scientific Department) with the number of study units

Learning outcomes: A consistent set of knowledge, skills, and values acquired by the student after the successful completion of the academic program. The learning outcomes for each course .must be defined in a way that achieves the program's objectives

Teaching and learning strategies are the strategies used by faculty members to enhance student teaching and learning. They are plans followed to achieve learning objectives. In other words, they describe all classroom and extracurricular activities aimed at achieving the program's .learning outcomes

Academic Program Description Template

University Name: Northern Technical University

College/Institute: Hawija Polytechnic College

of Medical Device Technologies Scientific Department: Department

Name of the academic or professional program: Diploma in Medical Device Technologies

Final Certificate Name: Diploma in Medical Device Technology
Study system: Courses
Date of description preparation : 3/7/2026
Date the file was filled out : 3/7/2026

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The file was reviewed by
University Quality Assurance and Performance Division
Name of the Director of the Quality Assurance and University Performance Division: M.M. Ahmed D. Abdul Khalaf
Date : 3/7/2026
the signature

Dean's approval

- 1vision The program
Striving for excellence through adherence to quality standards for medical device maintenance technology, providing the best education, and supplying the health sector with highly qualified personnel who contribute to the development and advancement of the local community.

- 2message The program
Preparing intermediate technical personnel specializing in the installation, calibration, operation and maintenance of all types of medical devices and providing a high-quality program for biomedical device maintenance technology to provide highly qualified .graduates to support the healthcare sector and serve the community

- 3Goals The program
• Graduating qualified technical personnel in the field of medical device technologies to work in the public, private and mixed sectors. • Providing the latest medical and educational equipment and technologies to keep pace with developments in the labor market. • Training and developing the expertise of the department's staff and affiliates, as well as the staff of local health institutions, and establishing a partnership with .the public and private sectors at the level of education and maintenance

- 4Accreditation Programming
no There is

- 5Effects Foreign Ministry The other
presence Entity Shepherdess Contributes in: Linking the program to the labor market or the community Facilitating employment and practical training Ongoing guidance for the program

Program structure				
*** comments**	**Percentage**	**Study unit**	**Number of courses**	**Program structure**
Core course	**(35-30) %**	**20**	**10**	**University requirements**
Essential and non-essential	**(10-5) %**	**7**	**3**	**College requirements**
Essential and non-essential	**(70-65) %**	**84**	**29**	**Department requirements**
Compliant and non-compliant	**The student starts on 1/7 and finishes on 1/9 in the first level**			**Summer training**

Program Description Level 1 - 7/ First Semester							
The symbol	The facilitator, if any	Number of units	Hours		Course Name		Type of requirement
			A	N	In English	In Arabic	
NTU100		2	0	2	Human Rights and Democracy	Human rights and democracy	University requirements: (10) units + (8) compulsory units + (2) elective units
NTU101		2	0	2	English Language	English language	
NTU102		2	1	1	Principles of Computer	computer	
NTU104		2	0	2	Arabic Language	Arabic	
NTU105		2	1	1	Sport	Sports (optional)	
TIHW100		2	0	2	Mathematics 1	Mathematics 1	Institute requirements (7) compulso
TIHW101		3	3	0	Mechanical Workshop	Mechanical Engineering Laboratory	

TIHW102	TIMO100	2	0	2	Mathematics 2	Mathematics 2	ry units
MDT100		4	2	2	DC Electrical Circuits	DC electrical circuits	Departmental Specialization Requirements (34) Compulsory Units
MDT101		4	2	2	Electronic Principles	Principles of Electronics	
MDT102		4	2	2	Digital Circuit Principle	Principles of Digital Circuits	
MDT103		2	0	2	Physiology	Physiology	
MDT104		2	2	0	Electrical Workshop	electrical workshop	
MDT105		2	2	0	Electrical Drawing	electrical drawing	
MDT106		2	2	0	Electronics Workshop	Electronic workshop	
MDMT107		4	2	2	AC Electrical Companies	alternating current circuits	
MDTI108		4	2	2	Electroic	Electronics	
MDT109		4	2	2	Digital Ciruit	Digital circuits	
MDT110		2	2	0	Engineering Drawing	engineering drawing	
		51	25	26	the total		

Level the first Program Description - 7/the chapter the second							
The symbol	The facilitator, if any	Number of units	Hours		Course Name		Type of requirement
			A	N	In English	In Arabic	
NTU201		2	0	2	Professional Ethies	Professional ethics	University requirements units (10)
NTU101		2	0	2	English Language	English language	
NTU102		2	1	1	Principles of Computer	computer	
NTU104		2	0	2	Arabic Language	Arabic	
NTU10 6		2	0	2	Crimes of the Ba'ath Party	Ba'ath Party crimes	
MDTI200		4	2	2	Measurement Devices	Measuring devices	Departmental Specialization Requirements (34) Compulsory Units
MDTI201		4	2	2	Electronic Circuits (1)	Electronic circuits 1	
MDTI202		4	2	2	Microcomputer (1)	Microcomputers 1	
MDTI203		4	2	2	Electronic Medical Instrument (1)	Electronic medical devices 1	
MDTI204		2	2	0	Medical Instrument Maintenance Workshop(1)	Medical Equipment Maintenance Workshop 1	
MDTI205		2	2	0	Project (1)	Project 1	
MDTI206		4	2	2	Electro-Mechanical Medical Instrument	Electromechanical medical devices	
MDTI207		4	2	2	Electronic Circuits (2)	Electronic circuits 2	
MDTI208		4	2	2	Microcomputer (2)	Microcomputers2	
MDTI209		4	2	2	Electronic Medical Instrument (2)	Electronic Medical Devices2	
MDTI210		2	2	0	Medical Instrument Maintenance Workshop(2)	Medical Equipment Maintenance Workshop2	

MDTI211		2	2	0	Project (2)	Project2	
MDTI212		4	2	2	Control	control	
MDT213		3	2	1	Programmable Logical Controller(PLC)	Programmable Logic Controller	
MDT214		3	2	1	Renewable energy systems	Renewable energy systems (optional)	
		60	31	29	the total		

Expected learning outcomes of the program
Knowledge
1. Familiarity with the basic principles of biomedical engineering and related medical .sciences 2. Explaining the mechanism of action of different medical devices and understanding .their electronic, mechanical, and software components 3. Explanation of the principles of medical measurement, vital signs, and methods of .processing them 4. Distinguishing between types of medical devices and classifying them according .to their clinical applications 5. Understanding international standards and specifications for the safety and quality .of medical devices 6. Knowledge of the procedures for installation, operation, calibration, and preventive .and corrective maintenance of medical devices 7. Interpretation of electrical and electronic diagrams and control circuits for medical .devices 8. Understanding the principles of hospital networks, medical device management .systems, and connectivity and communication technologies 9. Knowledge of the fundamentals of risk management, occupational safety, and .infection control when dealing with medical devices 10. Understanding the principles of medical technology management and the lifecycle .of medical devices within healthcare institutions 11. Understanding the ethical and legal aspects related to the use and maintenance of .medical devices and the protection of patient data 12. To learn about modern technologies and future trends in the field of medical .devices, such as artificial intelligence, the Internet of Things, and telemedicine 13. Recognizing the importance of scientific research and continuous development in .improving the performance of medical devices and the quality of health services 14. Employing mathematical, physical, and electronic knowledge in analyzing .technical problems related to medical devices 15. Evaluating the performance of medical devices based on test results and approved .technical standards
Skills
1. Install and operate medical devices in accordance with manufacturers' instructions and approved standards.

2. Conducting an initial inspection of the medical equipment and ensuring its readiness for operation.
3. Performing routine preventive maintenance work on medical equipment efficiently.
4. Diagnosing technical faults using appropriate measuring and testing equipment.
5. Perform corrective maintenance and replace damaged parts according to technical procedures.
6. Calibrating medical devices and verifying the accuracy of their performance using standard calibration tools.
7. Use electronic measuring devices such as multimeters, oscilloscopes, and signal generators efficiently.
8. Reading and analyzing electrical and electronic diagrams and control circuits for medical devices.
9. Operating maintenance programs, managing medical devices, and documenting inspection and maintenance processes electronically.
10. Applying electrical and mechanical safety standards and infection control procedures when handling medical devices.
11. Conducting electrical safety tests and functional performance tests for medical devices.
12. Dealing with the network and communication systems of medical devices and linking them to health systems when needed.
13. Preparing technical reports related to inspection, maintenance and calibration work in an accurate and organized manner.
14. Managing time and technical resources during the execution of maintenance work within healthcare institutions.
15. Applying troubleshooting techniquesto efficiently reach appropriate technical solutions.
16. Using modern software and digital tools to diagnose faults and analyze data from medical devices.
17. Adherence to quality procedures and quality assurance in all stages of installation, maintenance and calibration of medical devices.
18. Working effectively within an engineering and medical team and communicating technically with users and healthcare staff.
19. Providing basic guidance to users on the correct operation and safe use of medical devices.

Values

1. Adherence to the ethics of the medical device technology profession in all

.professional practices

2. Bear professional responsibility when operating, maintaining, and calibrating .medical devices
3. Compliance with occupational safety standards, electrical safety and infection .control procedures
4. Respecting patient privacy and maintaining the confidentiality of medical .information and data
5. Working as a team and cooperating effectively with medical, engineering and .administrative staff
6. Adherence to quality standards and continuous improvement in the performance of .technical tasks
7. Maintaining integrity, accuracy, and honesty in documenting inspection and .maintenance work and preparing technical reports
8. Demonstrate initiative, discipline, and commitment to the rules and instructions in .place at health institutions
9. Pursuing continuous learning and developing professional skills to keep pace with .developments in the field of medical devices
10. Promoting social responsibility and preserving medical resources and equipment in .a way that contributes to improving the quality of health services

Teaching and learning strategies
1. Interactive lectures to explain basic theoretical concepts. 2. Practical training in laboratories to develop technical skills on medical devices. 3. Clinical and field training in hospitals and health institutions. 4. Based Learning(PBL) to address real-world technical problems. 5. Project-based learning to implement applied projects in the field of medical devices. 6. Case study for analyzing technical malfunctions and situations in the work environment. 7. Collaborative learning through working within teams to accomplish activities and projects. 8. Simulation and training using models and software to develop skills before practical application. 9. E-learning and blended learning using educational platforms and digital media. 10. Brainstorming and scientific discussions to develop critical thinking, problem-.solving and decision-making

Assessment methods
field ,discussions , Weekly exams, homework assignments, monthly and daily technical reports) (training, and end-of-course exam

Faculty						
Faculty members						
Faculty preparation		Special requirements/skills (if any)		Specialization		Scientific rank
lecturer	angel			private	general	
	angel			Information Technology	Calculators	assistant professor
	angel			electricity	Electrical Engineering	teacher
	angel			capacity	Electrical Engineering	Assistant teacher
	angel			Mechanic	Mechanical Engineering	teacher
	angel			Mechanic	Mechanical Engineering	Assistant teacher

Technical staff			
	angel	Electrical Engineering	Bachelor's
	angel	Electronic Engineering	Bachelor's
	angel	electricity	diploma
Support staff from the college formation			
	angel	Arabic language	assistant professor

Professional Development
Orienting new faculty members
1. Introducing the mission, vision, and goals of the department, college, and university. 2. Clarification of the organizational structure, systems, and academic and administrative instructions. 3. Introducing them to the curriculum, learning outcomes, and study plan. 4. Training on modern teaching methods and effective learning strategies. 5. Clarifying the mechanisms for preparing study plans and managing lectures. 6. Training on assessment methods and test preparation according to quality standards. 7. Introduction to the use of e-learning systems and digital platforms. 8. Clarifying safety procedures within laboratories and the mechanism for using educational medical equipment. 9. Introducing them to the requirements for quality assurance, academic accreditation, and mechanisms for documenting activities. 10. Encouraging participation in scientific research, community service, and .continuing professional development programs
Professional development of faculty members
Participating in training courses and workshops on modern teaching and assessment methods. Developing skills in using e-learning technologies and digital platforms. Encouraging participation in local and international scientific conferences and

seminars.
Supporting the conduct of scientific research and publication in reputable scientific journals.
Developing practical skills in operating, maintaining, and calibrating modern medical devices.
Participating in training programs within hospitals and companies specializing in medical devices.
Enhancing academic supervision and student guidance skills.
Training on quality assurance and academic accreditation requirements and the preparation of program and course descriptions.
Developing academic leadership, teamwork, and time management skills.
Encouraging continuous learning and keeping up with scientific and technological developments in the field of medical device technologies.

Admission standard
The standards adopted in central admissions by the Ministry of Higher Education and Scientific Research

Key sources of information about the program
National Qualifications Framework(NQF) Academic Accreditation Standards Vision and Mission of the Educational Institution, Previous Study Plans Faculty members' opinions and observations Student and graduate opinions Feedback from employers Similar programs at local and international universities Local and international labor market needs

Program development plan
First: Vision and Mission :Vision To elevate the Medical Device Technologies program to become a leading program in preparing qualified technical personnel capable of keeping pace with technological developments in the field of medical devices, and contributing to improving the quality of healthcare and serving the community.

:message

Qualifying graduates who possess theoretical knowledge and practical skills in operating, maintaining, calibrating and managing medical devices, and applying modern technologies and quality and safety standards, in order to meet the needs of .the health sector and contribute to the development of medical services

Second: Development Goals

Updating curricula to keep pace with modern developments in medical device .technologies and health digitization

Strengthening the practical and applied aspect within laboratories, hospitals and .health institutions

The program was linked to the needs of the labor market in the health sector and .companies specializing in medical devices

Developing students' scientific research and innovation skills in the field of medical .technologies

Introducing modern technologies such as artificial intelligence, the Internet of .Medical Things, and digital healthcare systems into the educational process

Third: Curriculum Development

أ- :Adding new courses such as

1. .Artificial intelligence in medical devices
2.) Internet of Medical ThingsIoMT .(
3. .Medical Technology Management
4. .Cybersecurity for medical devices
5. .Risk management and safety of medical devices
6. Updating traditional curricula to be more relevant to practical applications and .modern technologies
7. Introducing applied graduation projects to address real-world problems in the .operation, maintenance, and calibration of medical devices

Fourth: The practical aspect and training

1. Developing and equipping medical device laboratories with modern .equipment
2. .Establishing laboratories for medical simulation and practical training

3. :Activating summer training in
4. .Government and private hospitals
5. .Companies that supply and maintain medical equipment
6. .Specialized centers and health institutions
7. Increasing the number of practical and applied hours compared to theoretical .hours

Fifth: Teaching staff

:Encouraging faculty members to

1. .Participating in specialized training courses
2. .Conducting applied scientific research
3. Cooperation with hospitals and companies operating in the field of medical .devices
4. Attracting experts and specialists from the health sector and medical device .companies as visiting instructors

Sixth: Scientific research and innovation

1. Establishing a research unit specializing in medical device technologies and .biomedical engineering
2. .Supporting students' applied and innovative projects
3. .Cooperation with hospitals, research centers and health institutions
4. Encouraging the publication of research in peer-reviewed scientific journals .and participation in scientific conferences

Seventh: Linking to the labor market

:Signing Memoranda of Understanding with

.Government and private hospitals

.Medical device companies

.Health institutions and regulatory bodies

Establish an advisory committee comprising representatives from the health sector .to develop the program

) Follow up with department graduatesTracer Study and utilize the results of the (.follow-up in developing curricula and learning outcomes

Eighth: Infrastructure and Equipment

1. .Updating medical device laboratories according to the latest standards

2. :Providing modern equipment and devices such as
3. .Medical device testing and calibration equipment
4. Safety . Analyzers
5. Patient . simulators
6. .Medical signal measurement and analysis devices
7. Developing the paper and electronic library and providing specialized .scientific databases

Ninth: Quality assurance and evaluation

1. Applying quality standards and academic accreditation for medical device .technology programs
2. Conduct a periodic evaluation of the program every year or two based on .performance indicators
3. Conducting periodic surveys to measure the satisfaction of students, graduates .and employers
4. Review and update learning outcomes to align with labor market needs and .technological developments
5.) Monitoring key performance indicatorsKPIs and analyzing their results to (.ensure continuous improvement of the program

Program Skills Plan

Curriculum Skills Plan / Level 1																		
Learning outcomes required from the program																		
General and transferable skills Other skills related to) employability and personal (development					Affective and value-based goals			Program-specific skills objectives				Cognitive objectives			essential My choice	Course Name	Course code	Year / Level
D4	**D3**	**D2**	D 1	Q 4	Pa rt 3	Pa rt 2	Pa rt 1	B 4	B 3	B 2	B 1	A4	A 3	A2	A 1				
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	essential	Human rights and democracy	NTU100	the first
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	essential	English Language 1	NTU101	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	essential	Computer Principles 1	NTU102	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	essential	Computer Principles 2	NTU103	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	essential	Arabic	NTU104	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	essential	Sports (optional)	NTU105	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	optional	Mathematics 1	TIHW100	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	optional	Mechanical Factors	TIHW101	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	essential	Mathematics 2	TIHW102	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	essential	Electronics basics	MDT101	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	essential	DC circuits	MDT100	

✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	essential	Digital circuit fundamentals	MDT102	the first
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	essential	Electronic workshop	MDT106	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	essential	engineering drawing	MDT110	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	essential	Electronics	MDT108	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	essential	AC circuits	MDT107	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	essential	Digital circuits	MDT109	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	essential	electrical drawing	MDT105	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	essential	electrical workshop	MDT104	

Curriculum Skills Plan / Level Two																		
Learning outcomes required from the program																		
General and transferable skills Other skills related to) employability and personal (development					Affective and value-based goals			Program-specific skills objectives			Cognitive objectives				essential My choice	Course Name	Course code	Year / Level
D4	D3	D2	D1	Q4	Part 3	Part 2	Part 1	B4	B3	B2	B1	A4	A3	A2	A1				
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	essential	English Language 2	NTU200	the second
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	essential	Professional ethics	NTU201	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	essential	Measuring devices	MDT200	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	essential	Electronic circuits 1	MDT 201	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	essential	Microcomputers 1	MDT 202	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	essential	Electronic medical devices 1	MDT 203	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	essential	Medical Equipment Maintenance Workshop 1	MDT 204	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	essential	Project 1	MDT 205	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	essential	Electromechanical medical devices	MDT 206	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	essential	Electronic Circuits 2	MDT 207	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	essent	Microcomputers 2	MDT 208	

																ial			the
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	essential	Electronic Medical Devices 2	MDT 209	second
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		Medical Equipment Maintenance Workshop 2	MDT 210	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	essential	Project 2	MDT 211	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	essential	control	MDT 212	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	essential	Programmable Logic Controller	MDMT 213	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	essential	Renewable energy systems (optional)	MDT I213	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	optional	Calculator applications (optional)	MDT 215	

Note: First-level courses have been suspended due to the department's .transition to a Bologna system of polytechnic studies

Description of the Microcomputers 1 course
Course Name -1
Microcomputers 1
Course Code-2
MDT202
Available forms of attendance -3
Traditional (face-to-face) attendance 2. Scientific attendance 3. Blended learning .1
Semester/Year-4
Level Two, First Semester 2026-2025
Total number of study hours / Number of units -5
hours / 4 units 60
Date this description was prepared -6
2026/7/3
Name of the course instructor -7
Name: Dr. Munif Abdullah Ahmed :Email**muneef_hwj@ntu.edu.iq**
Course Objectives (General Course Objectives) -8 1. To provide students with the basic concepts of microcomputers, their components, and how they work. 2. Developing skills in programming and using microcontrollers in various control applications. 3. To equip students with the ability to design and implement circuits based on microcomputers. 4. The use of microcomputers in medical device applications and measurement and control systems. 5. Preparing students to use microcomputers in the diagnosis, maintenance, and .development of medical devices
Course outcomes, teaching and learning methods, and assessment -9
:A - Cognitive objectives 1. Identifying the components of microcomputers and the function of each. 2. Explanation of the working mechanism of the microprocessor and microcontroller and the instruction execution cycle. 3. Distinguishing between types of memory, input and output units, and how they work. 4. Explanation of the principles of microcontroller programming and its basic applications. 5. .Explaining the uses of microcomputers in control systems and medical devices

B - Course-specific skills objectives

1. Programming microcontrollers to perform basic functions and controls.
2. Design and implementation of simple electronic circuits using microcomputers.
3. Connecting and operating input and output units and sensors with microcontrollers.
4. Using simulation software and programming tools to test and analyze system performance.
5. .errors in microcomputer applications and hardware software

Teaching and learning methods

1. Interactive lectures to explain basic theoretical concepts.
2. Practical training in the laboratory to carry out programming and interconnection experiments using microcontrollers.
3. Project-based learning for designing and implementing practical applications using microcomputers.
4. Problem-based learning involves analyzing software and hardware malfunctions and finding appropriate solutions.
5. Using simulation software and digital educational tools to illustrate the workings of .microcomputer circuits and systems before practical application

Assessment methods

1. Written tests (short, midterm, and final) to measure comprehension of theoretical concepts.
2. Practical tests to assess programming, plug-and-play skills using microcontrollers.
3. Laboratory reports to assess the accuracy of experimental execution and analyze results.
4. Practical projects or mini-applications to measure the student's ability to design and implement microcomputer-based systems.
5. Assignments and class participation to assess ongoing learning and interaction within .lectures and laboratories

Course Structure: Microcomputers 1 - Theoretical Topics -10 And the process					
Evaluation Method	Learning method	Subject name	Required learning outcomes	Hours	Week
Midterm exam, final exam	Interactive lecture, dialogue and discussion + practical lab work	Introduction to Microcomputers and their Applications in Medical Devices	The student learns about the concept of microcomputers and their importance in control systems and medical devices, and acquires basic knowledge related to the components .of microcomputers	4	1

Midterm exam, final exam	Interactive lecture, dialogue and discussion + practical lab work	Microprocessor and microcontroller	The student distinguishes between a microprocessor and a microcontroller and learns about the characteristics .and uses of each	4	2
Midterm exam, final exam	Interactive lecture, dialogue and discussion + practical lab work	Internal structure of the microcontroller	The student explains the internal structure of the microcontroller and the functions of its main units, and acquires concepts related to .instruction execution	4	3
Midterm exam, final exam	Interactive lecture, dialogue and discussion + practical lab work	Memory Organization	The student learns about the types of memory, how they are organized, and .how they are used in microcomputers	4	4
Term test	Interactive lecture, dialogue and discussion + practical lab work	) Input/Output I/O Ports (	The student explains the concept of input and output ports and how they .are connected to microcontrollers	4	5
Term test	Interactive lecture, dialogue and discussion + practical lab work	Microcontroller programming fundamentals	The student learns the basics of microcontroller programming and the .structure of simple programs	4	6
Short assignments + discussions	Interactive lecture, dialogue and discussion + practical lab work	Interrupts and Timers	The student acquires concepts related to interrupts and timers and their role .in control systems	4	7
Short assignments +	Interactive lecture, dialogue and discussion +	Serial Communication	The student learns about serial communication methods and data exchange between controllers and .external devices	4	8

discussions	practical lab work				
Short assignments + discussions	Interactive lecture, dialogue and discussion + practical lab work	Connecting sensors and actuators	The student explains the mechanism for connecting sensors and actuators to microcontrollers and using them in .control applications	4	9
Term test	Interactive lecture, dialogue and discussion + practical lab work	Analog and digital) converters ADC/DAC (	The student explains the principles of analog and digital signal conversion .and their use in medical systems	4	10
Term test	Interactive lecture, dialogue and discussion + practical lab work	Simulation and development programs	The student learns about the programming and simulation environments used in developing .microcomputer applications	4	11
Short assignments + discussions	Interactive lecture, dialogue and discussion + practical lab work	Microcomputer applications in medical devices	The student demonstrates the applications of microcomputers in patient monitoring devices and .medical measurement devices	4	12
Short assignments + discussions	Interactive lecture, dialogue and discussion + practical lab work	Fault diagnosis and troubleshooting	الصفحة The student learns about methods for detecting software and hardware .malfunctions and ways to fix them	4	13
Short assignments + discussions	Interactive lecture, dialogue and discussion + practical lab work	Designing control systems using microcontrollers	The student acquires concepts related to the design of simple control .systems using microcontrollers	4	14

Short test, final test	Interactive lecture, dialogue and discussion + practical lab work	Comprehensive review and practical applications	The student reviews the basic concepts of the course and applies them in analyzing practical applications related to medical .devices	4	15

Curriculum Development Plan

- Updating the scientific content to keep pace with modern developments in the field of microcomputers, microcontrollers and their applications in medical devices.
- Enhancing the practical and applied aspects of microcontroller programming and electronic control circuit design.
- Developing students' skills in using programming environments, simulation, and linking sensors and actuators to microcontrollers.
- Linking the curriculum to the needs of the health sector and the labor market by focusing on microcomputer applications in modern medical devices.
- Promoting concepts of occupational safety, work ethics, and sound engineering practices when dealing with .electronic systems and medical devices

Course Evaluation .11

Relative weight %	Degree	Calendar date (week)	Assessment methods	T
2.5	2.5	Week 4	Laboratory report)1(	1
2.5	2.5	Week 9	Laboratory report)2(	2
2	2	Week 6	) Short testQuiz 1 (	3
2	2	Week Fourteen	) Short QuizQuiz 2 (	4
1	1	Week fifteen	) Short QuizQuiz 3 (	5
7.5	7.5	Week 6	First semester exam الصفحة	6
7.5	7.5	Week Eleven	Second semester exam	7
40	40	Final exams	Final theory test	8
5	5	Week fifteen	Practical project programming or design) (using a microcontroller	9
2	2	Weeks three and ten	Laboratory performance evaluation	10
1	1	Week 1	) Short practical testQuiz 1 (	11
0.5	0.5	Week 4	) Short practical testQuiz 2 (	12

1	1	Week Fourteen	) Short practical testQuiz 3 (	13
5.5	5.5	Weeks (6, 8, 9, 10, 11, (13 ,12	Homework, discussions, and direct questions	14
20	20	Final exams	Final practical test	15
100%	100			the total

Sources of Education and Learning .12	
Microprocessors and Microcontrollers – Muhammad Ali Mazidi, Janice Gillispie Mazidi & Rolin D. McKinlay – 2016 – Pearson Education.	Required textbooks .1
The 8051 Microcontroller and Embedded Systems: Using Assembly and C – Muhammad Ali Mazidi, Janice Gillispie Mazidi & Rolin D. McKinlay – 2nd Edition – Pearson Education.	Main references (sources) .2
https://www.st.com/	Electronic references, the internet

description : Measuring Instruments
Course Name -1
Measuring devices
Course Code-2
MDT200
Available forms of attendance -3
Traditional (face-to-face) attendance 2. Scientific attendance 3. Blended learning .1
Semester/Year-4
Level Two, First Semester 2026-2025
Total number of study hours / Number of units -5
hours / 4 units 60
Date this description was prepared -6

2026/7/3

Name of the course instructor -7

M. Hassina Jassim Abdullah :Name
:Email**husniyah_hwj@ntu.edu.iq**

Course Objectives (General Course Objectives) -8

1- To become familiar with the basic principles of electrical and electronic measurements and various measuring devices.
2- Understanding the mechanism of analog and digital measuring devices and their uses in medical applications.
3- Equipping students with the skills to use and calibrate laboratory measuring devices correctly.
4- Developing students' ability to analyze measurement results, detect errors, and reduce them.
5- Employing measuring devices in the inspection and maintenance of medical devices in accordance with safety and quality standards.

Course outcomes, teaching and learning methods, and assessment -9

:A - Cognitive objectives

A1- Understanding the principles of measurement, systems of units and standards.
A2- Explanation of the working mechanism of analog and digital measuring devices.
A3- Distinguishing between the different types of measuring devices and their various uses.
A4- Explanation of the principles of calibrating measuring devices and sources of error in measurements.
A5- Explaining the applications of measuring devices in the inspection and maintenance of medical devices.

B - Course-specific skills objectives

الصفحة

B1- Using electrical and electronic measuring devices correctly.
B2- Accurately measure voltage, current, resistance, and frequency.
B3- Using a multimeter, oscilloscope, and signal generator in the laboratory.
B4- Calibrating measuring instruments and analyzing the results of practical measurements.
B5- Diagnosing basic faults in electronic circuits using measuring devices.

Teaching and learning methods

Interactive lectures.
Practical training within the laboratory.
Brainstorming.
Dialogue and discussion.

Assessment methods

- Commitment and consistent attendance.
- Daily oral and written tests.
- Laboratory reports.
- Homework.
- Term exams.
- Practical tests.
- .The final exam includes both theoretical and practical components

Course structure : Measuring instruments vocabulary			Theoretical -10		
Evaluation Method	**Teaching method**	**Unit/Topic Name**	**Required learning outcomes**	**Hours**	**Week**
Diagnostic – Formative – Summative	Theory + Practical	Introduction to measuring instruments, physical quantities, systems of units and .standards	Understanding the concept of measurement and its importance in engineering and medical devices, and distinguishing between physical quantities and units of .measurement	4	1
Diagnostic – Formative – Summative	Theory + Practical	Measuring instrument characteristics: accuracy, sensitivity, repeatability, sources .of error	Identifying the characteristics and specifications of measuring devices and the sources of error in .measurements الصفحة	4	2
Diagnostic – Formative – Summative	Theory + Practical	Analog and digital .measuring devices	Explaining the mechanism of operation of analog and digital measuring devices and .distinguishing between them	4	3
Diagnostic – Formative – Summative	Theory + Practical	The multimeter and its .uses	Using a multimeter to accurately measure voltage, current, and .resistance	4	4

Diagnostic – Formative – Summative	Theory + Practical	. Oscilloscope	Measuring and analyzing electrical .signals using an oscilloscope	4	5
Diagnostic – Formative – Summative	Theory + Practical	) Signal generator Function Generator .(	Identifying and using a signal generator in testing electronic .circuits	4	6
Diagnostic – Formative – Summative	Theory + Practical	Measuring frequency, .power, and time	Measure frequency, time and power using appropriate measuring .instruments	4	7
Diagnostic – Formative – Summative	Theory + Practical	Sensorsand . Transducers	Identifying sensors, transducers, and the mechanism for converting physical quantities into electrical .signals	4	8
Diagnostic – Formative – Summative	Theory + Practical	Instruments for measuring physical .variables	Understanding temperature, pressure, and flow measurement devices and their الصفحة medical .applications	4	9
Diagnostic – Formative – Summative	Theory + Practical	Bioelectric Measurements .	Identifying vital signs measurement devices used in .medical devices	4	10
Diagnostic – Formative –	Theory + Practical	Calibration of . measuring instruments	Perform calibration of measuring instruments and understand the importance of metrological .tracking	4	11

Summative					
Diagnostic – Formative – Summative	Theory + Practical	Applications of measuring devices in the maintenance of .medical equipment	Using measuring devices to inspect and diagnose faults in medical .equipment	4	12
Diagnostic – Formative – Summative	Theory + Practical	Occupational safety and electrical safety in .measurements	Applying electrical safety procedures when using measuring .devices	4	13
Diagnostic – Formative – Summative	Theory + Practical	Analyzing measurement results and writing technical .reports	Analyzing practical measurements and preparing related technical .reports	4	14
Diagnostic – Formative – Summative	Theory + Practical	General review and advanced applications in measuring .instruments	A comprehensive review of theoretical vocabulary and its connection to practical applications .in medical devices	4	15

Curriculum Development Plan

- Updating the scientific content to keep pace with modern developments in electronic .and medical measurement devices and digital measurement systems
- Enhancing the practical aspect by increasing laboratory applications of measurement .and calibration devices used in the maintenance of medical devices
- Developing students' skills in using modern software for measuring and analyzing .signals and electronic simulation
- Linking the course content to the applications of measuring devices in the inspection, calibration, and maintenance of medical devices in accordance with the needs of the .labor market
- Promoting the concepts of quality, metrology and electrical safety in accordance with .internationally approved standards in the use of medical measuring devices

Course Evaluation .11				
5%	Theory 3, Practical 2	Theory: 2–15 Practical: 2–15	Daily oral exams	T
10%	Theory 5, Practical 5	Theory: 2–15 Practical: 2–15	Daily written exams	1
15%	Theory 10, Practical 5	Theory: Weeks 7 and 13; Practical: Weeks 7 and 13	Two (2) semester exams, one for theory .and one for practice	2
10%	Theory 7, Practical 3	Theory: 6–13; Practical: 5–14	Students are assigned laboratory reports and .practical tasks	3
60%	Theory 40, Practical 20	Theory: Week 15 Practical: Week 15	Final exam	4
1	1	Week fifteen	) Short QuizQuiz 3 (	5
100%	100			the total

Sources of Education and Learning .12	
Electrical and Electronic Measurements and Instrumentation – AK Sawhney – Dhanpat Rai Publications.	Required textbooks -1
Modern Electronic Instrumentation and Measurement Techniques – Albert D. Helfrick & William D. Cooper – Prentice Hall.	-2 Main references (sources)
• Measurement Systems: Application and Design – Ernest O. Doebelin & Dhanesh N. Manik. • Instrumentation for Engineering Measurements – James W. Dally, William F. Riley & Kenneth G. McConnell. • Research published in scientific journals specializing in measurement devices, biometrics, and medical device engineering . الصفحة	A- Recommended books and references (scientific (.... ,journals, reports
• https://www.ni.com (National Instruments) • https://www.keysight.com (Keysight Technologies) • https://www.tek.com (Tektronix) • https://www.fluke.com (Fluke Corporation) • https://ieeexplore.ieee.org (IEEE Xplore Digital Library)	b) Electronic references, websites

description for Electronic Circuits 1
Course Name -1
Electronic circuits 1
Course Code-2
MDT202
Available forms of attendance -3
Traditional (face-to-face) attendance 2. Scientific attendance 3. Blended learning .1
Semester/Year-4
Level Two, First Semester 2026-2025
Total number of study hours / Number of units -5
hours / 4 units 60
Date this description was prepared -6
2026/7/3
Name of the course instructor -7
Name: M.M. Muhammad Ahmad Khalaf :Email**mohmdahmed-haw@ntu.edu.iq**
Course Objectives (General Course Objectives) -8
1- To become familiar with the basic principles of electronic circuits and the electronic components used in them. 2- Understanding the properties and operation of semiconductors, diodes, transistors, and various electronic circuits. 3- Developing students' skills in analyzing, designing, and testing basic electronic circuits. 4- To equip students with the ability to use measuring devices to examine and analyze electronic circuits. Employing electronic circuits in medical device applications and measurement and control -5 .systems الصفحة
Course outcomes, teaching and learning methods, and assessment -9
:A - Cognitive objectives **A1-** Understanding the properties of semiconductors and basic electronic components. **A2-** Explanation of the operating principle of diodes and transistors and their different types . **A3-** Analysis of the calendar, filtering, and amplification circuits. **A4-** Explanation of the operating principles and applications of operational amplifiers. **A5-** Explanation of the applications of electronic circuits in medical devices.
B - Course-specific skills objectives **B1-** Building and testing basic electronic circuits. **B2-** Using electronic measuring devices to test circuits. **B3-** Analyzing electrical signals using an oscilloscope.

B4- Designing simple electronic circuits using simulation software. **B5-** Diagnosing electronic faults and performing initial maintenance.
Teaching and learning methods • Interactive lectures. • Practical training within the laboratory. • Brainstorming. • Dialogue and discussion. • Using electronic simulation software. • Problem-based learning.
Assessment methods • Commitment and consistent attendance. • Daily oral and written tests. • Laboratory reports. • Practical duties. • Term exams. • Practical tests. • .The final exam includes both theoretical and practical components

Course Structure: Electronic Circuits 1 - Theoretical Topics -10					
Evaluation Method	**Teaching method**	**Unit/Topic Name**	**Required learning outcomes**	**Hours**	**Week**
Diagnostic – Formative – Summative	Theory + Practical	Introduction to electronic circuits .and their applications	Understanding the concept of electronic circuits and their importance in medical .devices	4	1
Diagnostic – Formative – Summative	Theory + Practical	. Semiconductors	Identifying semiconductor materials and their .properties	4	2
Diagnostic – Formative – Summative	Theory + Practical	The diode, its characteristics and .applications	Explanation of the principle of	4	3

			operation of the diode and its different .types		
Diagnostic – Formative – Summative	Theory + Practical	. Rectifiers	Analysis of single-wave and full-wave rectifier .circuits	4	4
Diagnostic – Formative – Summative	Theory + Practical	.Filters and voltage regulators	Identifying filter circuits and voltage .regulation	4	5
Diagnostic – Formative – Summative	Theory + Practical	) Bipolar transistorBJT .(	Understanding the operating principle and characteristics of a BJT transistor .	4	6
Diagnostic – Formative – Summative	Theory + Practical	.Transistor bias circuits	Analysis of transistor bias .circuits	4	7
Diagnostic – Formative – Summative	Theory + Practical	Signal amplifiers usingBJT .	Identifying basic transistor .amplifiers	4	8
Diagnostic – Formative – Summative	Theory + Practical	FET andMOSFET . transistor	Understanding the field-effect transistor and its operating .principle	4	9
Diagnostic – Formative – Summative	Theory + Practical	OperationalAmplifiers .	Understanding the characteristics of operational .amplifiers	4	10

Diagnostic – Formative – Summative	Theory + Practical	Applications of operational .amplifiers	Application of basic circuitry for operational .amplifiers	4	11
Diagnostic – Formative – Summative	Theory + Practical	. Oscillators	Identifying oscillator circuits and signal .generators	4	12
Diagnostic – Formative – Summative	Theory + Practical	PowerSupplies .	Identifying electronic power supply .circuits	4	13
Diagnostic – Formative – Summative	Theory + Practical	Applications of electronic .circuits in medical devices	Connecting electronic circuits to medical device .applications	4	14
Diagnostic – Formative – Summative	Theory + Practical	General review and practical .applications	A comprehensive review and linking of concepts to practical .applications	4	15

Curriculum Development Plan

- Updating the scientific content to keep pace with modern developments in analog and digital electronic circuits used in medical devices.
- Enhancing the practical aspect by increasing laboratory applications in the analysis, construction, and testing of electronic circuits.
- Developing students' skills in using modern electronic simulation programs for designing and analyzing circuits.
- Linking the course content to the applications of electronic circuits in medical devices and measurement and control systems.
- Promoting occupational safety concepts and quality of design and maintenance in .accordance with modern standards

Course Evaluation .11

Relative weight %	Degree	Calendar date (week)	Assessment methods	T
Relative weight %	Degree	Assessment date (one (week	Assessment methods	1
5%	Theory 3, Practical 2	Theory: 2–15 Practical: 2–15	Daily oral exams	2
10%	Theory 5, Practical 5	Theory: 2–15 Practical: 2–15	Daily written exams	3
15%	Theory 10, Practical 5	Theory: Weeks 7 and Practical: Weeks 7 ;13 and 13	Two (2) semester exams, one for theory .and one for practice	4
10%	Theory 7, Practical 3	Theory: 6–13; Practical: 5–14	Students are assigned laboratory reports and .practical tasks	5
60%	Theory 40, Practical 20	Theory: Week 15 Practical: Week 15	Final exam	6
100%	100		the total	7

Sources of Education and Learning .12	
Electronic Devices and Circuit Theory – Robert L. Boylestad & Louis Nashelsky – Pearson Education.	**1- Required textbooks**
Microelectronic Circuits – Adel S. Sedra & Kenneth C. Smith – Oxford University Press.	**2- Main references (sources)**
• **Electronic Principles** – Albert Malvino & David Bates. • **The Art of Electronics** – Paul Horowitz & Winfield Hill. • Research published in specialized scientific journals in electronic circuits and medical device engineering.	**A- Recommended books and references (scientific (.... ,journals, reports**
• https://www.allaboutcircuits.com • https://www.analog.com • https://www.ti.com • https://ieeexplore.ieee.org	**b) Electronic references, websites**

Description of the Electronic Medical Devices course 1
Course Name -1
Electronic medical devices 1
Course Code-2
MDT202
Available forms of attendance -3
Traditional (face-to-face) attendance 2. Scientific attendance 3. Blended learning .1
Semester/Year-4
Level Two, First Semester 2026-2025
Total number of study hours / Number of units -5
hours / 4 units 60
Date this description was prepared -6
2026/7/3
Name of the course instructor -7
Name: M. Qutaiba Khalaf Khalil :Email**engkutaibakk@ntu.edu.iq**
Course Objectives (General Course Objectives) -8
To become familiar with the basic principles of operation -1of electronic medical devices and their main components. 2- Understanding the mechanism of operation of electronic medical diagnostic and monitoring devices. 3- Developing students' skills in operating, inspecting and maintaining electronic medical

devices.

4- Acquiring the ability to analyze and diagnose electronic faults in medical devices.

5- Applying electrical safety and quality standards when dealing with electronic medical devices.

Course outcomes, teaching and learning methods, and assessment -9

:A - Cognitive objectives

A1- Understanding the classification of electronic medical devices and their areas of use.

A2- Explanation of the operating principle of medical measurement and monitoring devices.

A3- Explanation of the main electronic components of medical devices.

A4- Explanation of methods for testing and calibrating electronic medical devices.

A5- Statement of electrical safety and quality standards for medical devices.

B - Course-specific skills objectives

B1- Operating electronic medical devices correctly.

B2- Using measuring devices to inspect the electronic circuits of medical devices.

B3- Performing preventive maintenance and detecting basic faults.

B4- Calibrate medical devices according to the manufacturers' instructions.

B5- Preparing technical reports on the results of inspection and maintenance.

Teaching and learning methods

- Interactive lectures.
- Practical training within the laboratory.
- Using real medical devices.
- Brainstorming, dialogue, and discussion.
- Study.
- .Problem-based learning

Assessment methods

الصفحة

- Daily oral and written tests.
- Laboratory reports.
- Practical duties.
- Term exams.
- Evaluating practical performance.
- .The final exam includes both theoretical and practical components

course : Theoretical topics the Electronic Medical Devices 1 Structure of -10

Evaluation Method	Teaching method	Unit/Topic Name	Required learning outcomes	Hours	Week
Diagnostic – Formative – Summative	Theory + Practical	Introduction to electronic .medical devices	Understanding the concept of electronic medical devices, their classification, and their .importance in healthcare	4	1
Diagnostic – Formative – Summative	Theory + Practical	Electrical safety and .medical standards	Identifying electrical safety .requirements in medical devices	4	2
Diagnostic – Formative – Summative	Theory + Practical	Vital signs and medical .measurement systems	Understanding the principles of .measuring vital signs	4	3
Diagnostic – Formative – Summative	Theory + Practical	Electrocardiogram (ECG) machine.	Explanation of how an electrocardiogram (ECG) .machine works	4	4
Diagnostic – Formative – Summative	Theory + Practical	Blood pressure .monitoring devices	Identifying electronic blood .pressure monitors	4	5
Diagnostic – Formative – Summative	Theory + Practical	Pulse Oximeter . device	Understanding the pulse oximeter and its operating .principle الصفحة	4	6
Diagnostic – Formative – Summative	Theory + Practical	vital signs monitoring devices).	A study of patient monitoring .devices and their basic functions	4	7
Diagnostic – Formative – Summative	Theory + Practical	Defibrillator.	Understanding defibrillators and .how they work	4	8
Diagnostic – Formative – Summative	Theory + Practical	Artificial respirator (Ventilator).	Identifying artificial respirators .and their basic components	4	9

Diagnostic – Formative – Summative	Theory + Practical	Pumps.	Study of electronic injection .devices and medical solutions	4	10
Diagnostic – Formative – Summative	Theory + Practical	machines.	Learn about anesthesia machines .and their operating principles	4	11
Diagnostic – Formative – Summative	Theory + Practical	Preventive and periodic .maintenance	Understanding the principles of preventive maintenance of .electronic medical devices	4	12
Diagnostic – Formative – Summative	Theory + Practical	Troubleshooting and .maintenance procedures	Diagnosing basic electronic .faults in medical devices	4	13
Diagnostic – Formative – Summative	Theory + Practical	Calibration of electronic .medical devices	Applying calibration and .performance control methods	4	14
Diagnostic – Formative – Summative	Theory + Practical	General review and .practical applications	A comprehensive review and linking of concepts to practical .applications	4	15

Curriculum Development Plan

- Updating the scientific content to keep pace with modern developments in electronic الصفدة. medical devices and healthcare systems
- Enhancing laboratory applications using modern medical devices and specialized simulation software.
- Developing students' skills in operating, maintaining, and calibrating medical devices according to international standards.
- Linking the course content to the needs of hospitals and companies specializing in medical devices.
- Promoting concepts of electrical safety, quality assurance and risk management in .electronic medical devices

Course Evaluation .11

% Relative weight	Degree	Calendar date (week)	Assessment methods	T

% Relative weight	Degree	Assessment date (one week)	Assessment methods	1
5%	Theory 3, Practical 2	Theory: 2–15 Practical: 2–15	Daily oral exams	2
10%	Theory 5, Practical 5	Theory: 2–15 Practical: 2–15	Daily written exams	3
15%	Theory 10, Practical 5	Theory: Weeks 7 and 13; Practical: Weeks 7 and 13	Two (2) semester exams, one for theory and one for .practice	4
10%	Theory 7, Practical 3	Theory: 6–13; Practical: 5–14	Students are assigned laboratory reports and .practical tasks	5
60%	Theory 40, Practical 20	Theory: Week 15 Practical: Week 15	Final exam	6
100%	100		the total	7

Sources of Education and Learning .12	
Introduction to Biomedical Equipment Technology – Joseph J. Carr & John M. Brown – Pearson Education.	Required textbooks -1
Biomedical Instrumentation and Measurements – Leslie Cromwell, Fred J. Weibell & Erich A. Pfeiffer – Prentice Hall.	Main references -2 (sources)
• Medical Instrumentation: Application and Design – John G. Webster & Amit J. Nimunkar. • Principles of Biomedical Instrumentation – Andrew G. Webb. • Research Published in scientific journals specializing in medical device engineering and technology.	A- Recommended books and references scientific journals,) (.... ,reports
• https://www.aami.org • https://www.ecri.org • https://www.fda.gov/medical-devices • https://ieeexplore.ieee.org	b) Electronic references, websites

Description of the Electromechanical Medical Devices course
Course Name -1
Electromechanical medical devices
Course Code-2
MDT202
Available forms of attendance -3
Traditional (face-to-face) attendance 2. Scientific attendance 3. Blended learning .1
Semester/Year-4
Level Two, First Semester 2026-2025
Total number of study hours / Number of units -5
hours / 4 units 60
Date this description was prepared -6
2026/7/3
Name of the course instructor -7
M.M. Firas Hussein Mar'i :Name :Email**firashussain-haw@ntu.edu.iq**

Course Objectives (General Course Objectives) -8

1. Understanding the basic principles of electromechanical medical devices and how they work.
2. Understanding the components of electromechanical systems used in medical devices .
3. Acquiring skills in operating, inspecting, and maintaining electromechanical medical devices.
4. Developing the ability to diagnose mechanical, electrical, and electronic faults in medical devices.
5. Applying safety and quality standards during the operation and maintenance of .electromechanical medical devices

Course outcomes, teaching and learning methods, and assessment -9

:A - Cognitive objectives

A1- Identifying the components of electromechanical medical devices and the function of each.

A2- Explanation of the operating principle of motors, pumps, and compressors used in medical devices.

A3- Explanation of electromechanical control systems in medical devices.

A4- Explanation of preventive maintenance and calibration procedures.

A5- Statement of electrical and mechanical safety requirements in medical devices.

B - Course-specific skills objectives

B1- Operate electromechanical medical devices according to operating instructions.

B2- Using measuring devices to inspect electromechanical systems.

B3- Diagnosing faults and replacing damaged parts.

B4- Performing preventive and periodic maintenance on equipment.

B5- Preparing technical reports on inspection and maintenance work.

Teaching and learning methods

- .Interactive lectures
- .Practical training within the laboratory
- .Using real medical devices
- .Scientific visits to hospitals
- .Problem-based learning
- .Using simulation software

Assessment methods

- Daily oral and written tests.
- Laboratory reports.
- Practical duties.
- Term exams.
- Evaluating practical performance.

- .The final exam includes both theoretical and practical components

Course the Electromechanical Medical Devices B. Structure of -10 Theoretical vocabulary					
Evaluation Method	**Teaching method**	**Unit/Topic Name**	**Required learning outcomes**	**Hours**	**Week**
Diagnostic – Formative – Summative	Theory + Practical	Introduction to electromechanical .medical devices	Understanding the concept of electromechanical medical devices and their importance in .healthcare institutions	4	1
Diagnostic – Formative – Summative	Theory + Practical	Components of electromechanical .systems	Identifying the electrical, mechanical, and electronic .components of medical devices	4	2
Diagnostic – Formative – Summative	Theory + Practical	Medical electric .motors	Understanding the operating principles of electric motors used .in medical devices	4	3
Diagnostic – Formative – Summative	Theory + Practical	Medicalpumps .	Learn about medical pumps, their .types and applications	4	4
Diagnostic – Formative – Summative	Theory + Practical	Compressors and compressed air .systems	Understanding the workings of compressors and medical air .systems	4	5
Diagnostic – Formative – Summative	Theory + Practical	Valves and actuators)Actuators &Valves .(	Identifying valves and .electromechanical actuators	4	6
Diagnostic – Formative – Summative	Theory + Practical	Electromechanical .control systems	Study of electromechanical control systems in medical .devices	4	7
Diagnostic – Formative – Summative	Theory +	Medical suction) deviceSuction Machine .(	Identifying medical suction .devices and their components	4	8

	Practical				
Diagnostic – Formative – Summative	Theory + Practical	) Sterilization device Autoclave .(	A study of steam sterilization devices and their operating .principle	4	9
Diagnostic – Formative – Summative	Theory + Practical	Electric medical .family	Identifying the electric medical bed and its movement .mechanisms	4	10
Diagnostic – Formative – Summative	Theory + Practical	Hemodialysis Machine .	Studying dialysis machines from .an electromechanical perspective	4	11
Diagnostic – Formative – Summative	Theory + Practical	Preventive and periodic .maintenance	Understanding preventive maintenance for .electromechanical equipment	4	12
Diagnostic – Formative – Summative	Theory + Practical	Fault detection and corrective .maintenance	Diagnosing mechanical, .electrical, and electronic faults	4	13
Diagnostic – Formative – Summative	Theory + Practical	Calibration and testing of electromechanical .devices	Implementing calibration .procedures and performance tests	4	14
Diagnostic – Formative – Summative	Theory + Practical	General review and practical .applications	A comprehensive review of the curriculum and linking the .concepts to practical applications	4	15

Curriculum Development Plan

- Updating the course content to keep pace with modern developments in .electromechanical medical devices and intelligent control systems
- Enhancing practical training in the operation and maintenance of electromechanical .medical equipment used in hospitals
- Introducing simulation applications and educational software to support the .understanding of electromechanical systems
- The course is linked to the needs of the labor market through the study of common

.devices used in health institutions

- Promoting occupational safety concepts, quality assurance, and preventive .maintenance in accordance with international standards

Course Evaluation .11

Relative weight %	Degree	Calendar date (week)	Assessment methods	T
5%	5	Theory: 2–15 / Practical: 2–15	Daily oral exams	1
10%	10	Theory: 2–15 / Practical: 2–15	Daily written exams	2
15%	15	Weeks 7 and 13	Term exams)2(	3
10%	10	Weeks 5–14	Laboratory reports and practical assignments	4
60%	60	Week 15	Final exam (theoretical and (practical	5
100%	100		the total	6

Sources of Education and Learning .12

Introduction to Biomedical Equipment Technology – Joseph J. Carr & John M. Brown – Pearson Education.	Required textbooks -1
Medical Instrumentation: Application and Design – John G. Webster & Amit J. Nimunkar – Wiley.	Main References(Sources) -2
• Biomedical Engineering Handbook – Joseph D. Bronzino. • Clinical Engineering Handbook – Ernesto Iadanza. • Recent research In the maintenance and operation of electromechanical medical devices.	A- Recommended books and references (scientific journals, (.... ,reports
• https://www.aami.org • https://www.ecri.org • https://www.fda.gov/medical-devices • https://ieeexplore.ieee.org	الصفحة b) Electronic references, websites

Programmable Logic Controller (PLC) Course Description
Course Name -1
Programmable Logic Controller
Course Code-2
MDT213
Available forms of attendance -3
Traditional (face-to-face) attendance 2. Scientific attendance 3. Blended learning .1

Semester/Year-4

Level Two, First Semester 2026-2025

Total number of study hours / Number of units -5

hours / 3 units 45

Date this description was prepared -6

2026/7/3

Name of the course instructor -7

Name: M.M. Muhammad Ahmad Khalaf
e-mail mohmdahmed-haw@ntu.edu.iq

Course Objectives (General Course Objectives) -8

- Understanding the principles and systems of the Programmable Logic Controller(PLC) and its basic components.
- UnderstandingPLC programming languages and the mechanism for designing industrial control programs.
- Acquire skills in connecting and programming digital and analog input and output units.
- PLC systems in controlling medical and laboratory equipment.
- .Developing skills in diagnosing faults and maintaining programmed control systems

Course outcomes, teaching and learning methods, and assessment -9

:A - Cognitive objectives

A1- Identifying the components of a programmable logic controller and the function of each .

A2- Explanation of the PLC's operating principle and program execution cycle.

A3- Distinguishing between types of digital and analog input and output units.

A4- Explanation of PLC programming languages according toIEC 61131-3 . standard

A5- Explaining the applications ofPLCs in medical devices and automation systems.

B - Course-specific skills objectives

B1- Programming control circuits using LadderDiagram. الصفحة

B2- Connecting sensors and actuators toPLC units.

B3- Using simulation programs and software from PLC manufacturers.

B4- Implementing simple control projects related to medical devices.

B5- Diagnosing and maintainingPLC system faults.

Teaching and learning methods

- .Interactive lectures
- .Practical training within the laboratory
- Programming practical applications usinga PLC .
- .Using simulation software
- .Project-based learning
- .Dialogue and discussion

Assessment methods

- .Daily tests
- .Programming assignments
- .Practical reports
- .Term exams
- .Applied projects
- .The final exam includes both theoretical and practical components

the Programmable Logic Controller (PLC) course of Structure -10 Theoretical vocabulary					
Evaluation Method	**Teaching method**	**Unit/Topic Name**	**Required learning outcomes**	**Hours**	**Week**
Diagnostic – Formative – Summative	Theory + Practical	Introduction to the Programmable Logic .Controller	Understanding the concept ofPLC and its importance .in modern control systems	3	1
Diagnostic – Formative – Summative	Theory + Practical	components.	Identifying the components of thePLC and the function .of each unit	3	2
Diagnostic – Formative – Summative	Theory + Practical	ScanCycle.	Understanding the controller's workflow and the program execution .mechanism	3	3
Diagnostic – Formative – Summative	Theory + Practical	Input/Output(I/O) Modules.	Identifying digital and analog input and output .units	3	4
Diagnostic – Formative – Summative	Theory + Practical	Basics ofLadder Diagram.	Creating simple programs .using ladder logic	3	5
Diagnostic – Formative – Summative	Theory + Practical	Timers & Counters.	Using timers and counters in control programs.	3	6

Diagnostic – Formative – Summative	Theory + Practical	Logical Instructions.	Designing logic control circuits using basic .instructions	3	7
Diagnostic – Formative – Summative	Theory + Practical	Controlling motors and .sequential processes	Programming sequential operations and controlling .motors	3	8
Diagnostic – Formative – Summative	Theory + Practical	Sensors and Actuators Interface.	Connecting the sensors and actuators to the logic controller.	3	9
Diagnostic – Formative – Summative	Theory + Practical	Communication protocols (Modbus, Ethernet, RS-485).	Identifying industrial .communication interfaces	3	10
Diagnostic – Formative – Summative	Theory + Practical	simulation and programming.	Using PLC simulation software.	3	11
Diagnostic – Formative – Summative	Theory + Practical	PLC applications in .medical devices	PLC systems in medical .and laboratory equipment	3	12
Diagnostic – Formative – Summative	Theory + Practical	Troubleshooting and .maintenance	Diagnosing software and hardware faults inPLC systems. الصفحة	3	13
Diagnostic – Formative – Summative	Theory + Practical	A comprehensive applied .project	Implementing a control project usinga PLC.	3	14
Diagnostic – Formative – Summative	Theory + Practical	General review and .advanced applications	A comprehensive review of the vocabulary and its connection to practical .applications	3	15

Curriculum Development Plan

- Updating the course content to keep pace with modern developments in industrial

control systems andPLCs .

- Enhanced hands-on training using modernPLC controllers and certified simulation .software
- Developing students' skills in designing and implementing automated control projects .related to medical devices
- The course is linked to automation and control applications used in hospitals and .medical laboratories
- Promoting concepts of electrical safety, control system security, and preventive .maintenance in accordance with international standards

Course Evaluation .11

Relative weight %	Degree	Calendar date (week)	Assessment methods	T
5%	5	Theory: 2–15 / Practical: 15–2	Daily oral exams	1
10%	10	Theory: 2–15 / Practical: 15–2	Daily written exams	2
15%	15	Weeks 7 and 13	Term exams)2(	3
10%	10	Weeks 5–14	Practical reports, programming assignments, and small projects	4
60%	60	Week 15	Final exam (theoretical and (practical	5
100%	100		the total	6

Sources of Education and Learning .12

Programmable Logic Controllers – Frank D. Petruzella – McGraw-Hill Education.	Required textbooks -1
Automating Manufacturing Systems with PLCs – Hugh Jack.	Main references (sources) -2
• Programmable Logic Controllers: Principles and Applications – John W. Webb & Ronald A. Reis. • Industrial Automation and Process Control – Jon Steenerson. • Published research in the fields of industrial control, automation, and medical device engineering.	A- Recommended books and references (scientific journals, (.... ,reports
• https://new.siemens.com (Siemens Automation) • https://www.rockwellautomation.com (Rockwell Automation) • https://www.automationdirect.com • https://ieeexplore.ieee.org	b) Electronic references, websites

Description of the control course
Course Name -1
control
Course Code-2
MDT212
Available forms of attendance -3
Traditional (face-to-face) attendance 2. Scientific attendance 3. Blended learning .1
Semester/Year-4
Level Two, First Semester 2026-2025
Total number of study hours / Number of units -5
hours / 4 units 60
Date this description was prepared -6
2026/7/3
Name of the course instructor -7
M.M. Wissam Sattam Ghanem :Name :Email**wisamsattam_hwj@ntu.edu.iq** الصفحة
Course Objectives (General Course Objectives) -8
• Understanding the basic principles of control systems and their importance in engineering and medical applications. • Understanding the components of open-loop and closed-loop control systems and how they work. • Analyzing mathematical models of control systems and evaluating their performance using different mathematical methods. • Acquire skills in designing and analyzing control systems using modern engineering software. • Employing control systems to operate and improve the performance of medical .devices and measurement and control systems
Course outcomes, teaching and learning methods, and assessment -9

:A - Cognitive objectives

- Understanding the basic concepts of control systems and their types.
- Interpretation of mathematical models, translational functions, and block diagrams.
- Analysis of system responses in the time domain and frequency domain.
- Evaluating the stability of systems using different analytical criteria.
- Explaining the applications of control systems in medical devices and automation .systems

B - Course-specific skills objectives

- Drawing and analyzing block diagrams and signal flow diagrams.
- **MATLAB/Simulink** software To simulate and analyze control systems.
- Calculating time response characteristics, performance coefficients, and stability.
- Design of different controllers such as**P ,PI ,PD and ,PID** And analyzing its performance.
- Applying control concepts to medical devices such as ventilators, dialysis machines, infusion pumps, and patient monitoring systems.

C- Values

- Adherence to scientific accuracy when analyzing and designing control systems.
- Working as a team while carrying out experiments and laboratory projects.
- Adherence to occupational safety procedures when using devices and software.
- Developing analytical and creative thinking in solving engineering problems.
- Adherence to scientific integrity in preparing reports and practical projects.

Teaching and learning methods

- Interactive lectures.
- Practical training within the laboratory.
- UsingMATLAB/Simulink software for analysis and simulation.
- Brainstorming, dialogue, and discussion.
- Problem-based learning.
- Project-based learning.
- Demonstrations and practical case studies.

Assessment methods

- Daily oral tests.
- Daily written tests.
- Laboratory reports.
- Homework.
- Term exams.
- Applied projects.
- Evaluating practical performance.
- The final exam includes both theoretical and practical components.

Evidence of control		Theoretical vocabulary -10			
Evaluation Method	**Teaching method**	**Unit/Topic Name**	**Required learning outcomes**	**Hours**	**Week**
Diagnostic – Formative – Summative	Theory + Practical	Introduction to control systems, components of a control system, open .loop and closed loop	Understanding the concept of control systems and their importance in industrial and medical applications, and distinguishing between open- .loop and closed-loop systems	4	1
Diagnostic – Formative – Summative	Theory + Practical	Mathematical modeling of control .systems	Analyzing the mathematical models of physical systems and extracting the differential equations that represent .them	4	2
Diagnostic – Formative – Summative	Theory + Practical	Transfer Functions.	Derivation of the translational function, analysis of its properties, .and its use in representing systems	4	3
Diagnostic – Formative – Summative	Theory + Practical	diagrams.	Representing control systems using block diagrams and performing .various reduction operations	4	4
Diagnostic – Formative – Summative	Theory + Practical	Signal Flow Graphs and Mason's Rule.	Representing systems using signal flow diagrams and applying Mason's .rule to find the translational function	4	5
Diagnostic – Formativ	Theory +	Time response of systems.	Analyzing the response of first and second-order systems and calculating .various performance coefficients	4	6

e – Summative	Practical				
Diagnostic – Formative – Summative	Theory + Practical	Stability and the Routh-Hurwitz criterion.	Evaluating the stability of control systems using the Roth-Horowitz .standard	4	7
Diagnostic – Formative – Summative	Theory + Practical	diagram.	Analyzing the positions of the poles and their impact on system .performance using a root diagram	4	8
Diagnostic – Formative – Summative	Theory + Practical	Plots.	Frequency response analysis using Bodey diagrams and extraction of .stability margins	4	9
Diagnostic – Formative – Summative	Theory + Practical	Plot.	Studying the stability of systems using Nyquist diagrams and .interpreting their results	4	10
Diagnostic – Formative – Summative	Theory + Practical	P ,PI ,PD and PID , dominants.	Design of key controllers and analysis of their impact on improving system .performance	4	11
Diagnostic – Formative – Summative	Theory + Practical	Simulating control systems using MATLAB/Simulink.	UsingMATLAB/Simulink software to simulate and analyze various .control systems	4	12

Diagnostic – Formative – Summative	Theory + Practical	State Space Representation.	Identifying and analyzing the representation of systems in state .space	4	13
Diagnostic – Formative – Summative	Theory + Practical	Applications of control systems in .medical devices	Applying control concepts to medical devices such as ventilators, infusion pumps, medical incubators, and .dialysis machines	4	14
Diagnostic – Formative – Summative	Theory + Practical	General review and practical .applications	A comprehensive review of the course content and implementation of integrated practical applications using .simulation	4	15

Curriculum Development Plan

- Updating the scientific content of the course to align with modern developments in .control systems and their applications in biomedical engineering
- Enhancing the practical aspect by increasing the use of engineering simulation software such asMATLAB/Simulink .and linking it to real-world applications
- Introducing modern applications for control systems in medical devices such as ventilators, infusion pumps, dialysis machines, medical incubators, and patient .monitoring systems
- Developing students' skills in designing and analyzing control systems using modern .engineering software
- Linking the course content to the needs of the labor market in the fields of .maintenance and operation of medical devices and industrial automation
- .Encouraging project-based learning and teamwork to solve engineering problems
- Developing educational laboratories and updating the software and equipment used .to keep pace with technological development

Course Evaluation .11

Relative weight %	Degree	Assessment date (one (week	Assessment methods	T
5%	5	Week 2–15	Daily oral exams	1
10%	10	Week 2–15	Daily written exams	2

10%	10	Week 7	First semester exam	3
10%	10	Week 13	Second semester exam	4
10%	10	Week 4–14	Lab reports and homework	5
5%	5	Week 14–15	Projector seminar	6
35%	35	End-of-term exams	Final theory exam	7
15%	15	End-of-term exams	Final practical exam	8
100%	100		the total	9

Sources of Education and Learning .12	
Modern Control Engineering, Katsuhiko Ogata, Pearson Education.	Required textbooks -1
Control Systems Engineering, Norman S. Nise, Wiley.	Main references (sources) -2
• Feedback Control of Dynamic Systems – Franklin, Powell & Emami-Naeini. • Automatic Control Systems – Benjamin C. Kuo. • Articles and scientific journals in the field of control systems Biomedical engineering.	A- Recommended books and references (scientific journals, (.... ,reports
MathWorks) websiteMATLAB &Simulink Documentation (•IEEE Xplore Digital Library •ScienceDirect • SpringerLink University e-learning portals •	b) Electronic references, websites

Renewable energy systems Course description
Course Name -1
Renewable energy systems
Course Code-2
MDT202
Available forms of attendance -3
Traditional (face-to-face) attendance 2. Scientific attendance 3. Blended learning .1
Semester/Year-4
Level Two, First Semester 2026-2025
Total number of study hours / Number of units -5
hours / 3 units 45
Date this description was prepared -6
2026/7/3 الصفحة
Name of the course instructor -7
Name: Dr. Munif Abdullah Ahmed :e-mail muneef_hwj@ntu.edu.iq
Course Objectives (General Course Objectives) -8
• Identifying renewable energy sources and their importance in achieving sustainable development. • Understanding the operating principles of solar energy systems, wind energy, and other renewable energy sources. • Acquiring skills in designing and analyzing renewable energy systems using modern engineering methods.

- Learn about the components of solar energy systems, storage systems, power converters, and how to select them.
- Employing renewable energy systems to power medical equipment and health facilities, especially in areas suffering from power outages.

Course outcomes, teaching and learning methods, and assessment -9

:A - Cognitive objectives

- Identifying the types of renewable energy sources and the characteristics of each.
- Explanation of the principles of converting solar and wind energy into electrical energy.
- Analysis of the components of photovoltaic solar energy systems and their mechanism of operation.
- Explaining the operating principles of batteries, charge controllers, and electrical inverters.
- Statement of applications of renewable energy systems in operating medical equipment and hospitals.

B - Course-specific skills objectives

- Calculating electrical loads and designing suitable solar power systems.
- Select solar panels, batteries, charge controllers and inverters according to load requirements.
- Using engineering software to simulate and analyze the performance of renewable energy systems.
- Performing inspection, measurement, and initial commissioning operations for solar energy systems.
- Implementing safety procedures during the installation, operation and maintenance of renewable energy systems.

C- Values

- .Commitment to optimal energy use and rationalizing its consumption
- Promoting a culture of environmental conservation and reliance on clean energy .sources
- .Adherence to occupational safety procedures when dealing with electrical systems
- .Developing teamwork skills in implementing applied projects
- .Adherence to scientific integrity in preparing reports and projects

Teaching and learning methods

- .Interactive lectures
- .Practical training within the laboratory
- .Demonstrations using educational solar energy systems
- .Using engineering simulation software
- .Scientific discussions and brainstorming
- .Problem-based learning

• .Implementing small-scale applied projects
Assessment methods • .Daily oral tests • .Daily written tests • .Practical reports • .Homework • .Term exams • .Applied projects • .Evaluating practical performance • .The final exam includes both theoretical and practical components

Renewable energy systems framework			Theoretical vocabulary -10		
Evaluation Method	Teaching method	Unit/Topic Name	Required learning outcomes	Hours	Week
Diagnostic – Formative – Summative	Theory + Practical	Introduction to renewable energies and their .applications	Understanding the concept of renewable energies and their importance in sustainable .development and the health sector	3	1
Diagnostic – Formative – Summative	Theory + Practical	Renewable energy sources (solar, wind, biomass, hydroelectric, .(geothermal	Identifying the types of renewable energy sources and comparing their .characteristics الصفحة	3	2
Diagnostic – Formative – Summative	Theory + Practical	Solar radiation, its measurement and .basic calculations	Understanding solar radiation and the factors affecting solar energy .production	3	3
Diagnostic – Formative –	Theory + Practical	) Solar cells Photovoltaic Cells .(	Understanding the structure of solar cells and the mechanism of converting light energy into electrical .energy	3	4

Summative					
Diagnostic – Formative – Summative	Theory + Practical	Photovoltaic solar) panelsPV Modules .(	Learn about the types of solar panels, their characteristics, and selection .criteria	3	5
Diagnostic – Formative – Summative	Theory + Practical	Components of solar power systems panels, charge) controller, batteries, .(inverter	Analysis of the components of a solar energy system and the function of .each element	3	6
Diagnostic – Formative – Summative	Theory + Practical	Calculating electrical loads and designing solar .systems	Calculating electrical loads and determining the requirements of the .solar system	3	7
Diagnostic – Formative – Summative	Theory + Practical	Batteries and energy .storage systems	Choosing the right batteries and studying their characteristics and .maintenance methods	3	8
Diagnostic – Formative – Summative	Theory + Practical	) Charge controllers PWM andMPPT .(	الصفحة Identifying the types of shipping .organizations and how they work	3	9
Diagnostic – Formative – Summative	Theory + Practical	Electricalinverters .	Learn about the types of electrical inverters, their characteristics and .uses	3	10

Diagnostic – Formative – Summative	Theory + Practical	Solar energy system design and simulation software.	Using engineering software in the design and simulation of solar energy systems.	3	11
Diagnostic – Formative – Summative	Theory + Practical	Installation, operation and maintenance of solar energy systems.	Understanding the installation requirements, inspection procedures, operation and maintenance.	3	12
Diagnostic – Formative – Summative	Theory + Practical	Occupational safety and electrical protection.	Implementing occupational safety and electrical protection procedures in solar systems.	3	13
Diagnostic – Formative – Summative	Theory + Practical	Renewable energy applications in medical devices and hospitals.	Identifying applications of renewable energy systems in operating medical equipment and health centers.	3	14
Diagnostic – Formative – Summative	Theory + Practical	General review and applied project.	A comprehensive review of the curriculum and implementation of practical applications on the design of a solar energy system.	3	15

Curriculum Development Plan

- Updating the scientific content of the course to keep pace with global developments in renewable energy technologies.
- Enhancing the practical aspect through training in the design, operation and maintenance of solar energy systems.
- Introducing specialized software for designing and simulating solar energy systems and analyzing their performance.
- Linking the course content to renewable energy applications in hospitals and health

.centers and the operation of medical equipment

- Developing students' skills in calculating electrical loads and designing solar energy .systems according to technical standards
- Promoting the concepts of energy efficiency, environmental sustainability, and .rationalizing energy consumption
- Developing educational laboratories and providing modern training models for solar .energy systems

Course Evaluation .11

Relative weight %	Degree	Assessment date (one (week	Assessment methods	T
5%	5	Week 2–15	Daily oral exams	1
10%	10	Week 2–15	Daily written exams	2
10%	10	Week 7	First semester exam	3
10%	10	Week 13	Second semester exam	4
10%	10	Week 4–14	Practical reports and homework assignments	5
5%	5	Week 14–15	Solar energy system design project	6
35%	35	End-of-term exams	Final theoretical exam	7
15%	15	End-of-term exams	Final practical exam	8
100%	100		the total	9

Sources of Education and Learning .12

• Roger A. Messenger & Jerry Ventre, Photovoltaic Systems Engineering, CRC Press. • Gilbert M. Masters, Renewable and Efficient Electric Power Systems, Wiley.	Required textbooks -1
• Chetan Singh Solanki, Solar Photovoltaics: Fundamentals, Technologies and Applications, PHI Learning. • Eduardo Lorenzo, Solar Electricity: Engineering of Photovoltaic Systems, Progensa.	Main references (sources) -2
• Solar Energy Renewable ,Energy and ,IEEE Journal of Photovoltaics. • International Renewable Energy Agency (IRENA) and International Energy Agency (IEA) reports on renewable energy.	A- Recommended books and references (scientific journals, (.... ,reports
• The official website ofIRENA. • The official website ofNREL (National Renewable Energy Laboratory).	b) Electronic references, websites

• The official website ofPVsyst. • The official website ofHOMER Energy. • The university's e-learning portals.	

Medical Equipment Maintenance Workshop 1 Course description
Course Name -1
Medical Equipment Maintenance Workshop 1
Course Code-2
MDT202
Available forms of attendance -3
Traditional (face-to-face) attendance 2. Scientific attendance 3. Blended learning .1
Semester/Year-4
Level Two, First Semester 2026-2025 الصفحة
Total number of study hours / Number of units -5
30 / hours2 units
Date this description was prepared -6
2026/7/3
Name of the course instructor -7
Name: M. Hasaniya Jassim Abdullah :Email**husniyah_hwj@ntu.edu.iq**
Course Objectives (General Course Objectives) -8
• Understanding the fundamentals of managing medical equipment maintenance .workshops and organizing the work environment

- Acquiring practical skills in inspecting, diagnosing faults, and maintaining medical .devices
- .Identifying the measuring tools and testing equipment used in maintenance work
- Applying occupational safety procedures and quality standards during maintenance .work
- Developing skills in preparing technical reports and managing preventive and .corrective maintenance records

Course outcomes, teaching and learning methods, and assessment -9

:A - Cognitive objectives

- .Understanding the principles of medical device maintenance and its types
- Explanation of the mechanism of operation of the measuring and testing devices used in .workshops
- .Explaining preventive and corrective maintenance procedures
- .Explanation of the steps for diagnosing electrical, electronic, and mechanical faults
- Statement of safety and quality requirements in medical equipment maintenance workshops.

B - Course-specific skills objectives

- .Use measuring and testing equipment accurately during maintenance work
- .Diagnosing and repairing faults according to technical procedures
- .Performing preventive maintenance on various medical devices
- .Calibration of medical devices after maintenance using standard testing equipment
- Preparing technical reports, maintenance records, and documenting completed work.

C- Values

- .Adherence to professional ethics during the maintenance of medical devices
- .Maintaining the equipment, tools, and supplies inside the workshop
- .Adherence to occupational safety and risk control procedures الصفحة
- .Enhancing the spirit of teamwork and cooperation within the workshop
- .Commitment to accuracy and honesty in carrying out maintenance work

Teaching and learning methods

- .Interactive lectures
- .Practical training inside the maintenance workshop
- .Conducting practical experiments on real or training medical devices
- .Problem-based learning
- .Studying common malfunction cases
- .Scientific discussions and practical demonstrations

Assessment methods

- .Daily oral tests

- .Daily written tests
- .Technical reports
- .Practical duties
- .Term exams
- .Performance evaluation within the workshop
- .The practical project
- .The final exam includes both theoretical and practical components

Structure of the Medical Equipment Maintenance Workshop Course: Theoretical -10 Content					
Evaluation Method	Teaching method	Unit/Topic Name	Required learning outcomes	Hours	Week
Diagnostic – Formative – Summative	Theory + Practical	Introduction to the Medical Equipment Maintenance and Occupational Safety .Workshop	Understanding the workshop objectives, occupational safety instructions, and work environment .organization	2	1
Diagnostic – Formative – Summative	Theory + Practical	Maintenance tools and measuring .devices	Identifying the hand tools and measuring devices used in .maintenance work	2	2
Diagnostic – Formative – Summative	Theory + Practical	Use of multimeter, oscilloscope and .power supply	Using electrical and electronic .measuring devices correctly	2	3
Diagnostic – Formative – Summative	Theory + Practical	Disassembling and assembling medical .devices	Performing disassembly and assembly operations for medical devices according to technical .instructions	2	4

Diagnostic – Formative – Summative	Theory + Practical	Diagnosing electrical and .electronic faults	Diagnosing electrical and electronic .faults using measuring devices	2	5
Diagnostic – Formative – Summative	Theory + Practical	Welding techniques and electronic circuit .repair	Performing welding, disassembly and .assembly of electronic components	2	6
Diagnostic – Formative – Summative	Theory + Practical	Preventive maintenance of .medical devices	Perform preventive maintenance according to the approved .maintenance schedules	2	7
Diagnostic – Formative – Summative	Theory + Practical	Corrective maintenance of .medical devices	Perform corrective maintenance and .repair common faults	2	8
Diagnostic – Formative – Summative	Theory + Practical	Calibration of .medical devices	Understanding the methods of calibrating medical devices after .maintenance	2	9
Diagnostic – Formative – Summative	Theory + Practical	Electrical safety .tests	Applying electrical safety testing .procedures for medical devices	2	10
Diagnostic – Formative –	Theory + Practical	Maintenance of medical monitoring .equipment	Performing maintenance work on patient monitoring devices and vital .signs measuring devices	2	11

Summative					
Diagnostic – Formative – Summative	Theory + Practical	Maintenance of therapeutic and laboratory .equipment	Performing maintenance work on treatment equipment and laboratory .devices	2	12
Diagnostic – Formative – Summative	Theory + Practical	Documenting maintenance work and workshop .management	Preparing technical reports, maintenance records, and managing .spare parts	2	13
Diagnostic – Formative – Summative	Theory + Practical	An applied project in the maintenance of .medical equipment	Implementing a comprehensive maintenance project for a medical device, starting from diagnosis to .final testing	2	14
Diagnostic – Formative – Summative	Theory + Practical	General review and practical .applications	A comprehensive review and implementation of integrated practical applications for .maintenance work	2	15

Curriculum Development Plan

- Updating the course content to keep pace with modern technologies in medical device .maintenance
- Enhancing the practical aspect through training on modern medical devices and .simulators
- .Introducing modern testing and calibration equipment to the maintenance workshop
- The course is linked to the requirements of hospitals and companies specializing in .the maintenance of medical equipment
- .Developing students' skills in diagnosing faults and preparing technical reports
- Promoting the application of quality standards, risk management, and occupational .safety
- Encouraging applied projects and teamwork in the maintenance of medical

.equipment				
Course Evaluation .11				
Relative weight %	Degree	Assessment date (one (week	Assessment methods	T
5%	5	Week 2–15	Daily oral exams	1
10%	10	Week 2–15	Daily written exams	2
10%	10	Week 7	First semester exam	3
10%	10	Week 13	Second semester exam	4
10%	10	Week 4–14	Technical reports and practical duties	5
5%	5	Week 14–15	Practical maintenance project	6
35%	35	End-of-term exams	Final theoretical exam	7
15%	15	End-of-term exams	Final practical exam	8
100%	100		the total	9
Sources of Education and Learning .12				
• Joseph J. Carr & John M. Brown, Introduction to Biomedical Equipment Technology. • Richard Aston, Principles of Biomedical Instrumentation and Measurement.			Required textbooks -1	
• Joseph D. Bronzino, The Biomedical Engineering Handbook. • David Prutchi & Michael Norris, Design and Development of Medical Electronic Instrumentation.			Main references (sources) -2	
• Maintenance andService Manuals .For medical devices IEC .standards for the safety of medical devices Scientific journals in biomedical engineering and medical maintenance.			A- Recommended books and references (scientific journals, (.... ,reports الصفحة	
• The official website ofAAMI (Association for the Advancement of Medical Instrumentation). • The official website of theIEC. • WHO official website (Medical Device Management (and Maintenance The official websites of medical device • manufacturers to obtain maintenance and operation manuals.			b) Electronic references, websites	

Graduation project Course description
Course Name -1
Graduation project
Course Code-2
MDT202
Available forms of attendance -3
Traditional (face-to-face) attendance 2. Scientific attendance 3. Blended learning .1
Semester/Year-4
Level Two, First Semester 2026-2025
Total number of study hours / Number of units -5
30 / hours2 units
Date this description was prepared -6
2026/7/3
Name of the course instructor -7
Name: Dr. Muneef Abdullah AhmedMuneef_hwj@ntu.edu.iq :Qutaiba Khalaf Khalil .Mengkutaibakk@ntu.edu.iq **M.M. Mohammed Ahmed Khalafmohmdahmed-haw@ntu.edu.iq** **M.M. Firas Hussain Mar'ifirashussain-haw@ntu.edu.iq**
Course Objectives (General Course Objectives) -8

- Developing students' ability to utilize acquired knowledge and skills in implementing .an integrated engineering project in the field of medical device technologies
- Developing scientific research skills, analyzing engineering problems, and proposing .appropriate solutions
- Gaining experience in the design, development, maintenance, or evaluation of medical .devices and systems
- Enhancing skills in preparing technical reports, presentations, and scientific .discussions
- Developing teamwork skills, time management, and commitment to the ethics of .scientific research

Course outcomes, teaching and learning methods, and assessment -9

:A - Cognitive objectives

- Learn about the steps for preparing and implementing graduation projects according to .the scientific methodology
- Explanation of the engineering principles used in the design, development, or .maintenance of medical devices
- .Analyzing technical problems and selecting appropriate solutions
- .Utilizing modern scientific references to support the project
- .Understanding the requirements for project documentation and writing the final report

B - Course-specific skills objectives

- Preparing a comprehensive project proposal, defining its objectives and implementation .plan
- .Use engineering software, design tools, and simulation tools when needed
- .Conducting experiments and measurements and analyzing the results
- .Design, development, or maintenance of a prototype or system related to medical devices
- .Preparing a professional technical report, presenting the project, and discussing it

C- Values

- .Commitment to scientific integrity and respect for intellectual property rights
- .Working as a team and taking responsibility
- .Adherence to the specified deadlines for completing the project phases
- .Developing a spirit of innovation and creativity in addressing engineering problems
- .Adherence to safety procedures during project implementation

Teaching and learning methods

- .Individual and group academic supervision
- .Regular meetings with the supervisor
- .Scientific discussion panels
- Project-based . learning

- .Scientific research and access to modern references
- .Practical training in laboratories and workshops

Assessment methods

- .Evaluate the project plan
- .Periodic work progress assessment
- .Progress reports
- .Evaluate the practical model or implemented program
- .Evaluate the final report
- .Evaluate the presentation and discussion
- .Final exam (discussion)

Structure of the Medical Equipment Maintenance Workshop Course: Theoretical -10 Content					
Evaluation Method	Teaching method	Unit/Topic Name	Required learning outcomes	Hours	Week
Diagnostic-formative	Supervision + Discussion	Introduction and instructions for the .graduation project	Understanding the requirements for the graduation project and the project .selection process	2	1
formative	Supervision + Discussion	Project selection and .proposal preparation	Choosing the project topic, defining its objectives, and creating a work .plan	2	2
formative	Supervision + Scientific Research	Review of scientific .literature	Gathering and analyzing previous .references and studies	2	3
formative	Supervision + Practical	Initial design of the .project	Preparing the initial design or .implementation plan for the project	2	4
formative	My work +	Project .implementation)1(	Implementation of the first phase of .the project	2	5

	supervision				
formative	supervision	Follow-up on .implementation)1(	Evaluate the progress of the work and .make the necessary adjustments	2	6
Interim assessment	supervision	.First progress report	Completion of the first progress .report	2	7
formative	My work + supervision	Project .implementation)2(	Completing the project implementation and testing the initial .results	2	8
formative	My work + supervision	Analysis of the .results	Analyzing results and improving .performance	2	9
formative	practical	.Final exams	Implementing the final tests for the .project	2	10
formative	supervision	Writing the final .report	.Preparing the final technical report	2	11
formative	supervision	.Review the report	Review the report and make the final .adjustments	2	12
formative	discussion	Preparing the scientific .presentation	.Preparing the project presentation	2	13
formative	Presentation + Discussion	The initial presentation of the .project	الصفحة Present a demo and discuss the .project	2	14
Final	Supervision + Discussion	Final review of the .project	Complete all project requirements .and prepare for the final discussion	2	15

Curriculum Development Plan

- .Encouraging projects that address real problems in hospitals and health institutions
- Strengthening cooperation with hospitals and specialized companies to implement

.applied projects

- Guiding students to use modern engineering software, artificial intelligence .technologies, and the Internet of Things in medical device projects
- .Supporting innovative projects that can be developed into prototypes or products
- Developing scientific research and academic publishing skills for outstanding .students
- .Promoting teamwork and interdisciplinary expertise in project implementation
- .Updating project topics to align with recent developments in biomedical engineering

Course Evaluation .11

Relative weight %	Degree	Assessment date (one (week	Assessment methods	T
10%	10	Week 3	Project proposal evaluation	1
10%	10	Week 7	First interim report	2
20%	20	Week 4–14	Monitoring project implementation	3
20%	20	Week fifteen	Final Report	4
10%	10	Week fifteen	Presentation and initial discussion	5
30%	30	End-of-term exams	Final discussion of the project	6
100%	100		the total	7
Relative weight %	Degree	Assessment date (one (week	Assessment methods	8
10%	10	Week 3	Project proposal evaluation	9

Sources of Education and Learning .12

A guide to preparing the graduation project • .approved by the college •Joseph J. Carr &John M .Brown, Introduction to Biomedical Equipment Technology .	Required textbooks -1 الصفحة
• Joseph D. Bronzino, The Biomedical Engineering Handbook. • Richard Aston, Principles of Biomedical Instrumentation and Measurement.	Main references (sources) -2
Research published in biomedical engineering • .journals IEC andISO .standards related to medical devices .Directory of medical device manufacturers •	A- Recommended books and references (scientific journals, (.... ,reports
• IEEE Xplore Digital Library. • ScienceDirect. • PubMed.	b) Electronic references, websites

• Google Scholar. • Official company websites Manufacturers of medical devices and international universities.	

Arabic Course description
Course Name -1
Arabic
Course Code-2
MDT202
Available forms of attendance -3
Traditional (face-to-face) attendance 2. Scientific attendance 3. Blended learning .1
Semester/Year-4
Level Two, Second Semester 2026-2025
Total number of study hours / Number of units -5
30 / hours2 units
Date this description was prepared -6
2026/7/3
Name of the course instructor -7
Name: Hiwa Kamal Tawfiq :e-mail
Course Objectives (General Course Objectives) -8

- Developing students' skills in using standard Arabic in academic and professional .fields
- Developing scientific writing skills and preparing technical reports related to the field .of medical devices
- .Enhancing reading and analysis skills for scientific and technical texts in Arabic
- .Developing oral communication and scientific presentation skills using correct Arabic
- Establishing the rules of Arabic grammar, spelling, and punctuation in academic .writing

Course outcomes, teaching and learning methods, and assessment -9

:A - Cognitive objectives

- .To learn the rules of Arabic grammar used in academic writing
- .Explanation of the fundamentals of scientific writing and technical report preparation
- .Identifying common linguistic, spelling, and grammatical errors

- .Understanding scientific and professional expression methods
- .Clarifying the importance of the Arabic language in preparing research and reports

B - Course-specific skills objectives

- .Writing technical reports and academic research in clear language
- .Editing scientific texts and correcting linguistic errors
- .Preparing presentations and reports using the scientific method
- .Using punctuation and spelling rules correctly
- .Developing dialogue, public speaking, and presentation skills in Arabic

C- Values

- .Taking pride in the Arabic language and using it in the academic field
- .Adherence to scientific integrity in writing and quoting
- .Respecting the opinions of others during scientific discussions
- .Developing self-confidence in oral and written communication
- .Adherence to the ethics of academic writing

Teaching and learning methods

- .Interactive lectures
- .Classroom discussions
- .Collaborative learning
- .Presentations
- .Analysis of scientific texts
- .Report writing training
- .Practical assignments

Assessment methods

- .Daily tests
- .Homework
- .Written reports
- .Oral presentations
- .Term exams
- .The final exam

Structure of the Arabic language course: theoretical vocabulary -10					
Evaluation Method	Teaching method	Unit/Topic Name	Required learning outcomes	Hours	Week

Diagnostic – Formative – Summative	theoretical	Introduction to Arabic for Academic .Purposes	To identify the course objectives and the importance of the Arabic .language in academic writing	2	1
Diagnostic – Formative – Summative	Theory + Application	Common spelling .rules	Applying correct spelling rules in .scientific writing	2	2
Diagnostic – Formative – Summative	Theory + Application	.punctuation marks	.Use punctuation marks correctly	2	3
Diagnostic – Formative – Summative	Theory + Application	Reviewing basic .grammar rules	Distinguishing between grammatical .errors and correct styles	2	4
Diagnostic – Formative – Summative	Theory + Application	Academic writing .techniques	Writing sentences and paragraphs in .correct Arabic الصفحة	2	5
Diagnostic – Formative – Summative	Theory + Application	Writing technical .reports	Preparing technical reports according .to the scientific method	2	6
Diagnostic – Formative –	Theory + Application	Scientific and technical .terminology	Using scientific terminology .correctly	2	7

Summative					
Diagnostic – Formative – Summative	Theory + Application	Summarizing and preparing .summaries	Developing skills in summarizing and .preparing scientific summaries	2	8
Diagnostic – Formative – Summative	Theory + Application	Reading and analyzing scientific .texts	Developing reading and analysis .skills for scientific texts	2	9
Diagnostic – Formative – Summative	Theory + Application	Official .correspondence	Preparing official and administrative .correspondence	2	10
Diagnostic – Formative – Summative	Theory + Application	Scientific writing and academic .research	Learning about scientific research .methods in Arabic	2	11
Diagnostic – Formative – Summative	Theory + Application	Scientific documentation and .research ethics	الصفحة Applying the rules of scientific .documentation and citation	2	12
Diagnostic – Formative – Summative	Theory + Practical	Presentation and .delivery skills	Preparing a scientific presentation in .Arabic	2	13
Diagnostic –	practical	Practical .applications	Discussion of scientific reports and .presentations	2	14

Formative – Summative					
Diagnostic – Formative – Summative	theoretical	.General review	A comprehensive review of the .course	2	15

Curriculum Development Plan

- Updating the course syllabus to meet the requirements of modern university .education
- .Focus on academic writing skills and technical report writing
- .Linking linguistic applications to the field of medical device technologies
- .Developing presentation, public speaking, and scientific communication skills
- .Using digital educational tools in teaching the Arabic language
- .Enhancing scientific research and documentation skills in Arabic
- .Encouraging students to use standard Arabic in preparing research papers and reports

Course Evaluation .11

Relative % weight	Degree	Assessment date (one (week	Assessment methods	T
5%	5	Week 2–15	Daily oral exams	1
10%	10	Week 2–15	Daily written exams	2
10%	10	Week 7	First semester exam	3
10%	10	Week 13	Second semester exam	4
10%	10	Week 4–14	Written reports and assignments	5
5%	5	Week 14–15	oral presentation	6
50%	50	End-of-term exams	Final exam	7
100%	100		the total	8

Sources of Education and Learning .12

Mustafa Al-Ghalayini, Comprehensive Collection of Arabic Lessons. • Fouad Ne’meh, Summary of Arabic Grammar Rules. •	Required textbooks -1
.Abbas Hassan, Al-Nahw Al-Wafi •	Main references (sources) -2

Ahmed Mukhtar Omar, Dictionary of • .Contemporary Arabic Language	
.Books on rhetoric and Arabic style • A guide to writing university research papers • .and reports .Peer-reviewed scientific journals in Arabic •	A- Recommended books and references (.... ,scientific journals, reports)
.Website of the Arabic Language Academy • .The Comprehensive Library • .Noor Library • .Digital databases of Arab universities •	b) Electronic references, websites

English language Course description

Course Name -1
English language
Course Code-2
MDT201
Available forms of attendance -3
Traditional (face-to-face) attendance 2. Scientific attendance 3. Blended learning .1
Semester/Year-4
Level Two, Second Semester 2026-2025
Total number of study hours / Number of units -5
30 / hours2 units
Date this description was prepared -6
2026/7/3
Name of the course instructor -7
Name: Dr. Munif Abdullah Ahmed :e-mail **Muneef_hwj@ntu.edu.iq**
Course Objectives (General Course Objectives) -8

- Developing students' skills in using the English language in academic and professional .fields
- Developing skills in reading and understanding scientific texts related to medical .devices and biomedical engineering
- .Enhancing academic writing skills and preparing technical reports in English
- .Developing listening and speaking skills in scientific and professional situations
- To equip students with the English vocabulary and terminology used in medical device .technologies

Course outcomes, teaching and learning methods, and assessment -9

:A - Cognitive objectives

- .To become familiar with the grammatical rules used in academic writing
- .Understanding scientific and technical texts in English
- .Explanation of common medical and engineering terms
- .Learning the methods of writing technical reports and correspondence
- Explaining the importance of the English language in scientific research and professional .communication

B - Course-specific skills objectives

- .Reading and analyzing scientific texts related to medical devices
- .Writing technical reports and summaries in English
- .Using medical and engineering terminology correctly
- .Giving oral presentations in English

- .Communicating in English in academic and professional environments

C- Values

- .Developing self-confidence in using the English language
- .Encouraging self-learning and the development of language skills
- .Adherence to scientific integrity in translation and writing
- .Respecting the opinions of others during scientific discussions
- Recognizing the importance of the English language in scientific and professional .development

Teaching and learning methods

- .Interactive lectures
- .Classroom discussions
- .Collaborative learning
- .Reading and writing training
- .Presentations
- .E-learning
- .Practical assignments

Assessment methods

- .Daily tests
- .Homework
- .Written reports
- .Oral presentations
- .Term exams
- .The final exam

Structure of the English language course: theoretical vocabulary -10					
Evaluation Method	Teaching method	Unit/Topic Name	Required learning outcomes	Hours	Week
Diagnostic – Formative – Summative	Theory + Application	Course Introduction and Language Review	Identifying the course objectives and reviewing the basics of the English .language	2	1
Diagnostic –	Theory +	Reading Scientific Texts	Developing skills in reading scientific .texts	2	2

Formative – Summative	Application				
Diagnostic – Formative – Summative	Theory + Application	Medical and Technical Vocabulary	Acquiring scientific vocabulary .related to medical devices	2	3
Diagnostic – Formative – Summative	Theory + Application	Grammar in Scientific Writing	Using basic tenses in scientific .writing	2	4
Diagnostic – Formative – Summative	Theory + Application	Academic Paragraph Writing	Writing academic paragraphs .correctly	2	5
Diagnostic – Formative – Summative	Theory + Application	Technical Report Writing	.Preparing technical reports in English الصفحة	2	6
Diagnostic – Formative – Summative	Theory + Application	Reading Medical Equipment Manuals	Understanding the operating and maintenance instructions for medical .devices	2	7
Diagnostic – Formative – Summative	Theory + Application	Technical Translation	Translation of simple technical texts .related to the field	2	8

Diagnostic – Formative – Summative	Theory + Application	Listening Skills	Developing listening skills for .lectures and scientific presentations	2	9
Diagnostic – Formative – Summative	Theory + Application	Speaking Skills	Developing conversation skills in .academic and professional situations	2	10
Diagnostic – Formative – Summative	Theory + Application	Professional Correspondence	Writing professional emails and .correspondence	2	11
Diagnostic – Formative – Summative	Theory + Application	English for Research Purposes	Learning scientific research methods .in English	2	12
Diagnostic – Formative – Summative	Theory + Practical	Presentation Skills	Preparing and delivering a scientific .presentation in English الصفحة	2	13
Diagnostic – Formative – Summative	practical	Student Presentations	Discussion of scientific presentations .and reports	2	14
Diagnostic – Formative –	theoretical	General Revision	A comprehensive review of the .course	2	15

Summative					

Curriculum Development Plan

-) Updating the course content to comply with the English for Academic PurposesEAP .requirements (
- Focus on the medical and engineering terminology used in medical device .technologies
- Developing skills in reading technical manuals and operating and maintenance guides .for medical devices
- .Enhancing skills in writing technical reports and scientific research in English
- .Using digital tools and e-learning platforms in language teaching
- Encouraging students to use international scientific references and electronic .databases
- .Linking language skills to the needs of the labor market in the field of medical devices

Course Evaluation .11

Relative weight %	Degree	Assessment date (one (week	Assessment methods	T
5%	5	Week 2–15	Daily oral exams	1
10%	10	Week 2–15	Daily written exams	2
10%	10	Week 7	First semester exam	3
10%	10	Week 13	Second semester exam	4
10%	10	Week 4–14	Written assignments and reports	5
5%	5	Week 14–15	Presentation	6
50%	50	End-of-term exams	Final exam الصفحة	7
100%	100		the total	8

Sources of Education and Learning .12

• Eric H. Glendinning & Ron Howard, Professional English in Use: Medicine, Cambridge University Press. • Oxford English for Careers: Technology 2, Oxford University Press.	Required textbooks -1
• Cambridge English for Engineering. • Technical English – Pearson Education.	Main references (sources) -2
.Dictionaries of medical and engineering terms • .Scientific journals in biomedical engineering • Manuals for operating and maintaining medical • .equipment in English	A- Recommended books and references (scientific journals, (.... ,reports

• Cambridge English. • British Council – Learn English. • Oxford Learner's Dictionaries. • PubMed. • IEEE Xplore Digital Library.	b) Electronic references, websites

Professional ethics Course description
Course Name -1
Professional ethics
Course Code-2
MDT202
Available forms of attendance -3
Traditional (face-to-face) attendance 2. Scientific attendance 3. Blended learning .1
Semester/Year-4
Level Two, Second Semester 2026-2025

Total number of study hours / Number of units -5
30 / hours2 units
Date this description was prepared -6
2026/7/3
Name of the course instructor -7
Name: M.M. Muhammad Ahmad Khalaf :Emailmohmdahmed-haw@ntu.edu.iq
Course Objectives (General Course Objectives) -8

- Understanding the basic principles of professional ethics and their importance in the .work environment
- Developing responsible professional behavior and commitment to professional values .and ethics
- Raising awareness of the legal and ethical responsibilities of medical device engineers .and technicians
- .Developing ethical decision-making skills in different professional situations
- Establishing the principles of quality, safety, respect for patients' rights and .confidentiality

Course outcomes, teaching and learning methods, and assessment -9

:A - Cognitive objectives

- .Understanding the concepts of professional ethics and professional conduct
- An explanation of the ethical principles associated with the health and engineering .professions
- Clarifying the legal and professional responsibilities of those working in the field of .medical devices
- .Understanding quality and occupational safety standards
- .Statement of research ethics and academic integrity

B - Course-specific skills objectives

- .Analyzing professional situations and making appropriate ethical decisions
- .Applying professional conduct rules in the workplace
- .Preparing reports and discussions on ethical issues
- .Effective professional communication with patients and medical staff
- .Solving professional problems according to ethical principles

C- Values

- .Commitment to integrity and transparency in performing work
- .Respecting patients' rights and maintaining confidentiality
- .Commitment to teamwork ethics
- .Promoting a sense of responsibility and professional discipline

- .Respecting professional regulations and instructions

Teaching and learning methods

- .Interactive lectures
- .Group discussions
-) Real-life case studiesCase Study .(
- .Brainstorming
- .Collaborative learning
- .Presentations
- .Scientific seminars

Assessment methods

- .Daily tests
- .Homework
- .Individual and group reports
- .Presentations
- .Term exams
- .Final exam. Final exam

Structure of the Professional Ethics Course : Theoretical Content -10					
Evaluation Method	Teaching method	Unit/Topic Name	Required learning outcomes	Hours	Week
Diagnostic – Formative – Summative	theoretical	Introduction to .professional ethics	Understanding the concept of professional ethics and its importance .in society and the labor market	2	1
Diagnostic – Formative – Summative	theoretical	Values and .professional conduct	Understanding professional values .and work ethics	2	2

Diagnostic – Formative – Summative	Theory + Discussion	Professional .responsibility	Explanation of the professional and ethical responsibilities of a medical .device technician	2	3
Diagnostic – Formative – Summative	Theory + Case Study	Ethics of dealing with patients and healthcare .institutions	Applying the principles of ethics in dealing with patients and healthcare .staff	2	4
Diagnostic – Formative – Summative	theoretical	Confidentiality and .privacy	Understanding the confidentiality of medical information and patient .privacy	2	5
Diagnostic – Formative – Summative	Theory + Discussion	Ethics of using and maintaining medical .devices	Clarifying the ethics of using and .maintaining medical devices	2	6
Diagnostic – Formative – Summative	Theory + Application	Occupational safety and risk .management	Understanding the principles of occupational safety and risk .management	2	7
Diagnostic – Formative – Summative	theoretical	Quality and professional .accreditation	Clarifying quality and accreditation .standards in healthcare institutions	2	8
Diagnostic – Formative –	theoretical	Academic integrity .and research ethics	Understanding the ethics of scientific .research	2	9

Summative					
Diagnostic – Formative – Summative	Discussion + Case Study	Contemporary .ethical issues	Analysis of ethical issues in .biomedical engineering	2	10
Diagnostic – Formative – Summative	Theory + Discussion	Teamwork and professional .leadership	Understanding the ethics of .teamwork and leadership	2	11
Diagnostic – Formative – Summative	Theory + Application	Professional communication and conflict .management	Developing professional communication and conflict .resolution skills	2	12
Diagnostic – Formative – Summative	theoretical	Professional laws .and regulations	Familiarization with legislation and .regulations related to medical devices	2	13
Diagnostic – Formative – Summative	Discussion + Presentation	Applications and .case studies	الصفحة Discussion of applied cases in .professional ethics	2	14
Diagnostic – Formative – Summative	theoretical	.General review	A comprehensive review of the .course syllabus	2	15

Curriculum Development Plan

- Updating the course content to align with the latest developments in health and .engineering professions ethics
- The course topics are linked to the practical situations faced by medical equipment .technicians in hospitals
- .Promoting the use of the case study method to develop ethical decision-making skills
- Including modern topics such as medical data protection, cybersecurity for medical .devices, and artificial intelligence in healthcare from an ethical perspective
- Developing professional communication skills and working within a .multidisciplinary team
- .Promoting a culture of quality, patient safety, and professional responsibility
- Encouraging students to adhere to academic integrity and the ethics of scientific .research

Course Evaluation .11

Relative weight %	Degree	Assessment date (one (week	Assessment methods	T
5%	5	Week 2–15	Daily oral exams	1
10%	10	Week 2–15	Daily written exams	2
10%	10	Week 7	First semester exam	3
10%	10	Week 13	Second semester exam	4
15%	15	Week 4–14	Reports, assignments, and presentations	5
50%	50	End-of-term exams	Final exam	6
100%	100		the total	7
5%	5	Week 2–15	Daily oral exams	8

Sources of Education and Learning .12

• Edmund G. Seebauer & Robert L. Barry, Fundamentals of Ethics for Scientists and Engineers. • Charles E. Harris Jr. et al., Engineering Ethics: Concepts and Cases.	الصفحة Required textbooks -1
• World Health Organization (WHO), Medical Device Regulations and Ethics. • AAMI, Code of Ethics and Professional Conduct.	Main references (sources) -2
.Journals of medical ethics and biomedical engineering • Codes of professional conduct issued by health and • .engineering institutions .Quality and patient safety evidence •	A- Recommended books and references (scientific journals, (.... ,reports
WHO . website AAMI . website	b) Electronic references, websites

UNESCO Ethics of Science and Technology . website PubMed andIEEE Xplore databases for accessing studies related to professional ethics and biomedical .engineering	

Ba'ath Party crimes Course description
Course Name -1
Ba'ath Party crimes
Course Code-2
MDT202
Available forms of attendance -3
Traditional (face-to-face) attendance 2. Scientific attendance 3. Blended learning .1
Semester/Year-4
Level Two, Second Semester 2026-2025
Total number of study hours / Number of units -5
hours / 2 units 30
Date this description was prepared -6

2026/7/3

Name of the course instructor -7

Name: Dr. Raad Hamza Awad
:Email**raadawad_hwj@ntu.edu.iq**

Course Objectives (General Course Objectives) -8

- To understand the nature of the Ba'ath Party's political system in Iraq and its most .prominent historical phases
- A study of the crimes and violations committed during the Ba'ath Party's rule, based .on approved documents and sources
- Developing students' awareness of human rights, transitional justice, and the .importance of the rule of law
- Analyzing the political, social, economic, and humanitarian consequences of those .crimes
- Establishing the values of citizenship, respect for human rights, and rejection of .violence and tyranny

Course outcomes, teaching and learning methods, and assessment -9

:A - Cognitive objectives

- .Understanding the historical background of the Ba'ath Party regime in Iraq
- .Explaining the concepts related to genocide, crimes against humanity, and war crimes
- Clarifying the most prominent crimes and documented violations during the period of .rule
- Statement on the role of the Iraqi and international judiciary in holding perpetrators of .crimes accountable
- .Understanding the principles of transitional justice and community reconciliation

B - Course-specific skills objectives

- .Analysis of historical documents and legal texts related to the issues studied
- .Discussing historical events objectively based on evidence
- .Preparing short reports and research papers on course topics
- .Developing dialogue and discussion skills and respecting the opinions of others
- .Using academic sources in the study of historical events

C- Values

- .Dear [Name], respect human rights and human dignity
- .Establishing the values of citizenship and the rule of law
- .Reject violence, extremism, and tyranny
- .Respect for societal diversity and peaceful coexistence
- .Adherence to scientific integrity when dealing with historical issues

Teaching and learning methods

- .Interactive lectures
- .Classroom discussions
- .Studying historical documents
- .Case studies
- .Presentations
- .Collaborative learning
- .Preparing reports and research

Assessment methods

- .Daily tests
- .Homework
- .Reports and research
- .Presentations
- .Term exams
- .The final exam

Structure of the Professional Ethics Course : Theoretical Content -10					
Evaluation Method	Teaching method	Unit/Topic Name	Required learning outcomes	Hours	Week
Diagnostic – Formative – Summative	theoretical	Introduction to the course and basic .concepts	To learn about the course objectives and the concepts of human rights and .transitional justice الصفحة	2	1
Diagnostic – Formative – Summative	theoretical	The origins and historical development of the .Ba'ath Party	Understanding the historical background of the emergence and development of the Ba'ath Party in .Iraq	2	2
Diagnostic – Formative –	theoretical	The political system under the rule of the .Ba'ath Party	Understanding the nature of the political system and state institutions .during the period of rule	2	3

Summative					
Diagnostic – Formative – Summative	Theory + Discussion	Human rights .violations	Identifying documented human rights .violations	2	4
Diagnostic – Formative – Summative	theoretical	Displacement and .political arrests	A study of forced displacement .campaigns and political arrests	2	5
Diagnostic – Formative – Summative	Theory + Case Study	Crimes against .civilians	Identifying crimes committed against different social groups based on .documented sources	2	6
Diagnostic – Formative – Summative	theoretical	.The Anfal campaign	A study of the Anfal crime and its .humanitarian and legal implications	2	7
Diagnostic – Formative – Summative	theoretical	The Halabja .massacre	الصفحة Studying the crime of using chemical .weapons against civilians	2	8
Diagnostic – Formative – Summative	theoretical	Political, social, and .economic effects	Understanding the effects of wars and .internal policies on Iraqi society	2	9

Diagnostic – Formative – Summative	theoretical	Mass graves and .documentation	Understanding the concept of mass graves and the mechanisms for .documenting them	2	10
Diagnostic – Formative – Summative	Theory + Discussion	Trials and .transitional justice	Understanding the role of the judiciary in holding perpetrators of .crimes accountable	2	11
Diagnostic – Formative – Summative	theoretical	Legal documentation and .relevant institutions	Understanding the role of national and international institutions in .documenting crimes	2	12
Diagnostic – Formative – Summative	Theory + Discussion	Studying documents .and certificates	Analysis of historical documents and .testimonies	2	13
Diagnostic – Formative – Summative	discussion	Human rights and .citizenship	Discussion of lessons learned in the field of human rights and the rule of .law	2	14
Diagnostic – Formative – Summative	theoretical	.General review	A comprehensive review of the .course syllabus	2	15

Curriculum Development Plan

- Updating the course syllabus based on official documents and recent academic

.research

- Enhancing the use of primary sources and documented historical records in studying .course topics
- Developing critical thinking skills and the ability to objectively analyze historical .events
- The course topics are linked to the concepts of human rights, transitional justice, and .the rule of law
- Encouraging students to prepare scientific research and reports based on reliable .sources
- Using digital educational tools and approved documentary films to support the .educational process
- Promoting a culture of peaceful coexistence, respect for diversity, and rejection of .violence and tyranny

Course Evaluation .11

% Relative weight	Degree	Assessment date (one week)	Assessment methods	T
5%	5	Week 2–15	Daily oral exams	1
10%	10	Week 2–15	Daily written exams	2
10%	10	Week 7	First semester exam	3
10%	10	Week 13	Second semester exam	4
15%	15	Week 4–14	Research, reports, and presentations	5
50%	50	End-of-term exams	Final exam	6
100%	100		the total	7

Sources of Education and Learning .12

Books and educational materials approved by the Iraqi Ministry of Higher Education and Scientific Research for the course on .Baath Party crimes	Required textbooks -1
Official documents, rulings of the Iraqi High Criminal Court, reports issued by relevant national and international bodies, and .approved academic references used in teaching the course	Main references -2 (sources)
Peer-reviewed research in modern history, international law, human rights, and transitional justice, in addition to reports .issued by academic and official institutions	A- Recommended books and references scientific journals,) (.... ,reports
The official websites of Iraqi universities, the Ministry of Higher Education and Scientific Research, academic databases, and the official websites of national and international institutions that .provide accredited documents and reports related to the course	b) Electronic references, websites

computer Course description
Course Name -1
computer
Course Code-2
MDT202
Available forms of attendance -3
Traditional (face-to-face) attendance 2. Scientific attendance 3. Blended learning .1
Semester/Year-4
Level Two, Second Semester 2026-2025
Total number of study hours / Number of units -5
hours / 4 units 60

Date this description was prepared -6

2026/7/3

Name of the course instructor -7

Name: M.M. Ahmed Abdel Khalaf
:Email**ahmedabd-hwj@ntu.edu.iq**

Course Objectives (General Course Objectives) -8

- .Developing computer skills and applications in the academic and professional field
- To equip students with the skills to useMicrosoft Office programs in preparing reports, .presentations, and tables
- Developing skills in dealing with the Internet, cloud services, and electronic scientific .research
- .Developing skills in data management and analysis using computer applications
- Using computer applications in preparing documents and reports related to the field .of medical device technology

Course outcomes, teaching and learning methods, and assessment -9

:A - Cognitive objectives

- .Understanding the basic concepts of computer applications
- .Explanation of the functions of word processing, spreadsheet, and presentation software
- .Learn about internet and cloud computing services
- .Explaining the principles of information security and data protection
- A statement of the importance of computers in education, scientific research, and .professional work

B - Course-specific skills objectives

- Preparing and formatting documents usingMicrosoft Word .
- Creating tables and charts usingMicrosoft Excel .
- Designing presentations usingMicrosoft PowerPoint .
- .Using email and online academic research
- .Organizing and exchanging files and data using cloud services

C- Values

- .Adherence to computer and internet ethics
- .Respecting intellectual property rights for software and data
- .Enhancing self-learning using digital technologies
- .Developing collaborative work skills using electronic tools
- .Commitment to information security and data protection

Teaching and learning methods

- .Theoretical lectures
- .Practical training within the laboratory

- .Application-based learning
- .Demonstrations
- .E-learning
- .Practical duties

Assessment methods

- .Practical tests
- .Theoretical tests
- .Practical assignments
- .Reports
- .Term exams
- .The final exam

Structure of the Professional Ethics Course : Theoretical Content -10					
Evaluation Method	Teaching method	Unit/Topic Name	Required learning outcomes	Hours	Week
Diagnostic – Formative – Summative	Theory + Practical	Introduction to computer .applications	Identifying the course objectives and .reviewing the basics of computer use	2	1
Diagnostic – Formative – Summative	practical	Microsoft Word (text formatting).	الصفحة Creating and formatting professional .documents	2	2
Diagnostic – Formative – Summative	practical	Microsoft Word (Tables and Objects).	Use tables, images, and shapes within .documents	2	3
Diagnostic –	practical	Microsoft Excel (Basics).	Creating electronic spreadsheets and .performing basic calculations	2	4

Formative – Summative					
Diagnostic – Formative – Summative	practical	Microsoft Excel (Functions and Charts).	Using functions, graphs, and data .analysis	2	5
Diagnostic – Formative – Summative	practical	Microsoft PowerPoint.	.Designing professional presentations	2	6
Diagnostic – Formative – Summative	Theory + Practical	Online academic .research	Using the internet in scientific .research	2	7
Diagnostic – Formative – Summative	practical	Email and digital .communication	Using email and managing electronic .correspondence الصفحة	2	8
Diagnostic – Formative – Summative	Theory + Practical	) Cloud services OneDrive and Google Drive .(	Learn about cloud computing and file .sharing	2	9
Diagnostic – Formative – Summative	Theory + Practical	Information security .and cybersecurity	Understanding the principles of information security and data .protection	2	10

Diagnostic – Formative – Summative	practical	Digital file and document .management	PDF reading and editing software and .archiving tools	2	11
Diagnostic – Formative – Summative	Theory + Practical	Artificial intelligence .applications	Understanding the applications of artificial intelligence in education and .the health sector	2	12
Diagnostic – Formative – Summative	practical	A comprehensive .practical project	Implementing a practical project usingOffice programs .	2	13
Diagnostic – Formative – Summative	practical	.Project discussion	Presentation and discussion of .practical projects	2	14
Diagnostic – Formative – Summative	Theory + Practical	.General review	A comprehensive review of the .course الصفحة	2	15

Curriculum Development Plan

- The course syllabus has been updated to be consistent with the latest versions of Microsoft Office software .
- .Enhancing practical applications related to the field of medical device technologies
- .Integrating artificial intelligence and cybersecurity topics into computer applications
- .Developing scientific research skills using electronic databases
- .Promoting the use of cloud computing and digital collaborative work
- Linking computer applications to the requirements of the labor market and the health

.sector

- .Encouraging students to use legal and open-source software

Course Evaluation .11

Relative % weight	Degree	Assessment date (one (week	Assessment methods	T
10%	10	Week 2–15	Daily practical exams	1
10%	10	Week 2–15	Daily theoretical exams	2
10%	10	Week 7	First semester exam	3
10%	10	Week 13	Second semester exam	4
20%	20	Week 4–14	Practical project and assignments	5
40%	40	End-of-term exams	Final exam (theoretical and (practical	6
100%	100		the total	7

Sources of Education and Learning .12

• Microsoft Office 2021 Step by Step – Joan Lambert. • Computer Fundamentals – Pradeep K. Sinha & Priti Sinha.	Required textbooks -1
• Discovering Computers – Misty E. Vermaat et al . • Using Information Technology – Brian K. Williams & Stacey Sawyer.	Main references (sources) -2
Microsoft Office . user guides Journals and reports on information technology • .and digital transformation Books on information security and cloud • .computing	A- Recommended books and ,references (scientific journals, reports (.... الصفحة
•Microsoft website Learn . Microsoft 365 Support . website Google Workspace Learning Center . website Cisco Networking Academy . website .Academic databases and digital libraries •	b) Electronic references, websites

الصفحة