Ministry of Higher Education and Scientific Research
Scientific Supervision and Scientific Evaluation Apparatus
Directorate of Quality Assurance and Academic Accreditatio
Accreditation Department

Academic Program Description for medical instrumentation

2024

Academic Program Description Form

University Name: .Alayen Iraqi University

Faculty/Institute: Engineering technical collage.....

Scientific Department: .. Medical instrumentation.....

Academic or Professional Program Name: ..... Medical instrumentation.....

Final Certificate Name: .....BSc

Academic System: Annual

Description Preparation Date: 18|9|2024

File Completion Date: 18/2025

Signature:

Head of Department Name: Mohammed Ghaleb Mathem

Date: 25/1/2025

Signature:

Scientific Associate Name: Dr. Rawid N. Alubady

Date: 25/1/2025

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Date: 25/1/2025 Mohammed Hussien Haider

Signature:

Approval of the Dean

1. Program Vision

Qualifying distinguished and innovative competencies scientifically and with high skill and professional and ethical behavior that is able to keep pace with developments in the fields of medical instrumentation and facing the engineering scientific challenges to provide applicable solutions and community service.

2. Program Mission

Graduating distinguished technical engineers with qualified scientific and ethical levels and high efficiency in the fields of medical instrumentation technologies by providing an advanced scientific environment and specialized faculty to be able to complete the process of higher education and professional learning and provide community service within multidisciplinary work teams.

3. Program Objectives

PEO1: competently apply engineering methods to solve professional problems associated with the design, development, manufacture, and maintenance of medical instrumentation and related systems by understanding the social, ethical, and environmental context of their work.

PEO2: communicate effectively with diverse and international communities, collaborate competently in cross-functional teams, and assume leadership roles while meeting the expectations of their employers.

PEO3: habitually engage in technical professional development.

PEO4: Preparing applied engineers with the ability and skill to deal with different medical devices and keep pace with the advanced generations of new medical devices.

PEO5: Providing the student with the skills to install and operate devices and train on the use of medical devices and equipment and perform diagnostic and maintenance work.

PEO6: Providing the student with solid scientific knowledge and applied skills to enable him to diagnose malfunctions in electronic systems of diagnostic and therapeutic medical devices.

PEO7: Preparing a graduate with extensive and detailed knowledge of the new technologies in the field of medical devices and providing him with sufficient skills to make the necessary updates regarding the technology of engineering medical devices

PEO8: Vertical expansion towards creating postgraduate programs in the field of medical devices technology

PEO9: The department seeks to achieve the program's objectives in line with achieving international quality standards according to the available capabilities

4. Program Accreditation

UNDER PREPERATION

5. Other external influences

Labor market: where many seminars and meetings held to discuss academic and applied content with employers

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	8	20	9%	
College Requirements	١2	٥5	26%	
Department Requirements	٢4	١39	65%	
Summer Training				
Other				

* This can include notes whether the course is basic or optional.

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
			Theoretical	Practical

Third	**MIET3101**	**Medical Diagnostic Devices 1**	2	2
Third	**MIET3102**	**Microprocessors**	2	2
Third	**MIET3103**	**Electromagnetic fields**	2	2
Third	**MIET3104**	**Signals and Systems**	2	2
Third	**MIET3105**	**Computer Programming and its Applications 11**	2	2
Third	**MIET3106**	**Project Management**	2	2
Third	**MIET3201**	**Medical Diagnostic Devices 11**	2	2
Third	**MIET3202**	**Medical electronic systems**	2	2
Third	**MIET3203**	**Medical Communication Systems**	2	2
Third	**MIET3204**	**Power electronics**	2	2
Third	**MIET3205**	**Project 1**	2	2
Third	**MIET3206**	**advanced computer programming**	2	2
Fourth	**MIET4101**	**Medical Therapeutic Devices 1**	2	2
Fourth	**MIET4102**	**Medical Laser Systems**	2	2
Fourth	**MIET4103**	**Control systems**	2	2
Fourth	**MIET4104**	**Biomedical Signal Processing**	2	2
Fourth	**MIET4105**	**Project 11**	2	2
Fourth	**MIET41XX**	**Elective 1**	2	2
Fourth	**MIET4201**	**Medical Therapeutic Devices 111**	2	2
Fourth	**MIET4202**	**Radiological Instrumentation Engineering**	2	2
Fourth	**MIET4203**	**Prosthetics and Robotics**	2	2
Fourth	**MIET42XX**	**Elective 11**	2	2
Fourth	**MIET42XXX**	**Elective 111**	2	2
Fourth	**MTU 1008**	**Professional Ethics**	2	2

8. Expected learning outcomes of the program

Knowledge	
A1	Knowledge and understanding of programs and work methods, especially in the field of medical equipment technology and maintenance..
A2	Knowledge and understanding of on-site supervision of implementation and engineering distribution works for devices within hospitals and treatment service centers.
A3	Knowing and understanding the components of medical instruments and how to solve their problems.
A4	Knowledge and understanding of electronic circuits for different medical devices and how to design them.
A5	Knowledge and understanding of different medical instrumentation systems and how to take advantage of them.
A6	Know the types of digital medical instrumentation systems and how to design and program them.
Skills	
B1	Design and implementation of electronic circuits for medical devices.
B2	Electronic systems maintenance skills for medical instruments.
B3	Training and qualifying technical engineers and technicians to operate and maintain medical devices and keep pace with the latest developments.
B4	Diagnosis and maintenance of malfunctions that occur in medical instruments and its computer accessories.
B5	Decision-making skills
Ethics	
C1	Planting the spirit of creativity among students to ensure that they can find innovative solutions to problems.
C2	Developing students' ability to present projects in designing electronic circuits for medical devices
C3	Sense of responsibility among students and psychological configuration to carry burdens.
C4	Development and planning to keep pace with what is compatible with the future needs of medical devices, working to achieve satisfactory results.

9. Teaching and Learning Strategies

1. Use the strategy of cooperation and assistance during the educational process.
2. Field visits to relevant ministries and educational institutions.
3. Organizing seminars, courses and workshops for students that encourage spiritual values.
4. Discussions during lectures.
5. Labs, PowerPoint and multimedia presentation.
6. Visual aids: Use visual aids such as pictures, charts, graphs, and diagrams.

10. Evaluation methods

1. Observing students' interaction with electronic circuits
2. Problems -based scenarios
3. Homework
4. Questionnaires
5. Short MCQs
6. Oral exam and direct questions in the class
7. Midterm exam
8. Electronic exams on the electronic platform
9. Final exam

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Doctor Engineer	–	5				5
Teaching assistant	١٢				12	

Professional Development

Mentoring new faculty members

1- Participation in training courses held within the college.

2- Participation in professional courses held at the college within the prescribed curriculum, as well as professional educational courses held at the Engineers Syndicate, which helps in developing the graduate's personal skills in professional and functional aspects.

3- Within the program there are specific personal development modules that provide faculty and students with the opportunity and encouragement to engage in relevant professional qualifications that allow them to reflect on their own professional development.

Professional development of faculty members
1- The department organizes different courses through the center of continuing education in several areas. 2- Planning for personal development Participation in training courses held within the college. 3- Continuous improvement and development of faculty members through training programs and workshops inside and outside the department in cooperation with other universities and the Ministry of Higher Education.

12. Acceptance Criterion
This is done according to the acceptance rate in Engineering Group (of Electrical Engineering Technical College, Medical Instrumentation Department) within the electronic form approved by the Ministry of Higher Education and Scientific Research (central admission). The central admission standards have been applied to the college since the 2017 academic year.

13. The most important sources of information about the program
1. Lectures given by the subject teacher. 2. Books available in the college library. 3. Books on the Al-Ayen University platform. 4. Any website related to studying electronic circuits. Using modern references, using the latest books used in international universities, and developing the curriculum annually in a way that is compatible with university education

14. Program Development Plan
1. Creating an urgency for innovation and change 2. Overcoming barriers that often get in the way of effective change efforts 3. Looking outward for innovative inspiration and best practices 4. Determining the need for new facilities 5. Budgeting for marketing and recruitment efforts 6. Improving the quality of academic programs by developing their objectives and outcomes. 7. Addressing weaknesses that may appear during the implementation of the

academic program and developing executive plans for continuous development and improvement.

8. Developing learning outcomes according to the characteristics of graduates in new programs, based on the opinions of consultants and the labor market.
9. Keeping pace with labor market developments and harmonizing with local community changes.
10. Responding to the requirements of national and international bodies regarding academic accreditation at the national or international level.

Program Skills Outline

					Required program Learning outcomes														
Year/Level	**Course Code**	**Course Name**	**Basic or optional**	**Knowledge**						**Skills**					**Ethics**			
				A 1	A 2	A 3	A 4	A 5	A 6	B 1	B 2	B 3	B 4	B 5	C 1	C 2	C 3	C 4
Third	MIET3102	Microprocessors	Basic	X		X	X		X	X	X		X	X	X	X	X	X
	MIET3103	Digital Signal Processing	Basic	X	X	X	X	X		X		X	X	X	X	X		X
	MIET3104	Electrical Technology	Basic	X	X	X	X		X		X	X	X		X	X		X
	MIET3105	Medical Instrumentation 11	Basic		X	X	X	X			X	X		X	X	X	X	
	MIET3106	Medical Electronic Systems	Basic	X			X	X	X	X		X		X	X	X	X	X
	MIET3201	Medical Communication Systems	Basic	X	X		X	X	X	X	X		X		X	X	X	
	MIET3202	Power Electronics	Basic	X		X			X	X		X		X	X	X		X
	MIET3203	Systematic Training on Medical Instruments and Systems	Optional	X	X			X		X	X	X	X			X	X	X
	MIET3204	Computer Applications	Basic		X	X	X		X		X		X		X	X		X
Fourth	MIET4101	Medical Devices 111	Basic	X		X		X	X		X	X		X	X	X	X	

	MIET4102	Medical Laser Systems	Basic	X	X	X		X	X	X		X		X	X	X		X
	MIET4103	Control Systems	Basic	X	X	X			X	X	X	X		X	X		X	X
	MIET4104	Project Management	Optional	X		X	X	X			X	X	X			X	X	X
	MIET4105	Advanced Digital Design	Basic	X	X		X		X	X		X	X	X	X		X	X
	MIET4106	Radiological Instrumentation Engineering	Basic	X		X	X	X		X	X	X	X		X	X	X	X
	MIET4201	Computer Applications	Optional			X			X	X	X	X	X	X	X	X	X	
	MIET4202	Professional Ethics	Optional	X			X	X	X		X	X	X			X	X	X
	MIET4203	Project	Basic	X	X	X	X	X		X	X	X	X	X	X	X	X	X

- **Please tick the boxes corresponding to the individual program learning outcomes under evaluation.**

Course Description Form

1. Course Name:
2. Course Code:
3. Semester / Year:
4. Description Preparation Date:
5. Available Attendance Forms:
6. Number of Credit Hours (Total) / Number of Units (Total)
7. Course administrator's name (mention all, if more than one name)
Name: Email:
8. Course Objectives

Course Objectives	

9. Teaching and Learning Strategies

Strategy	

10. Course Structure

Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name:
Application computer
2. Course Code:
MIET3105
3. Semester / Year:
Third year (Yearly)
4. Description Preparation Date:
21/02/2025
5. Available Attendance Forms:
Compulsory
6. Number of Credit Hours (Total) / Number of Units (Total)
90 /4 Unit
7. Course administrator's name (mention all, if more than one name)
Name: Maysaa Aziz Mahdi Email: Maysaa.Aziz@alayen.edu.iq
8. Course Objectives

Course Objectives	Identify the working environment of the program and the different components of the screen 2. Know the interface of the program 3 - identify the types of programming instructions 4 - programming and design interface control program
9. Teaching and Learning Strategies	
Strategy	1. Lecture theory / software experiments.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st, 2nd,3th,	2	A1,A2,A4 B2,B5 C1,C2,C4	Introduction to MATLAB, MATLAB Windows (Command Window, Workspace Window	Theoretica lecture and laborator	1. Direct exam
2nd,3th,		A3,B3,B4,B5,C4	A first program, Expression, contacts, Entering Matrices, Useful matrix, End as a supscribt, colon operator	Theoretica lecture an laborator	
4th	2	A5,A6,A4 B1,B5,B3	Variables and assignment statement,	Theoretical lecture and	

		C1	logical operator	laboratory	
5th	2	A2,A3,A4,A6 B1,B2,B3 C2, C4	Arrays, Built in functions,	Theoretical lecture and laboratory	
6th	2	A2,A3 B1,B2,B5 C2, C4,C1	Basic Plotting (Multiple Data Sets in One Graph, Specifying Line Styles and Colors, Multiple Plots in One Figure, Setting Axis Limits).	Theoretical lecture and laboratory	
7th, 8th	8	A1,A4,A6 B1,B5,B3 C1, C4	Arguments and return values , M -file, input - output statement	Theoretical lecture and laboratory	
9th,10th,11th	2	A2,A3,A4 B1,B2,B5 C2, C4,C1	control Statements(Conditional statements: If, Else, Elseif, switch case)	Theoretical lecture and laboratory	
12th, 13th,14th	2	A4,A6 B1,B2,B3 C2, C4	Repetition statements: (While statement, For statement)	Theoretical lecture and laboratory	
15th	2	,B5,C1,C2,C4,C3	String handling	Theoretical lecture and laboratory	
16th	2	A2,B5,C1,C2,C4	procedures and Functions (a custom - made Matlab function , define the name of the function, the input and the output variables, Calling Functions)	Theoretical lecture and laboratory	
17th	2	B3,B5,C1,C2,C4	Cells (Pre -defined cells, its usage, cell Arrays, cell two structure).	Theoretical lecture and laboratory	Direct exam
18th	2	A3,C1,C2,C4	Printing Output . Array Functions(length , size, reshape, dot)	Theoretical lecture and laboratory	Direct exam
19th,20th,21th	2	A2,A3,B1,B2,C1,C2, C4	Handle graphics and user interface. 1.Pre - defined dialogs 2. Handle graphics a) Graphics objects b) Properties of objects c) Modifying properties of graphics objects	Theoretical lecture and laboratory	Direct exam
22th	2	A1,A3,A5,A6,C1,C3 C4	GUI Interface (Attaching buttons to	Theoretical lecture and	Direct exam

			actions, Getting Input, Setting Output)	laboratory	
23th,24th	2	A3,B2,B3,C1,C2,	Predefined GUIs and Dialog Boxes.	Theoretical lecture and laboratory	Direct exam
25th,26th	2	A3,B2,B3,C1,C2,	Menu-driven programs a) Controls: uimenu and uicontrol b) Interactive graphics c) Large program logic flow	Theoretical lecture and laboratory	Direct exam
27th,28th	2	A3,B2,B3,C1,C2,	Manipulating Text (Writing to a text file, Reading from a text file, Randomising and sorting a list, Searching a list).	Theoretical lecture and laboratory	Direct exam
29th,30th	2	A3,B2,B3,C1,C2,	Introduction to Image Analysis(Reading & Writing Images,Displaying Images)	Theoretical lecture and laboratory	Direct exam

11.Course Evaluation

		Time/Number	Weight (Marks)	Week Due
Formative assessment	**Semester 1 Quizzes**	1.5 hr	25% (25)	5, 10
	Semester 1 Quizzes	1.5 hr	25% (25)	17, 25
	Final Exam	3hr	50% (50)	30
Total assessment			100% (100 Marks)	

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. Introduction to MATLAB for Engineers William J. Palm III
Main references (sources)	Introduction to MATLAB for Engineers William J. Palm III INTRODUCTION TO MATLAB FOR ENGINEERING STUDENTS ,David Houcque

Course Description Form

1. Course Name:
Medical Electronic Systems
2. Course Code:
MIET3202
3. Semester / Year:
Third year (Yearly)
4. Description Preparation Date:
18/01/2025
5. Available Attendance Forms:
Compulsory
6. Number of Credit Hours (Total) / Number of Units (Total)
120 Hours /6 Unit
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Ali Shahin Email: Ali.Ahmad@alayen.edu.iq

8. Course Objectives	
Course Objectives	1. To understand the principle of regulated power supply. 2. To understand the operational amplifier. 3. To understand types of filters. 4. To understand analogue –to – digital & digital – to analogue converting.
9. Teaching and Learning Strategies	
Strategy	1. Academic lectures: providing a solid foundation upon which to develop 2. cognitive balance for students 3. Practical laboratory, which provides each student the expertise to help develop 4. Practical skills side and consolidate the principles necessary to carry out the projects 5. Discussions during lectures.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st, 2nd,	8	A1, A2, A3, B1, B2, B3, C1, C3	Introduction to electronic systems	Theoretical lecture and laboratory	1. Short MCQs 2. Oral exam and direct

3rd & 9th	28	A1, A2, A3, B1, B2, B3, C1, C3, C4, C5	regulated power supplies	Theoretical lecture and laboratory	questions in the class 3. Midterm exam 4. Electronic exams on the electronic platform 5. Final exam
10th & 12th	12	A1, A2, A3, B1, B2, B3, C1, C3,	Zener Diodes with AC circuits	Theoretical lecture and laboratory	
13th -20th	32	A1, A2, A3, B1, B2, B3, C1, C3, C4, C5	operational amplifier	Theoretical lecture and laboratory	
21th & 24th	16	A1, A2, A3, B1, B2, B3, C1, C3, C4	Active filters	Theoretical lecture and laboratory	
25th - 27th	12	A1, A2, A3, B1, B2, B3, C1, C3, C4, C5	passive filters	Theoretical lecture and laboratory	
28th, 30th	12	A1, A2, A3, B1, B2, B3, C1, C3, C4, C5	ADC & DAC	Theoretical lecture and laboratory	

11.Course Evaluation

		Time/Number	Weight (Marks)	Week Due
Formative assessment	**Semester 1 Quizzes**	2	25% (25)	5, 10
	Semester 2 Quizzes	2	25% (25)	17, 25
	Projects / Lab.	1	10% (10)	Continuous
	Final Exam	3hr	40% (40)	30
Total assessment			100% (100 Marks)	

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	Electronic Circuit Analysis,1st edition, B. Visvesvara Rao et al, 2011 .
Main references (sources)	Principle of electronic circuits, second edition, S. Burns & P. Bond, 1996 .
Recommended books and references (scientific journals, reports...)	Electronic Devices and Circuit Theory, 11th edition, Robert Boylestad & Louis Nashelsky 2013.
Electronic References, Websites	www.mit.edu

Course Description Form

1. Course Name:
Technology of the Electricity
2. Course Code:
MIET3207
3. Semester / Year:
Fourth (Yearly)
4. Description Preparation Date:
21/02/2025
5. Available Attendance Forms:
Compulsory
6. Number of Credit Hours (Total) / Number of Units (Total)
120 Hours /6 Unit
7. Course administrator's name (mention all, if more than one name)
Name: Abdelhady Ali Ellakany Email: Abdelhady_ali@alayen.edu.iq

8. Course Objectives	
Course Objectives	1. Identifying the Components of transformers 2. Identifying the Types of inductions machines 3. Identifying the Uses of DC machine 4. Identifying the Applications of high voltage circuits
9. Teaching and Learning Strategies	
Strategy	1. Academic lectures: providing a solid foundation upon which to develop 2. cognitive balance for students 3. Practical laboratory, which provides each student the expertise to help develop 4. Practical skills side and consolidate the principles necessary to carry out the projects 5. Discussions during lectures.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st, 2nd,	4	A1, A2, A4 B2, B5 C1, C2, C4	Transformers: single phase transformer and construction	Theoretical lecture and laboratory	1. Short MCQs 2. Oral exam and direct

3rd,	2	A1, A2, A4 B2, B5 C1, C2, C4	Theory of operation, no load and short circuit test	Theoretical lecture and laboratory	questions in the class 3. Midterm exam 4. Electronic exams on the electronic platform 5. Final exam
4th,5th,	4	A1, A2, A4 B2, B5 C1, C2, C4	Equivalent circuit, auto–transformers, instrument transformers	Theoretical lecture and laboratory	
6th, 7th,	4	A1, A2, A4 B2, B5 C1, C2, C4	Three phase transformers, constructions methods of connection	Theoretical lecture and laboratory	
8th,9th	4	A1, A2, A4 B2, B5 C1, C2, C4	Electromechanical energy conversion principles, relay operation	Theoretical lecture and laboratory	
,10th,11th,12th,	6	A5, A6, A4 B1, B5, B3 C1	D.C machines: e.m.f and torque equation , equivalent circuit , methods of excitation , generator characteristics	Theoretical lecture and laboratory	
13th, 14th,15th,	6	A2, A3, A4, A6 B1, B2, B3 C2, C4	Motor characteristics, testing , calculation of losses and efficiency	Theoretical lecture and laboratory	
16th,17th, 18th	6	A2, A3 B1, B2, B5 C2, C4, C1	induction machines: equivalent circuit , basic equation , simple analysis testing	Theoretical lecture and laboratory	
19th,20th, 21st,	6	A2, A3 B1, B2, B5 C2, C4, C1	Single phase induction motor, methods of starting , siplit phase , capacitor short , capacitor run and shaded pole motors	Theoretical lecture and laboratory	
22nd, 23th,	4	A2, A3 B1, B2, B5 C2, C4, C1	Synchronous machines, generators and motors , equivalent circuit , basic equation .	Theoretical lecture and laboratory	
24th, 25th,	4	A1, A4, A6 B1, B5, B3 C1, C4	Special machines: Reluctance motor , hysteresis motor , linear motor , stepper motor , dray cup	Theoretical lecture and laboratory	

			type motor , servo motor , etc		
26th, 27th	6	A2, A3 B1, B2, B5 C2, C4, C1	Control switches: pilot switches, push bottoms , limits	Theoretical lecture and laboratory	
28th,	2	A5, A6, A4 B1, B5, B3 C1	Switches, flost switches , contactors , pressure switches .	Theoretical lecture and laboratory	
29th, 30th		A5, A6, A4 B1, B5, B3 C1	High voltage circuits	Theoretical lecture and laboratory	

11.Course Evaluation

		Time/Number	Weight (Marks)	Week Due
Formative assessment	**Semester 1 Quizzes**	2	25% (25)	5, 10
	Semester 1 Quizzes	2	25% (25)	17, 25
	Projects / Lab.	1	10% (10)	Continuous
	Final Exam	3hr	40% (40)	30
Total assessment			100% (100 Marks)	

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. Transformer Design Principles - With Applications to Core-Form Power Transformers 2. Induction Motor Control Design
Main references (sources)	Lectures presented by the subject teacher
Recommended books and references (scientific journals, reports...)	www.ieee power journal .com
Electronic References, Websites	• www.ocw.mit.edu www.math.uiowa.edu

Course Description Form

1. Course Name:
Medical Instrumentation 11
2. Course Code:
MIET3105
3. Semester / Year:
Third year (Yearly)
4. Description Preparation Date:
21/02/2025
5. Available Attendance Forms:
Compulsory
6. Number of Credit Hours (Total) / Number of Units (Total)
120 Hours /7Unit
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Akram hatem Email: Akram.mohamad@alayen.edu.iq
8. Course Objectives

Course Objectives	1: competently apply engineering methods to solve professional problems associated with the design, development, manufacture, and maintenance of medical instrumentation and related systems by understanding the social, ethical, and environmental context of their work. 2: communicate effectively with diverse and international communities, collaborate competently in cross-functional teams, and assume leadership roles while meeting the expectations of their employers. 3: habitually engage in technical professional development. 4: Preparing applied engineers with the ability and skill to deal with different medical devices and keep pace with the advanced generations of new medical devices. 5: Providing the student with the skills to install and operate devices and train on the use of medical devices and equipment and perform diagnostic and maintenance work. 6: Providing the student with solid scientific knowledge and applied skills to enable him to diagnose malfunctions in electronic systems of diagnostic and therapeutic medical devices. 7: Preparing a graduate with extensive and detailed knowledge of the new technologies in the field of medical devices and providing him with sufficient skills to make the necessary updates regarding the technology of engineering medical devices 8: Vertical expansion towards creating postgraduate programs in the field of medical devices technology 9: The department seeks to achieve the program's objectives in line with achieving international quality standards according to the

	available capabilities

9. Teaching and Learning Strategies

Strategy	1. Academic lectures: providing a solid foundation upon which to develop 2. cognitive balance for students 3. Practical laboratory, which provides each student the expertise to help develop 4. Practical skills side and consolidate the principles necessary to carry out the projects 5. Discussions during lectures.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st, 2nd,3th, 4th	16	A1,A3,A4 B1,B2 C1,C2,C4	***Biomedical signals recorders and monitors.***	Theoretical lecture and laboratory	1. Short MCQs 2. Oral exam and direct questions in the class 3. Midterm exam 4. Electronic exams on the electronic platform 5. Final exam
5th, 6th,7th ,8th	16	A3,A4,A5,A6, B1,B3,B4,B5 C1,C4	***ECG, EEG, EMG, ERG***	Theoretical lecture and laboratory	
9th,10th	8	A3,A4,A5,A6, B1,B3,B4,B5 C1,C4	***SurSurgical Scopegical***	Theoretical lecture and laboratory	
11th,12th,13th	12	A3,A4,A5,A6, B1,B3,B4,B5 C1,C4	***Audio logical system.***	Theoretical lecture and laboratory	
14th ,15th,16th,17th	16	A3,A4,A5,A6, B1,B3,B4,B5 C1,C4	***Ophthalmic system***	Theoretical lecture and laboratory	
18th ,19th ,20th,21th	16	A3,A4,A5,A6, B1,B3,B4,B5 C1,C4	***Pulmonary function system.***	Theoretical lecture and laboratory	
22th, 23th 24th, 25th	16	A3,A4,A5,A6, B1,B3,B4,B5 C1,C4	***Coronary care units.***	Theoretical lecture and laboratory	
26th, 27th, 28th 29th 30th	20	A3,A4,A5,A6, B1,B3,B4,B5 C1,C4	***Imaging tech. Ultrasound, Radiation, Thermal NMR, etc.***	Theoretical lecture and laboratory	

11. Course Evaluation

		Time/Number	Weight (Marks)	Week Due
Formative assessment	**Semester 1 Quizzes**	2	25% (25)	5, 10

	Semester 2 **Quizzes**	2	25% (25)	17, 25
	Projects / Lab.	1	10% (10)	Continuous
	Final Exam	3hr	40% (40)	30
Total assessment			100% (100 Marks)	

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. The Biomedical Engineering Handbook, Third Edition, **"Medical Devices and Systems"**, Chapter 25, 2006, published by CRC Press. Review 2. Paul James Moser: Electronics and Instrumentation for Audiologists, Taylor & Francis Group, LLC, New York, 2009
Main references (sources)	The Biomedical Engineering Handbook Medical Devices and Systems *Joseph D. Bronzino, Donald R. Peterson*, 2015
Recommended books and references (scientific journals, reports...)	1. Jon S. Wilson, "Sensor Technology Handbook", Copyright © 2005, Elsevier Inc, ISBN: 0-7506-7729-5 2. John G. Webster, Halit Eren, "The Measurement, Instrumentation, and Sensors" Handbook Second Edition: Two-Volume Set, ISBN 9781439848838, January 29, 2014 by CRC Press.
Electronic References, Websites	https://www.healthysimulation.com/

Course Description Form

1. Course Name:

Microprocessor and computer

2. Course Code:

MIET3102

3. Semester / Year:

Third (Yearly)

4. Description Preparation Date:

21/02/2025

5. Available Attendance Forms:

Compulsory

6. Number of Credit Hours (Total) / Number of Units (Total)

120 Hours /4 Unit

7. Course administrator's name (mention all, if more than one name)

Name: MSC.Adian Lateef
Email: adian.Latif@alayen.edu.iq

8. Course Objectives

Course Objectives	1- This program is aimed at third-stage students/Department of Medical Devices Engineering T Engineering Technical College. This program is one of the requirements for obtaining a bachel Devices Engineering Technologies.
	2- The program is taught in English for 150 hours at a rate of 2 hours of theory and 2 hours of p
	3- It works to develop individual skills and acquire knowledge in microprocessor programming

9. Teaching and Learning Strategies

Strategy	1- Use the strategy of cooperation and assistance during the education 2. Field visits to relevant ministries and educational institutions. 3.Organizing seminars, courses and workshops for students that encou 4. Discussions during the lecture

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning m
1-3	6+6	A1, A3, A4, A6,B1 , B2, B4,,B5,C1,C2 C3, C4	Introduction to learning Microprocessor	Theoretical lectu
4-5	4+4	A1, A3, A4, A6,B1 , B2, B4,,B5,C1,C2	Memory recognition The	Theoretical le

		C3, C4	complete structure of the microprocessor parts	practica
6-9	6+6	A1, A3, A4, A6,B1 , B2, B4,,B5,C1,C2 C3, C4	Learn about the 8085 processor, the internal structure of the 8085, the instruction register and the instruction decoder.	Theore ical le practica
10-14	8+8	A1, A3, A4, A6,B1 , B2, B4,,B5,C1,C2 C3, C4	Learn about the memory read and write mechanism in 8085	Theore ical le practica
15-19	8+8	A1, A3, A4, A6,B1 , B2, B4,,B5,C1,C2 C3, C4	Learn about the microprocessor instruction set and its types	Theore ical le practica
20-26	10+10	, A3, A4, A6,B1 , B2, B4,,B5,C1,C2 C3, C4	Learn about the inputs and outputs of the 8085 and the arithmetic and logical operations of the 8085.	Theore ical le practica
27-30	6+6	, A3, A4, A6,B1 , B2, B4,,B5,C1,C2 C3, C4	Applying some theoretical questions	Theore ical le practica

11. Course Evaluation

		Time/Number	Weight (Marks)	Week Due
Formative assessment	**Semester 1 Quizzes**	2	25% (25)	5, 10
	Semester 2 Quizzes	2	25% (25)	17, 25
	Projects / Lab.	1	10% (10)	Continuous
	Final Exam	3hr	40% (40)	30
Total assessment			100% (100 Marks)	

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Ramesh S. Gaonakar, Micropro Architecture, Programmin g an with the8085-PenramLnterna Publishing, Mumbai . Youtube lectures
Main references (sources)	Ramesh S.Gaonakar, Microproc
Recommended books and references (scientific journals, reports...)	Special requirements (include fo workshops, periodicals, 8085 so websites
Electronic References, Websites	YouTube, chatGPT

Course Description Form

1. Course Name:	
Power electronics	
2. Course Code:	
3. Semester / Year:	
Fourth year (Yearly)	
4. Description Preparation Date:	
20/02/2025	
5. Available Attendance Forms:	
Compulsory	
6. Number of Credit Hours (Total) / Number of Units (Total)	
120 hrs /7 Unit	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Mohammed K.ALhachami Email:alhachami1982 @gmail.com	
8. Course Objectives	
Course Objectives	**1. Identify semiconductors** **2. Types of electronic circuit elements** **3. Identify diode, thyristor, ...** **4. Identify rectifier circuits** **5. Prepare engineers who know how to convert from direct current to alternating current and vice versa** **6. Prepare a graduate with extensive and detailed knowledge of modern electronic technologies** **7. Vertical expansion towards establishing postgraduate programs in the field of medical communications technology.** **8. The department seeks to achieve the program's objectives in line with achieving international quality standards according to international specifications.**
1. Teaching and Learning Strategies	
Strategy	**1.** Academic lectures: providing a solid foundation upon which to develop. **2.** cognitive balance for students. **3.** Practical laboratory, which provides each student the expertise to help develop. **4.** Practical skills side and consolidate the principles necessary to carry out the projects. **5.** Short MCQs and homework. **6.** Discussions during lectures.

2. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
st1	6	A1, A2, A4 B2, B5 C1,C2,C4	**Introduction to Power Electronics**	Theoretical lecture and laboratory	1. Short MCQs 2. Oral exam and direct. questions in the class. 3. Midterm exam. 4. Electronic exams on the electronic platform. 5. Final exam
nd2	6	A5, A6, A4 B1, B5, B3 C1	Power Electronics Concepts	Theoretical lecture and laboratory	
th3	8	A2, A3, A4, A6 B1, B2, B3 C2, C4	Power Computations	Theoretical lecture and laboratory	
th and 5th4	8	A2, A3 B1, B2, B5 C2, C4,C1	Electronic Switches	Theoretical lecture and laboratory	
6th	8	A1, A4, A6 B1, B5, B3 C1, C4	Thyristors	Theoretical lecture and laboratory	
7th and 8th	8	A2, A3, A4 B1, B2, B5 C2, C4,C1	AC-DC Conversion: Single-Phase Uncontrolled Rectifications	Theoretical lecture and laboratory	
9th and 10th	8	A4, A6 B1, B2, B3 C2, C4	Single-Phase Half-Wave Uncontrolled Rectifier with Resistive Load	Theoretical lecture and laboratory	
11th and 12th	8	A1, A2, A4 B2, B5 C1,C2,C4	Single-Phase Half-Wave Uncontrolled Rectifier with Series Resistive and Inductive Load	Theoretical lecture and laboratory	
13th and 14th	8	A5, A6, A4 B1, B5, B3 C1	Single-Phase Full-Wave Uncontrolled Rectifier with Resistive Load	Theoretical lecture and laboratory	
15th, 16th and 17th	12	A2, A3, A4, A6 B1, B2, B3 C2, C4	Single-Phase Half-Wave Uncontrolled Rectifier Loaded with Highly	Theoretical lecture and laboratory	

			Inductive Load)		
18th, 19th and 20th	8	A2, A3 B1, B2, B5 C2, C4,C1	AC-DC Conversion: Single-Phase Controlled Rectifications	Theoretical lecture and laboratory	
21th and 22th	8	A1, A4, A6 B1, B5, B3 C1, C4	Single-Phase Half-Wave Controlled Rectifier with Resistive Load	Theoretical lecture and laboratory	
23th	8	A2, A3, A4 B1, B2, B5 C2, C4,C1	Single-Phase Half-Wave Controlled Rectifier with Series Resistive-Inductive Load:	Theoretical lecture and laboratory	
24th and 25th	8	A1, A2, A4, A6 B1, B2, B3 C2, C4	Single-Phase Full-Wave Fully Controlled Bridge Rectifier	Theoretical lecture and laboratory	
26 ,27th and 28th	8	A1, A2, A4, A6 B1, B2, B3 C2, C4	AC-DC Conversion: Three-Phase Controlled Rectifications	Theoretical lecture and laboratory	

3. Course Evaluation

s		Time/Number	Weight (Marks)	Week Due
Formative assessment	**Semester 1 Quizzes**	2	25% (25)	5, 10
	Semester 2 Quizzes	2	25% (25)	17, 25
	Projects / Lab.	1	10% (10)	Continuous
	Final Exam	3hr	40% (40)	30
Total assessment			100% (100 Marks)	

4. Learning and Teaching Resources

Required textbooks (curricular books, if any)	**1.** Modern Digital and Analog Communication Systems fourth edition by B. P. Lathi & Zhi Ding

	2010. **2.** Communication Systems Fourth Edition by Simon Haykin 2009. **3.** Engineering Electromagnetics Sixth Edition-chapters 3, 4, 5, & 6 By William H. Hayat, Jr. John A. Buck 2001. **4.** Engineering Electromagnetics Sixth Edition-chapter 10, 11, & 12 By William H. Hayt, Jr. John A. Buck 2001. **5.** Introduction to communication Systems Third Edition-chapter 2 & 3 by Ferrel G. Stremler 1990. **6.** Theory and Problems of Signals and Systems-chapter1 by Hwei P. Hsu 1995. **7.** Signals and Systems-chapter 1 By Richard Baraniuk 2003. **8.** Antenna and propagation for wireless communication systems second edition by Simon R. Saunders, Alejandro Aragon-zavala.2007. **9.** Microwave Engineering Third Edition-chapter3 by David M. Pozar. 2005. **10.** Digital Transmission Engineering Second editions -chapter 1, 2, 3. By John Anderson. • Books available in the college library. • Lectures given by the subject teacher. • Books available on the Al Ayan University platform. • Any website related to the study of electronic circuits. Using modern references and the latest books used in international universities and developing curricula annually in a manner consistent with university education.
Main references (sources)	**1.** Modern Digital and Analog Communication Systems fourth edition by B. P. Lathi & Zhi Ding 2010. **2.** Communication Systems Fourth

	Edition by Simon Haykin 2009. **3.** Engineering Electromagnetics Sixth Edition-chapters 3, 4, 5, & 6 By William H. Hayat, Jr. John A. Buck 2001. **4.** Engineering Electromagnetics Sixth Edition-chapter 10, 11, & 12 By William H. Hayt, Jr. John A. Buck 2001. **5.** Introduction to communication Systems Third Edition-chapter 2 & 3 by Ferrel G. Stremler 1990. **6.** Theory and Problems of Signals and Systems-chapter1 by Hwei P. Hsu 1995. **7.** Signals and Systems-chapter 1 By Richard Baraniuk 2003. **8.** **9.** John Anderson.
Recommended books and references (scientific journals, reports...)	**1.** Modern Digital and Analog Communication Systems fourth edition by B. P. Lathi & Zhi Ding 2010. **2.** Communication Systems Fourth Edition by Simon Haykin 2009. **3.** Engineering Electromagnetics Sixth Edition-chapters 3, 4, 5, & 6 By William H. Hayat, Jr. John A. Buck **4.** Systems Third Edition-chapter 2 & 3 by Ferrel G. Stremler 1990
Electronic References, Websites	Any website related to studying Medi Instrumentation.

Course Description Form

1. Course Name:	
Medical Communication Systems	
2. Course Code:	
MIET3201	
3. Semester / Year:	
Fourth year (Yearly)	
4. Description Preparation Date:	
20/02/2025	
5. Available Attendance Forms:	
Compulsory	
6. Number of Credit Hours (Total) / Number of Units (Total)	
120 hrs /7 Unit	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Ismail Shaaban Email: shaabanismail84@gmail.com	
8. Course Objectives	
Course Objectives	**1.** Identifying wired and wireless communication systems and electronic circuits used. **2.** Types of information transmission methods and the importance of communications in the medical field. **3.** Methods of transmitting wireless signals over long distances and high altitudes and types of antennas used in transmission and reception. **4.** Identifying sources of noise affecting the operation of medical devices and methods of treating them. **5.** Preparing applied engineers with the ability and skill to deal with various medical communication devices and keep pace with advanced generations of them. Providing the student with advanced scientific knowledge and applied skills to enable him to diagnose faults in the electronic systems of medical communication devices. **6.** Preparing a graduate with extensive and detailed knowledge of new technologies in the field of medical communications and providing him with sufficient skills to make the necessary updates regarding medical device engineering technology. **7.** Vertical expansion towards establishing postgraduate programs in the field of medical communication device technology. **8.** The department seeks to achieve the program objectives in line with achieving international quality standards according

	to the available capabilities

1. Teaching and Learning Strategies

Strategy	**1.** Academic lectures: providing a solid foundation upon which to develop. **2.** cognitive balance for students. **3.** Practical laboratory, which provides each student the expertise to help develop. **4.** Practical skills side and consolidate the principles necessary to carry out the projects. **5.** Short MCQs and homework. **6.** Discussions during lectures.

2. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
st1	6	A1, A2, A4 B2, B5 C1,C2,C4	General review in electrostatic	Theoretical lecture and laboratory	**1.** Short MCQs **2.** Oral exam and direct. questions in the class. **3.** Midterm exam. **4.** Electronic exams on the electronic platform. **5.** Final exam
nd2	6	A5, A6, A4 B1, B5, B3 C1	Gauss's law	Theoretical lecture and laboratory	
th3	8	A2, A3, A4, A6 B1, B2, B3 C2, C4	Steady magnetic field	Theoretical lecture and laboratory	
th and 5th4	8	A2, A3 B1, B2, B5 C2, C4,C1	Time – varying magnetic field	Theoretical lecture and laboratory	
6th	8	A1, A4, A6 B1, B5, B3 C1, C4	Uniform plane waves	Theoretical lecture and laboratory	
7th and 8th	8	A2, A3, A4 B1, B2, B5 C2, C4,C1	Fourier transform	Theoretical lecture and laboratory	
9th and 10th	8	A4, A6 B1, B2, B3 C2, C4	Signals & systems	Theoretical lecture and laboratory	
11th and 12th	8	A1, A2, A4 B2, B5 C1,C2,C4	AM & FM systems	Theoretical lecture and laboratory	
13th and 14th	8	A5, A6, A4 B1, B5, B3 C1	Sampling , PAM , PWM , PPM , PCM	Theoretical lecture and laboratory	
15th, 16th and 17th	12	A2, A3, A4, A6 B1, B2, B3	Digital modulation (ASK , FSK ,	Theoretical lecture and laboratory	

		C2, C4	PSK)		
18th, 19th and 20th	8	A2, A3 B1, B2, B5 C2, C4,C1	Noise in analogue & digital systems	Theoretical lecture and laboratory	
21th and 22th	8	A1, A4, A6 B1, B5, B3 C1, C4	Rectangular wave – guides	Theoretical lecture and laboratory	
23th and 24th	8	A2, A3, A4 B1, B2, B5 C2, C4,C1	Microwave passive devices	Theoretical lecture and laboratory	
25th and 26th	8	A1, A2, A4, A6 B1, B2, B3 C2, C4	Microwave generators	Theoretical lecture and laboratory	
27th and 28th	8	A1, A2, A4, A6 B1, B2, B3 C2, C4	Antennas	Theoretical lecture and laboratory	

3. Course Evaluation

s		Time/Number	Weight (Marks)	Week Due
Formative assessment	**Semester 1 Quizzes**	2	25% (25)	5, 10
	Semester 2 Quizzes	2	25% (25)	17, 25
	Projects / Lab.	1	10% (10)	Continuous
	Final Exam	3hr	40% (40)	30
Total assessment			100% (100 Marks)	

4. Learning and Teaching Resources

Required textbooks (curricular books, if any)	**1.** Modern Digital and Analog Communication Systems fourth edition by B. P. Lathi & Zhi Ding 2010. **2.** Communication Systems Fourth Edition by Simon Haykin 2009. **3.** Engineering Electromagnetics Sixth Edition-chapters 3, 4, 5, & 6 By William H. Hayat, Jr. John A. Buck 2001. **4.** Engineering Electromagnetics Sixth Edition-chapter 10, 11, & 12 By William H. Hayt, Jr. John A. Buck 2001. **5.** Introduction to communication Systems Third Edition-chapter 2 &

	3 by Ferrel G. Stremler 1990. **6.** Theory and Problems of Signals and Systems-chapter1 by Hwei P. Hsu 1995. **7.** Signals and Systems-chapter 1 By Richard Baraniuk 2003. **8.** Antenna and propagation for wireless communication systems second edition by Simon R. Saunders, Alejandro Aragon-zavala.2007. **9.** Microwave Engineering Third Edition-chapter3 by David M. Pozar. 2005. **10.** Digital Transmission Engineering Second editions -chapter 1, 2, 3. By John Anderson. • Books available in the college library. • Lectures given by the subject teacher. • Books available on the Al Ayan University platform. • Any website related to the study of electronic circuits. 🎬 Using modern references and the latest books used in international universities and developing curricula annually in a manner consistent with university education.
Main references (sources)	**1.** Modern Digital and Analog Communication Systems fourth edition by B. P. Lathi & Zhi Ding 2010. **2.** Communication Systems Fourth Edition by Simon Haykin 2009. **3.** Engineering Electromagnetics Sixth Edition-chapters 3, 4, 5, & 6 By William H. Hayat, Jr. John A. Buck 2001. **4.** Engineering Electromagnetics Sixth Edition-chapter 10, 11, & 12 By William H. Hayt, Jr. John A. Buck 2001. **5.** Introduction to communication Systems Third Edition-chapter 2 & 3 by Ferrel G. Stremler 1990. **6.** Theory and Problems of Signals and Systems-chapter1 by Hwei P.

	Hsu 1995. **7.** Signals and Systems-chapter 1 By Richard Baraniuk 2003. **8.** Antenna and propagation for wireless communication systems second edition by Simon R. Saunders, Alejandro Aragon-zavala.2007. **9.** Microwave Engineering Third Edition-chapter3 by David M. Pozar. 2005. **10.** Digital Transmission Engineering Second editions -chapter 1, 2, 3. By John Anderson.
Recommended books and references (scientific journals, reports...)	**1.** Modern Digital and Analog Communication Systems fourth edition by B. P. Lathi & Zhi Ding 2010. **2.** Communication Systems Fourth Edition by Simon Haykin 2009. **3.** Engineering Electromagnetics Sixth Edition-chapters 3, 4, 5, & 6 By William H. Hayat, Jr. John A. Buck 2001. **4.** Engineering Electromagnetics Sixth Edition-chapter 10, 11, & 12 By William H. Hayt, Jr. John A. Buck 2001. **5.** Introduction to communication Systems Third Edition-chapter 2 & 3 by Ferrel G. Stremler 1990
Electronic References, Websites	Any website related to studying Medi Instrumentation.

Course Description Form

1. Course Name:
Digital Signal Processing
2. Course Code:
CE 323
3. Semester / Year:
Third year (Yearly)
4. Description Preparation Date:
22/01/2025
5. Available Attendance Forms:
Compulsory
6. Number of Credit Hours (Total) / Number of Units (Total)
125Hours /5 Unit
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Fouad SALHA Email: Fouad.Muhammad@alayen.edu.iq

8. Course Objectives	
Course Objectives	1. Understanding the digital signal, its mathematical representations, characteristics, and frequency content 2. Understanding digital systems, their representation methods, and their characteristics 3. Knowledge of the signal analysis techniques: Fourier transforms, fast Fourier transforms and Z transforms. 4. Knowledge of digital filter design

9. Teaching and Learning Strategies	
Strategy	1. Academic lectures: providing a solid foundation upon which to develop 2. cognitive balance for students 3. Practical laboratory, which provides each student the expertise to help develop 4. Practical skills side and consolidate the principles necessary to carry out the projects 5. Discussions during lectures.

10. Course Structure

Week	Hours	Required Learning Outcome	Unit or subject name	Learning method	Evaluation method

		s			
1th, 2th,3th	12	A1,A3,A4 B1,B2,B5 C1,C2	Introduction to Digital Signal Processing: Basic elements of DSP versus ASP and applications of DSP, continuous time and discrete time signals	Theoretical lecture and laboratory	1. Short MCQs 2. Oral exam and direct questions in the class 3. Midterm exam 4. Electronic exams on the electronic platform 5. Final exam
4th, 5th,6th	12	A3,A4,A5 B1,B4 C1,C2,	Discrete-time signals and their sequences	Theoretical lecture and laboratory	
7th, 8th,9th	12	A4, A6 B2,B3,B5 C1,C2, C4	Standard digital time signals (sequences): Sequence unit sequence Single step sequence Slope unit sequence Exponential sequence	Theoretical lecture and laboratory	
10th, 11th,12th	12	A1,A4,A5 ,A6 B1,B3,B5 C1, C2,C4	Classification of digital time signals System characteristics: static system and dynamic system, causal and non-causal system, linear and non-linear system, stable and unstable system	Theoretical lecture and laboratory	
13th,14th	8	A1,A3,A4 ,A6 B1,B4,B5 C1, C4	Convolution: Direct method Drawing method	Theoretical lecture and laboratory	
15th,16th	8	A1,A3,A4 ,A6 B1,B4,B5 C1, C4	Digital sequence correlation: auto-correlation	Theoretical lecture and laboratory	
17th,18th	8	A4,A5,A6 B1,B2,B4, B5 C1, C2	Frequency Domain Representation: Searching for Frequency Response	Theoretical lecture and laboratory	
19th,21th	12	A1,A3,A4 ,A6 B1,B4,B5 C1, C4	Discrete Fourier transform (DFT), linear convolution using DFT, Invers Discrete Fourier Transform (IDFT)	Theoretical lecture and laboratory	
22th,24th	12	A1,A3,A4	Fast Fourier	Theoretical	

		,A6 B1,B4,B5 C1, C4	transform (FFT): Invers Fast Fourier transform (IFFT)	lecture and laboratory	
25th,27th	12	A1,A3,A4 ,A6 B1,B4 C1, C4	Introduction to Z transform: definition of Z transform and ROC, properties of Z transform, inverse Z transform and application of Z transform (polarity, causality, stability of Z transform, solution of difference equation using Z transform)	Theoretical lecture and laboratory	
28th,30th	12	A1,A2,A4 B1,B4,B5 C1, C4	Digital filter realization: basic structure of FIR (finite-duration impulse response) and IIR (infinite-duration impulse response) digital filters	Theoretical lecture and laboratory	

11.Course Evaluation

		Time/Number	Weight (Marks)	Week Due
Formative assessment	Semester 1 Quizzes	2	25% (25)	5, 10
	Semester 2 Quizzes	2	25% (25)	17, 25
	Projects / Lab.	1	10% (10)	Continuous
	Final Exam	3hr	40% (40)	30
Total assessment			100% (100 Marks)	

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. John G. Proakis , Dimitris K Manolakis Digital signal processing: principles algorithms and applications. Pearson; 4 edition (2006).
Main references (sources)	2. Tan, Li, and Jean Jiang. Digital signal processing: fundamentals and applications. Academic press, 2018. 3. Alan V. Oppenheim, Ronald W. Schafer - Discrete-Time Signal Processing (3rd Edition)-Prentice Hall (2009).
Recommended books and references (scientific journals, reports...)	4. Lyons, Richard G. Understanding digital signal processing, Pearson Education India, 2011.

Electronic References, Websites	http://www.academia.edu/