

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



Academic Program and Course Description Guide

2026

Introduction:

The educational program is a well-planned set of courses that include procedures and experiences arranged in the form of an academic syllabus. Its main goal is to improve and build graduates' skills so they are ready for the job market. The program is reviewed and evaluated every year through internal or external audit procedures and programs like the External Examiner Program.

The academic program description is a short summary of the main features of the program and its courses. It shows what skills students are working to develop based on the program's goals. This description is very important because it is the main part of getting the program accredited, and it is written by the teaching staff together under the supervision of scientific committees in the scientific departments.

This guide, in its second version, includes a description of the academic program after updating the subjects and paragraphs of the previous guide in light of the updates and developments of the educational system in Iraq, which included the description of the academic program in its traditional form (annual, quarterly), as well as the adoption of the academic program description circulated according to the letter of the Department of Studies T 3/2906 on 3/5/2023 regarding the programs that adopt the Bologna Process as the basis for their work.

In this regard, we can only emphasize the importance of writing an academic programs and course description to ensure the proper functioning of the educational process.

Concepts and terminology:

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

Course Description: Provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the students to achieve, proving whether they have made the most of the available learning opportunities. It is derived from the program description.

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

Program Mission: Briefly outlines the objectives and activities necessary to achieve them and defines the program's development paths and directions.

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

Curriculum Structure: All courses / subjects included in the academic program according to the approved learning system (quarterly, annual, Bologna Process) whether it is a requirement (ministry, university, college and scientific department) with the number of credit hours.

Learning Outcomes: A compatible set of knowledge, skills and values acquired by students after the successful completion of the academic program and must determine the learning outcomes of each course in a way that achieves the objectives of the program.

Teaching and learning strategies: They are the strategies used by the faculty members to develop students' teaching and learning, and they are plans that are followed to reach the learning goals. They describe all classroom and extra-curricular activities to achieve the learning outcomes of the program.

Academic Program Description Form

University Name:: University of Basrah

Faculty/Institute: College of engineering

Scientific Department: Electrical Engineering Department

Academic or Professional Program Name: Bachelor's degree (B.Sc.) – Electrical Engineering

Final Certificate Name: B.Sc. in Electrical Engineering

Academic System: Semester System

Description Preparation Date: 8/2026

File Completion Date: 9/2026

Signature:

Head of Department Name:

Prof. Dr. Amar A. Aldair

Date: 21/09/2026

Signature:

Scientific Associate Name:

Date:

21/9/2026

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Date: 21/9/2026

Dr. Ali K. Maryook

Signature:



1. Program Vision

Department of Electrical Engineering looks forward to preparing specialized engineers in various fields of electrical engineering that are armed with a sober scientific, intellectual engineering aspect, and enhanced by practical aspects by linking theoretical curricula with the requirements of the local and regional market . The department also aspires to keep pace with the progress and continuous development in the disciplines of electrical engineering sciences. The department also seeks to localize advanced technology in the industrial sector and harness the outputs of scientific research for it in a way that is compatible with the transition to clean energy and achieve economics of costs and resources. All of this is reflected to achieve the vision of the College of Engineering in the integration of the various engineering disciplines.

2. Program Mission

The electrical engineering department was established in 1964 as the second academic department for the establishment of the College of Engineering at the University of Basrah. It was necessary to establish a department for meeting the emerging need for skilled electrical engineers and to keep abreast of the scientific and technical progress in the world. Since its inauguration, the electrical engineering department adopted a well academic program equal to the electrical engineering departments worldwide by focusing on both theoretical and practical integrated aspects of the electrical engineering fields of study. The undergraduate study at the department is four years in length; from the moment of receiving the freshman year students whose average grades qualify them to join it up till the

graduation of the senior year students where they get their Bachelor of Science degree in electrical engineering.

3. Program Objectives

The curriculum requirements specify subject areas appropriate to Electrical Engineering (EE). The professional component must include:

- 1) A combination of mathematics and basic sciences general education component (some with experimental experience) appropriate to the discipline.
- 2) Electrical Engineering topics, consisting of electrical engineering sciences and engineering design appropriate to the electrical utilization study.
- 3) A general education component that complements the technical content of the curriculum and is consistent with the program and institution objectives..

4. Program Accreditation

5. Other external influences

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	7	13	9%	
College Requirements	12	29	22%	
Department Requirements	36	135	69%	
Summer Training				

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

7. Program Description			
4 th Year / Course-1			
No.	Module Name in English	Module Name in Arabic	Units
1	Power System Analysis I	تحليل أنظمة قدرة I	3
2	Information Theory and Coding	نظرية المعلومات والتشفير	3
3	Power Electronics	الالكترونيات القدرة	3
4	Modern Control Theory	نظرية التحكم الحديثة	3
5	Programmable Logic Controller	المتحكم المنطقي القابل للبرمجة	3
6	Laboratory 7	مختبرات 7	2
7	Engineering Project 1	مشروع هندسي 1	2
Total units			19
4 th Year / Course-2			
No.	Module Name in English	Module Name in Arabic	Units
1	Industrial Automation	الاتمة الصناعية	3
2	Digital Control Systems	أنظمة التحكم الرقمي	3
3	Communication Systems	أنظمة اتصالات	3
4	Special Machines	مكائن خاصة	3
5	Renewable Energy	طاقة متجددة	3
6	Laboratory 8	مختبرات 8	2
7	Engineering Project 2	مشروع هندسي 2	2
Total units			19

8. Expected learning outcomes of the program
Knowledge

Learning Outcomes 1	• LO1: Demonstrate understanding of fundamental concepts in mathematics, science, and engineering necessary to analyze and solve complex engineering problems.
Skills	
Learning Outcomes 2	• LO2: Apply modern engineering tools, techniques, and methodologies to design, analyze, and optimize engineering systems
Learning Outcomes 3	• LO3: Communicate effectively in oral, written, and graphical forms to present engineering ideas and technical solutions clearly and accurately.
Ethics	
Learning Outcomes 4	□ LO4: Recognize and evaluate the social, environmental, and ethical implications of engineering solutions, considering sustainability and safety.
Learning Outcomes 5	• LO5: Demonstrate the ability to work collaboratively and responsibly in multidisciplinary teams, respecting diverse perspectives and professional responsibilities.

9. Teaching and Learning Strategies

- Lectures and multimedia-supported theoretical instruction.
- Laboratory experiments and practical sessions.
- Problem-based learning (PBL) for real-world applications.
- Project-based learning and design assignments.
- Seminars, workshops, and interactive tutorials.
- Industrial training and field/site visits.
- Self-learning using e-learning platforms and digital resources.
- Final year capstone project integrating knowledge, skills, and ethics.

10. Evaluation methods

Written examinations (midterm and final).
Quizzes and short tests.

Laboratory reports and practical assessments.

Homework assignments and problem-solving exercises.

Oral presentations and seminars.

Project reports and design evaluations.

Participation in discussions, tutorials, and workshops.

Industrial training and fieldwork evaluation.

Final year capstone project assessment (report, presentation, and viva).

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Professor	Electrical Engineering				10	–
Assistant Professor	Electrical Engineering				13	–
Lecturer	Electrical Engineering				10	10
Assistant Lecturer	Electrical Engineering				16	–

Professional Development

Mentoring new faculty members

Mentoring New Faculty Members

At the University of Basrah, College of Engineering, Electrical Engineering Department, a structured process is followed to mentor new, visiting, full-time, and part-time faculty members. The process includes:

- **Orientation Programs:** New faculty members are introduced to the university regulations, academic policies, and departmental procedures.
- **Assigned Mentors:** Each new faculty member is paired with an experienced senior staff member who provides guidance on teaching methods, course planning, student assessment, and research activities.
- **Workshops and Training Sessions:** Regular professional development workshops are offered to enhance pedagogical skills, research capacity, and the use of modern engineering tools.
- **Peer Observation and Feedback:** Junior faculty are encouraged to attend classes of senior staff and receive constructive feedback on their own teaching performance.
- **Collaborative Activities:** New faculty are integrated into departmental committees, research groups, and student advising to strengthen teamwork and academic engagement.
- **Continuous Support:** Both full-time and part-time faculty receive ongoing support through departmental meetings, open discussions, and access to teaching resources.

This structured mentoring process ensures that new faculty members are effectively integrated into the academic environment and are able to contribute to the department's teaching, research, and community service missions.

Professional development of faculty members

The Electrical Engineering Department at the University of Basrah supports the professional and academic development of its faculty through a combination of teaching strategies, assessment methods, and ongoing training. Faculty members use lectures, seminars, laboratory sessions, project-based learning, and collaborative activities to enhance student learning. Student outcomes are assessed through exams, course evaluations, surveys, and regular program reviews to ensure educational objectives are met. The department also encourages faculty participation in workshops, conferences, and collaborations with industry and other institutions to improve teaching skills, stay updated on technological advancements, and engage in research, fostering continuous professional growth.

12. Acceptance Criterion

The Electrical Engineering Department at the University of Basrah follows the centralized admission system established by the Ministry of Higher Education and Scientific Research in Iraq. For the 2024 academic year, prospective students must meet the following criteria:

- **Educational Background:** Completion of secondary education with a focus on scientific subjects, particularly those relevant to engineering disciplines.
- **Minimum Grade Point Average (GPA):** Achieving a GPA that meets or exceeds the threshold set by the Ministry for the 2024 academic year.
- **Age Limit:** Applicants should be born in 1997 or later.
- **Graduation Status:** Only students who have graduated in the current academic year are eligible to apply.

These regulations are part of the centralized admission system designed to standardize and streamline the enrollment process across public universities in Iraq. Prospective students are encouraged to consult the official announcements from the Ministry of Higher Education and Scientific Research for the most current and detailed information regarding admission criteria.

13. The most important sources of information about the program

The primary sources of information about the Electrical Engineering program at the University of Basrah include:

1. **Official Department Website:** The Electrical Engineering Department's page provides comprehensive details about the department's history, faculty, research areas, and contact information.
2. **Academic Program Information:** The Academic Program page outlines the curriculum, program learning outcomes, and course specifications, offering insights into the educational structure and objectives.
3. **University of Basrah Official Website:** The University's main site serves as a central hub for announcements, regulations, and broader institutional information relevant to prospective and current students.
4. **Ministry of Higher Education and Scientific Research:** The Ministry's website is the authoritative source for national admission policies,

accreditation standards, and updates on higher education regulations in Iraq.

These resources collectively offer detailed and up-to-date information about the Electrical Engineering program at the University of Basrah.

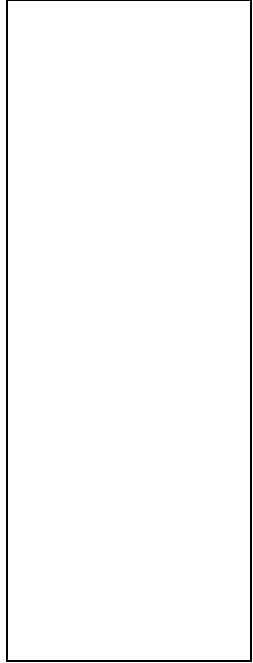
14. Program Development Plan

List all courses in the program by term starting with the first term of the first year and ending with the last term of the final year			Indicate Whether Course is Required, Elective or Selected Elective by R, E or SE ¹	Subject Area			Last Two Terms the Course was Offered: Year and Semester	Maximum Section Enrollment for the Last Two Terms the Course was Offered ²
				Math & Basic	Engine ering Topics. Check (√) if Contai	Oth		
Course								
Dept.	Code	Title						
Electrical	E401	Engineering Project I	Required		2		FS (2025-2026)	297
Electrical	E402	Engineering Project II	Required		2		SS (2025-2026)	297
Electrical	EE401	Programmable Logic controller	Required		3		FS (2025-2026)	297
Electrical	EE402	Modern Control Theory	Required		3		SS (2025-2026)	297
Electrical	EE403	Information Theory and coding	Required		3		FS (2025-2026)	297
Electrical	EE404	Power Electronics	Required		3		FS (2025-2026)	297
Electrical	EE405	Power System Analysis I	Required		3		FS (2025-2026)	297
Electrical	EE406	Industrial Automation	Required		3		SS (2025-2026)	297
Electrical	EE407	Digital Control System	Required		3		SS (2025-2026)	297
Electrical	EE408	Communication Systems	Required		3		SS (2025-2026)	297
Electrical	EE409	Special Machine	Required		3		FS (2025-2026)	297
Electrical	EE410	Renewable Energy	Required		3		SS (2025-2026)	297
Add rows as needed to show all courses in the curriculum								

Overall credit hours for completion of the program			
Totals must satisfy minimum semester credit hours			

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
Fourth	E401	Engineering Project I	Required	*	*	*	*	*	*	*	*	*	*	*	*
	E402	Engineering Project II	Required	*	*	*	*	*	*	*	*	*	*	*	*
	EE401	Programmable Logic controller	Required	*	*	*	*	*	*						
	EE402	Modern Control Theory	Required	*	*	*	*	*	*						
	EE403	Information Theory and coding	Required	*	*	*	*	*	*						
	EE404	Power Electronics	Required	*	*	*	*								
	EE405	Power System Analysis I	Required	*	*	*	*								
	EE406	Industrial Automation	Required	*	*	*	*	*	*						

	EE407	Digital Control System	Required	*	*	*	*	*	*						
	EE408	Communication Systems	Required	*	*	*	*	*	*						
	EE409	Special Machine	Required	*	*	*	*								
	EE410	Renewable Energy	Required	*	*	*	*								



Course Description Form

1. Course Name:	
Programmable Logic Controller	
2. Course Code:	
EE401	
3. Semester / Year:	
7/2023	
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: Ramzy S. Ali Email:	
8. Course Objectives	
Course Objectives	Introduction to PLCs: 2 hrs Definition and history of PLC, PLC types and selection criteria for PLC. PLC Architecture and Its Operation: 4 hrs PLC architecture, Scanning process, sourcing and sinking PLC Ladder Programming: 18 hrs PLC contact and coil instructions, PLC basic functions, PLC timer instructions, PLC counter instructions, rotate and shift instructions and miscellaneous instructions. Structured Text Programming: 5 hrs Sequential Function Chart Programming: 6 hrs PLC Applications 10 hrs

9. Teaching and Learning Strategies

Strategy	• Lectures with Conceptual Emphasis • Present foundational theory with clear derivations and practical examples. • Use visual aids such as signal waveforms, spectra, and block diagrams. • Integrate periodic concept checks or quick quizzes to enhance engagement. • Tutorials and Problem-Solving Sessions • Provide guided exercises on information theory calculation, modulation/demodulation, and noise analysis. • Encourage group discussions and peer-to-peer learning when tackling complex problems. • Use step-by-step approaches to build problem-solving confidence. • Simulation and Laboratory Work • Incorporate MATLAB or Python-based labs for signal generation, modulation, noise addition, and demodulation. • Allow hands-on exploration of BER curves and system performance under varying conditions. • Use real hardware or software-defined radio kits (if available) to demonstrate concepts practically. • Blended Learning Approaches • Supplement lectures with online video tutorials, animations, and interactive applets for visualization. • Use platforms like Coursera, MIT OpenCourseWare, or Khan Academy for self-paced reinforcement. • Case Studies and Real-World Examples • Discuss communication standards (e.g., GSM, LTE, WiFi) to contextualize theoretical concepts. • Analyze recent developments in wireless communications, such as digital broadcasting, to inspire interest. • Formative Assessments and Feedback • Conduct quizzes, mini-projects, or assignments to provide timely feedback. • Use peer assessment and self-assessment tools to promote reflective learning. • Group Projects or Presentations (optional) • Assign collaborative projects on designing basic communication systems or analyzing communication channels. • Encourage presentations to build communication skills and technical confidence.
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10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1			Introduction to PLC hardware and programming software		
2			Identification of PLC components and basic wiring		
3			Creating a PLC project and downloading a basic program		
4			Implementation of basic logic circuits using Ladder Diagram		
5			Timer- and counter-based control systems Data handling and memory operations		
6			Development of an intermediate PLC control program		
7			Design of a sequential industrial control system Interfacing and scaling an analog sensor		
8			PLC control of an induction motor		
9			Designing an HMI and connecting it to a PLC		

10			Establishing communication between PLC and HMI/device		
11			Implementation of a simple PLC-based PID control system		
12			PLC-based automated production/conveyor application		
13					
14			Implementation and presentation of an integrated PLC project		
15			Preparatory week before the final Exam		

11. Course Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	
	Assignments	2	10% (10)	2, 12	
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	
Summative assessment	Midterm Exam	2 hr	10% (10)	7	
	Final Exam	2hr	50% (50)	16	
Total assessment			100% (100 Marks)		

12. Learning and Teaching Resources

	Text
Required Texts	
Recommended Texts	
Websites	

Course Description Form

1. Course Name:	
Power System Analysis	
2. Course Code:	
EE405	
3. Semester / Year:	
7/2024	
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: Assistant Professor Abbas H. Abbas Email:	
8. Course Objectives	
Course Objectives	Per-Unit Systems Node equations, synchronous machines in power plant. Fault Calculations Symmetrical three-phase faults, symmetrical components (symmetrical components of unsymmetrical phasors, power in terms of symmetrical components, sequence impedance of sequence networks, +ve, -ve, and zero sequence networks, unsymmetrical faults on power systems Load Flow Solutions Gauss-Seidel method, Newton-Raphson method data for load flow studies, practical power flow problems utilizing computer algorithms. Power System Stability Stability problem, dynamics of synchronous machines, swing equation, power angle equation steady state stability, transient stability, equal area criterion, numerical solution of swing equation, multi-machine stability, computer program of transient

	stability, design methods for improving trans stability.
9. Teaching and Learning Strategies	
Strategy	• Lectures with Conceptual Emphasis • Present foundational theory with clear derivations and practical examples. • Use visual aids such as signal waveforms, spectra, and block diagrams. • Integrate periodic concept checks or quick quizzes to enhance engagement. • Tutorials and Problem-Solving Sessions • Provide guided exercises on information theory calculations, modulation/demodulation, and noise analysis. • Encourage group discussions and peer-to-peer learning when tackling complex problems. • Use step-by-step approaches to build problem-solving confidence. • Simulation and Laboratory Work • Incorporate MATLAB or Python-based labs for signal generation, modulation, noise addition, and demodulation. • Allow hands-on exploration of BER curves and system performance under varying conditions. • Use real hardware or software-defined radio kits (if available) to demonstrate concepts practically. • Blended Learning Approaches • Supplement lectures with online video tutorials, animations, and interactive applets for visualization. • Use platforms like Coursera, MIT OpenCourseWare, or Khan Academy for self-paced reinforcement. • Case Studies and Real-World Examples • Discuss communication standards (e.g., GSM, LTE, WiFi) to contextualize theoretical concepts. • Analyze recent developments in wireless communications, such as digital broadcasting, to inspire interest. • Formative Assessments and Feedback • Conduct quizzes, mini-projects, or assignments to provide timely feedback. • Use peer assessment and self-assessment tools to promote reflective learning. • Group Projects or Presentations (optional) • Assign collaborative projects on designing basic communication systems or analyzing communication channels.

- Encourage presentations to build communication skills and technical confidence.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1			Week 1: Introduction to Electric Power Systems		
2			Week 2: Review of Circuit Theory and Single-Phase AC Circuits		
3			Week 3: Three-Phase Circuits and Per-Unit System		
4			Week 4: Modeling of Transmission Lines		
5			Week 5: Modeling of Transformers		
6			Week 6: Modeling of Generators and Loads		
7			Week 7: Bus Admittance and Impedance Matrices		
8			Week 8: Power Flow Studies: Gauss-Seidel Method		

9			Week 9: Power Flow Studies: Newton-Raphson Method		
10			Week 10: Symmetrical Components		
11			Week 11: Symmetrical Fault Analysis		
12			Week 12: Unsymmetrical Fault Analysis: Single Line-to-Ground Fault		
13			Week 13: Unsymmetrical Fault Analysis: Double Line-to-Ground and Line-to-Line Faults		
14			Week 14: Economic Dispatch and Control		
15			Week 15: Power System Stability and Introduction to Transient Stability		

11. Course Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	
	Assignments	2	10% (10)	2, 12	

	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	
Summative assessment	Midterm Exam	2 hr	10% (10)	7	
	Final Exam	2hr	50% (50)	16	
Total assessment			100% (100 Marks)		

12. Learning and Teaching Resources

	Text
Required Texts	
Recommended Texts	"Elements of Power System Analysis" by William D. Stevenson
Websites	

Course Description Form

1. Course Name:	
Power Electronics	
2. Course Code:	
EE404	
3. Semester / Year:	
7/2024	
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: Assistant Professor Ali K. Abdulabbas Email:	
8. Course Objectives	
Course Objectives	Introduction Principle devices and characteristics: diode, pnp transistor, thyristor (SCR), GTO and triac, Static and dynamic properties at switching ON and OFF Methods of SCR turning ON, turning OFF Protection, trigger circuit design, series and parallel operation of SCR, cooling. Rectifiers Uncontrolled, half and full controlled, half and full wave rectifiers, single phase half wave, bridge, three phase half wave and bridge, and p-pulse rectifiers Effects of FWD, Specifications of devices Transformers Converter Operation Overlap, principles, 2 pulse, 3 pulse, p pulse Bridge converters, FWD overlap, power factor Effects of overlap, regulation, inversion and delay angle control. DC Line Commutation

	Inverter classifications, forced commutations parallel capacitors. Choppers: Chopper principles, series choppers (step-down), parallel choppers (step-up), commutation circuits, voltage chopper (voltage and current commutation), current chopper (voltage and current commutation), current commutation. Inverters Analysis of single phase bridge and center tap source inverters, square and quasi-square wave output, operation of 3-phase bridge inverter, square and quasi-square wave output, inverter voltage frequency control technique. Cyclo-converters Principles, circulating currents and blocked grid operations, types and applications. Single Phase Voltage Controllers AC regulators, transformer tap changers, controlled multi-winding transformers, integral cycle control
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9. Teaching and Learning Strategies

Strategy	• Lectures with Conceptual Emphasis • Tutorials and Problem-Solving Sessions • Laboratory Work • Blended Learning Approaches • Supplement lectures with online video tutorials, animations and interactive applets for visualization. • Use platforms like Coursera, MIT OpenCourseWare, or Khan Academy for self-paced reinforcement. • Case Studies and Real-World Examples • Discuss communication standards (e.g., GSM, LTE, WiFi) contextualize theoretical concepts. • Analyze recent developments in wireless communications digital broadcasting to inspire interest. • Formative Assessments and Feedback • Conduct quizzes, mini-projects, or assignments to provide timely feedback. • Use peer assessment and self-assessment tools to promote reflective learning. • Group Projects or Presentations (optional)
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	- Assign collaborative projects on designing basic communication systems or analyzing communication channels. - Encourage presentations to build communication skills and technical confidence.
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1			Week 1: Introduction to Power Electronic and Power Semiconductor Devices		
2			Week 2: Diodes and Transistors in Power Electronics		
3			Week 3: Thyristors and Triacs		
4			Week 4: Switching Regulators: Buck Converters		
5			Week 5: Switching Regulators: Boost and Buck-Boost Converters		
6			Week 6: Switching Regulators: Buck-Boost and Other Topologies		
7			Week 7: DC-DC Converters: Isolated Topologies		
8			Week 8: AC-DC Converters:		

9			Controlled Rectifiers (Half-wave and Full-wave)		
10			Week 9: AC-DC Converters: Uncontrolled Rectifiers and Cycloconverters		
11			Week 10: DC-AC Converters: Inverters (Voltage Source and Current Source)		
12			Week 11: PWM Control Techniques for Inverters		
13			Week 12: AC-AC Converters: AC Voltage Controllers		
14			Week 13: Power Electronics Applications: Motor Drives		
15			Week 14: Power Electronics Applications: Renewable Energy Systems and Power Supplies		
			Week 15: Design Considerations, EMI, and Thermal Management		

11. Course Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

12. Learning and Teaching Resources

	Text
Required Texts	
Recommended Texts	
Websites	

Course Description Form

1. Course Name:	
Modern Control Theory	
2. Course Code:	
EE402	
3. Semester / Year:	
7/2024	
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: Ammar A. Abdul Hameed Email:	
8. Course Objectives	
Course Objectives	1. Analysis of Control Systems in State Space: Mathematical modeling of dynamic systems in state space (Mechanical and Electric systems), transfer functions, Diagonalization, Eigen values, Eigenvector, determination of State Transition Matrix, solution of state equations, Cayley –Hamilton Theorem, Controllability and Observability. 2. Design of Control Systems in State Space: Pole-placement, State observers (Full, reduced order, minimum types), design of servo systems. 3. Liapunov Stability Analysis and Quadratic Optimal Control: Liapunov Stability analysis, Liapunov Stability analysis of LTI systems, Model reference control systems, quadratic optimal control 4. DESIGN IN DISCRETE DOMAIN: Sample and Hold-Digital equivalents-Impulse step invariant transformations Methods of discretization-Effect of sampling- Direct discrete design – discrete root locus, Design examples 5. DISCRETE STATE VARIABLE DESIGN:

	Discrete pole placement– state and output feedback, estimated state feedback–discrete optimal control, dynamic programming–Design examples 6. Non– linear systems: Common physical nonlinearities, the phase plane methods, Singular points, stability of nonlinear systems, Construction of phase trajectories. The describing function methods: Basic concepts, derivation of describing functions, common non linearity's, stability analysis Describing function approach, Jump resonance, Lyapunov stability criterion.
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9. Teaching and Learning Strategies

Strategy	• Lectures with Conceptual Emphasis • Tutorials and Problem-Solving Sessions • Laboratory Work • Blended Learning Approaches • Supplement lectures with online video tutorials, animation and interactive applets for visualization. • Use platforms like Coursera, MIT OpenCourseWare, or Khan Academy for self-paced reinforcement. • Case Studies and Real-World Examples • Discuss communication standards to contextualize theoretical concepts. • Analyze recent developments in wireless communications, digital broadcasting to inspire interest. • Formative Assessments and Feedback • Conduct quizzes, mini-projects, or assignments to provide timely feedback. • Use peer assessment and self-assessment tools to promote reflective learning. • Group Projects or Presentations (optional) • Assign collaborative projects on designing basic communication systems or analyzing communication channels. • Encourage presentations to build communication skills and technical confidence.
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1			Introduction to MATLAB and Control System Toolbox		
2			Modeling a physical system state-space form MATLAB conversion between transfer functions and state-space models		
3			Calculation and simulation of state responses		
4			Controllability analysis using MATLAB		
5			Observability analysis using MATLAB		
6			Stability analysis and eigenvalue computation		
7			Design of state-feedback controllers using MATLAB		
8			Simulation of tracking and servomechanism systems		

9			Design and simulation of a full-order observer		
10			Simulation of observer-based control		
11			LQR controller design using MATLAB		
12			Discrete-time state-space modeling and simulation		
13			Design and simulation of a digital controller		
14			Final control-system project and practical evaluation		
15			Preparatory work before the final Exam		

11. Course Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11

	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Course Description Form

1. Course Name:	
Information theory and coding	
2. Course Code:	
EE403	
3. Semester / Year:	
7/2024	
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	دراسة هذه المادة تهدف الى إعداد الطالب لاستيعاب المبادئ الأساسية لانظمة الاتصالات الرقمية وانواعها المختلفة ومميزات كل منها، كما تهدف المادة الى دراسة انظمة الاتصالات عبر الاقمار الصناعية وانظمة الاتصالات باستخدام الالياف الضوئية بما يمكن الطالب من العمل في مشروعات شبكات الإتصالات والعمل مع شركات الإتصالات التي تصمم مشروعات البنية التحتية للإتصالات.
9. Teaching and Learning Strategies	
Strategy	1. طرح النظريات الاساسيه للموضوع واعطاء الامثله النظرية والعملية. 2. تخصيص محاضرات للمناقشة وحل الاسئلة واعطاء الطلاب مجال للمشاركة بحل المسائل عن طريق اسلوب التفكير الجماعي. 3. اعطاء المجال للمنافسة بين الطلبة من خلال طرح بعض المسائل المتقدمة والتي تتطلب تفكيراً خارج اطار المحاضرات بما يجعل الطالب محتاجاً لقراءة مراجع اخرى غير المقررة والولوج للشبكة العنكبوتية لاكتساب المعلومات الاضافية. 4. عرض بعض وسائل الايضاح والافلام العلمية التي تخص بعض انواع انظمة الاتصالات.
10. Course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1			Sampling Theorem and PCM		
2			Uniform and non uniform Quantization Encoding		
3			Delta Modulation and Adaptive Delta Modulation		
4			Types of Line Codes		
5			Digital Carrier Systems		
6			Mid-term Exam		
7			Determination of Geometry parameters of satellite Global coverage and spot coverage satellites, Satellite system noise temperature		
8			Satellite uplink, downlink, and to link calculations Introduction to optical communication system		
9					

10			Total internal reflection , Numerical Aperture Losses in Optical Fiber,		
11			Wave modes and cutoff wavelength		
12			Mono-mode step index optical fiber		
13			Multi-mode step- index optical fiber		
14			Graded-index optical fibers		
15			Preparatory work before the final Exam		

11. Course Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Course Description Form

12.	Course Name:	Industrial Automation	
13.	Course Code:	EE402	
14.	Semester / Year:	7/2024	
15.	Description Preparation Date:		
16. Available Attendance Forms:			
17. Number of Credit Hours (Total) / Number of Units (Total)			
18.	Course administrator's name (mention all, if more than one name)		
	Name: Ramzy S. Ali Email:		
19.	Course Objectives		
Course Objectives		Introduction to Industrial Automation 2 hrs Sensors and Actuators: 9 hrs HMI Configuration and Programming: 6 hrs Screen designing, control and monitoring, PLC and HMI networking, interfacing of PLC with HMI. Electric Drives: 6 hrs VFD, servo drive, and stepper drive An Introduction to DCS System: 4 hrs Introduction and definition of DCS, fundamental principles of modern DCS systems and architectures. SCADA Systems: 10 hrs Introduction, definitions and history of Supervisory Control and Data Acquisition, typical SCADA system Architecture, Communication requirements, Desirable Properties of SCADA system, features, advantages, disadvantages and applications of	

	SCADA. SCADA Architectures (First generation - Monolithic, Second generation - Distributed, Third generation – Networked Architecture), SCADA applications. SCADA Protocols 8 hrs Open systems interconnection (OSI) Model, TCP/IP protocol, DNP3 protocol, IEC61850 layered architecture, Control and Information Protocol (CIP), Device Net, Control Net, Ether Net/IP, Flexible Function Block process (FFB), Process Field bus (Profibus). Interfacing of SCADA with PLC. and coil instructions, PLC basic functions, PLC timer instructions, PLC counter instructions, rotate and shift instructions and miscellaneous instructions. Structured Text Programming: 5 hrs Sequential Programming: Function Chart 6 hrs PLC Applications 10 hrs
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20. Teaching and Learning Strategies

Strategy	• Lectures with Conceptual Emphasis • Tutorials and Problem-Solving Sessions • Laboratory Work • Blended Learning Approaches • Supplement lectures with online video tutorials, animation and interactive applets for visualization. • Use platforms like Coursera, MIT OpenCourseWare, or Khan Academy for self-paced reinforcement. • Case Studies and Real-World Examples • Discuss communication standards to contextualize theoretical concepts. • Analyze recent developments in wireless communications digital broadcasting to inspire interest. • Formative Assessments and Feedback • Conduct quizzes, mini-projects, or assignments to provide timely feedback. • Use peer assessment and self-assessment tools to promote reflective learning.
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- Group Projects or Presentations (optional)
- Assign collaborative projects on designing basic communication systems or analyzing communication channels.
- Encourage presentations to build communication skills and technical confidence.

21. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1			Introduction to Industrial Automation 2 hrs		
2			Sensors and Actuators: 9 hrs		
3			HMI Configuration and Programming: 6 hrs		
4			Screen designing control and monitoring, PLC and HMI networking,		
5			interfacing of PLC with HMI.		
6			Electric Drives: 6 hrs		
7			VFD, servo drive, and stepper drive		
8			An Introduction to DCS System: 4 hrs		
			Introduction and definition of DCS, fundamental principles of modern DCS systems and architectures.		

9			SCADA Systems: 10 hrs Introduction, definitions and history of Supervisory Control and Data Acquisition, typical SCADA system Architecture, Communication requirements, Desirable Properties of SCADA system, features, advantages, disadvantages and applications of SCADA. SCADA Architectures (First generation Monolithic, Second generation - Distributed, Third generation - Networked Architecture), SCADA applications.		
10					
11					
12					
13					
14					
15			SCADA Protocol 8 hrs Open systems interconnection (OSI) Model, TCP/IP protocol, DNP3 protocol, IEC61850 layered architecture, Control and Information Protocol (CIP), Device Net, Control		

			Net, Ether Net/IP Flexible Function Block process (FFB), Process Field bus (Profibus). Interfacing of SCADA with PLC.		
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22. Course Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Course Description Form

1. Course Name:	
Digital Control Systems	
2. Course Code:	
EE404	
3. Semester / Year:	
7/2024	
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: Ammar A. Abdul Hameed	
Email:	
8. Course Objectives	
Course Objectives	This module aims to introduce students to fundamental principles and practical implementation of digital control systems. It seeks to develop a solid understanding of modeling, analysis, and design of control systems operating in discrete time. The module emphasizes the relationship between continuous-time and discrete-time systems, the effects of sampling and quantization, and the use of digital controllers in real-world engineering applications. By the end of the module, students will be equipped with the analytical and computational skills required to design, evaluate, and implement digital control algorithms using modern engineering tools.
9. Teaching and Learning Strategies	
Strategy	The module is delivered using a blended approach that integrates theoretical instruction with practical application to enhance student understanding and engagement. Teaching and learning strategies include: Lectures Formal lectures are used to introduce fundamental theoretical concepts, mathematical concepts, and analytical techniques related to digital control systems, supported by illustrative examples and real-world applications.

	2. Tutorials and Problem-Solving Session Guided tutorial sessions focus on solving analytical and numerical problems to reinforce theoretical concepts, develop critical thinking, and enhance students' problem-solving skills. 3. Laboratory Session Practical laboratory work enables students to implement and test digital control algorithms using simulation tools and hardware platforms. Emphasis is placed on modeling, control design, and performance evaluation. 4. Computer-Based Learning Students use software tools such as MATLAB/Simulink to model discrete-time systems, analyze system behavior, and design digital controllers. 5. Case Studies and Application Real-world case studies are used to demonstrate industrial and embedded control applications, helping students relate theoretical concepts to practical engineering problems. 6. Independent Learning Students are encouraged to engage in self-directed study through assigned readings, online resources, and practical exercises to consolidate their understanding. 7. Group Work and Discussion Collaborative activities promote teamwork, peer learning, and effective communication while addressing design-oriented control problems. 8. Formative Assessment and Feedback Continuous formative assessments, quizzes, and feedback sessions are used to monitor student progress and support learning improvement throughout the module.
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1			Introduction to Discrete time control systems		
2			Introduction to z Transform z plane Analysis		

3			Discrete Time Control Systems		
4			Impulse sampling and Data Hold		
5			Obtaining the z Transform by Convolution		
6			Integral Method The Pulse Transfer Function		
7			Realization of Digital Controller Mapping between the s plan and z plan		
8			Stability analysis closed loop Systems in z plan part 1		
9			Stability analysis closed loop Systems in z plan part 2		
10			Transient and Steady state		
11			Response Analysis		
12			Root locus Method in z plan: part 1		
13			Root locus Method in z plan: part 2		
14			Design based on the root Locus method: part 1		

15			Design based on the root Locus method: part 2 Preparatory work before the final Exam		
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11. Course Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Course Description Form

12.	Course Name:	Communication Systems-II	
13.	Course Code:	EE406	
14.	Semester / Year:	7/2024	
15.	Description Preparation Date:		
16. Available Attendance Forms:			
17. Number of Credit Hours (Total) / Number of Units (Total)			
18.	Course administrator's name (mention all, if more than one name)		
	Name: Professor		
	Email:		
19.	Course Objectives		
	Course Objectives	دراسة هذه المادة تهدف الى إعداد الطالب لاستيعاب المبادئ الأساسية لطرق تشفير الإشارات الرقمية واكتشاف الأخطاء الحاصلة أثناء الإرسال بما يمكن الطالب من العمل في مشروعات شبكات الاتصالات والعمل مع شركات الاتصالات التي تصمم مشروعات البنية التحتية للاتصالات..	
20.	Teaching and Learning Strategies		
Strategy	1. طرح النظريات الأساسية للموضوع واعطاء الامثلة النظرية والعملية. 2. تخصيص محاضرات للمناقشة وحل الاسئلة واعطاء الطلاب مجال للمشاركة بحل المسائل عن طريق اسلوب التفكير الجماعي. 3. اعطاء المجال للمناقشة بين الطلبة من خلال طرح بعض المسائل المتقدمة والتي تتطلب تفكيراً خارج اطار المحاضرات بما يجعل الطالب محتاجاً لقراءة مراجع اخرى غير المقررة والولوج للشبكة العنكبوتية لاكتساب المعلومات الإضافية. 4. عرض بعض وسائل الايضاح والافلام العلمية التي تخص بعض انواع انظمة الاتصالات.		

يجل المسائل
عن طريق
اسلوب
التفكير
الجماعي
اعطاء
المجال
للمنافسة بين
الطلبة
من خلال طرح
بعض
المسائل
المتقدمة
والتي
تتطلب
تفكيراً خارج
الطار
المحاضرات
يتم
الطالب
محتاجاً
للقراءة
مراجع
أخرى
المقررة
والولوج
للشبكة
العنكبوتية
لاكتساب
المعلومات
الاضافية
عرض
بعض
وسائل
الايضاح
والافلام
العلمية
تخصص
بعض
انواع
الاتصالات.

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21. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1			Information Theory and Discrete		

			Memoryless Channels		
2			Channel Capacity and Shannon's Theorem		
3			Source Coding and Entropy Coding		
4			Shannon -Fano Coding,		
5			Shannon -Fano Coding,		
6			Huffman Coding		
7			Mid-term Exam		
8			Lempel-Ziv Coding		
9			Linear Block Codes		
10			Hamming codes		
11			Syndrome decoding rule		
12			Systematic and nonsystematic Cyclic Codes		
13			Convolution Codes		
14			Convolution Codes Decoding of convolutional codes and Viterbi algorithm		
15					

			Preparatory work before the final Exam		
22. Course Evaluation					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Course Description Form

23.	Course Name:
	Special Machines
24.	Course Code:
	EE408

25. Semester / Year:	
7/2024	
26. Description Preparation Date:	
27. Available Attendance Forms:	
28. Number of Credit Hours (Total) / Number of Units (Total)	
29. Course administrator's name (mention all, if more than one name)	
Name: Ali K. Abdul Abbas Email:	
30. Course Objectives	
Course Objectives	<u>DC servo mechanism:</u> armature-controlled DC motors, field-controlled DC motors, motorgenerator transfer function. Two-Phase Servo Motors Main requirements of servos, two phase servo motor transfer function, the IM as a servo motor, drug cup construction, introduction to tacho generators and induction tacho generators. <u>Shaded Pole Motors</u> Construction, principle of operation, speed reversal and speed changing. Universal and Single Phase AC Series Motors Principles, torque and speed equations, small universal and large AC motors, speed changing, applications. Single-Phase Repulsion Motors Repulsion principles and repulsion motors, repulsion start IM, repulsion IM. <u>Stepper Motors</u> Permanent magnet stepper motors, variable reluctance stepper motors, torque-speed characteristics, step angle and speed. <u>Reluctance motors:</u> Single and three phase reluctance motors, construction and principle of operation.

		Linear Induction Motor: Construction, principle of operation, applications
31. Teaching and Learning Strategies		
Strategy	• Lectures with Conceptual Emphasis • Tutorials and Problem-Solving Sessions • Laboratory Work • Blended Learning Approaches • Supplement lectures with online video tutorials, animation and interactive applets for visualization. • Use platforms like Coursera, MIT OpenCourseWare, or Khan Academy for self-paced reinforcement. • Case Studies and Real-World Examples • Discuss communication standards to contextualize theoretical concepts. • Analyze recent developments in wireless communications and digital broadcasting to inspire interest. • Formative Assessments and Feedback • Conduct quizzes, mini-projects, or assignments to provide timely feedback. • Use peer assessment and self-assessment tools to promote reflective learning. • Group Projects or Presentations (optional) • Assign collaborative projects on designing basic communication systems or analyzing communication channels. • Encourage presentations to build communication skills and technical confidence.	

32. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1			Introduction special-machine laboratory simulation tools		
2			Simulation of single-phase induction motor		
3			Speed and load characteristics		
4			Simulation of synchronous reluctance motor		
5			SRM modeling and drive simulation		
6			PM motor modeling and characteristics BLDC motor simulation and speed control		

7			PMSM simulation and performance analysis		
8			Stepper motor position-control simulation		
9			Servo motor position and speed control		
10			Performance comparison of special-purpose motors		
11			Simulation of a line induction motor Resolver/synchro signal analysis		
12					
13			Motor selection and drive design for application		
14			Final project integrated simulation Preparatory work before the final Exam		
15					

33. Course Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10

Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Course Description Form

34.	Course Name:		
	Renewable Energy		
35.	Course Code:		
	EE410		
36.	Semester / Year:		
	7/2024		
37.	Description Preparation Date:		
	38.Available Attendance Forms:		
	39.Number of Credit Hours (Total) / Number of Units (Total)		
40.	Course administrator's name (mention all, if more than one name)		
	Name: Abbas H. Abbas		
	Email:		
41.	Course Objectives		
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; vertical-align: top;"> Course Objectives </td> <td style="width: 50%; vertical-align: top;"> This module aims to provide students with a comprehensive understanding of renewable energy resources and technologies, with emphasis on their principles of operation, system components, and integration into </td> </tr> </table>	Course Objectives	This module aims to provide students with a comprehensive understanding of renewable energy resources and technologies, with emphasis on their principles of operation, system components, and integration into
Course Objectives	This module aims to provide students with a comprehensive understanding of renewable energy resources and technologies, with emphasis on their principles of operation, system components, and integration into		

	modern power and energy systems. The module seeks to develop the ability to analyze, design, and evaluate renewable energy systems while considering technical, economic, and environmental factors. It also aims to raise awareness of sustainability, energy efficiency, and the role of renewable energy in addressing global energy challenges and climate change.
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42. Teaching and Learning Strategies

Strategy	The module adopts a student-centered and practice-oriented approach that integrates theoretical knowledge with real-world renewable energy applications. The learning and teaching strategies include: 1. Lectures Structured lectures introduce core concepts, principles, and technologies related to renewable energy systems, supported by real-world examples and current industry practices. 2. Tutorials and Problem-Solving Sessions Tutorial sessions reinforce lecture material through analytical exercises, numerical problems, and case-based discussions to enhance students' critical thinking skills. 3. Laboratory and Practical Sessions Practical activities and laboratory experiments allow students to analyze the performance of renewable energy systems, such as photovoltaic panels, wind energy models, and energy storage systems. 4. Computer-Based Learning Simulation tools and software packages are used to model renewable energy systems, perform performance analysis, and evaluate system design alternatives. 5. Case Studies and Industrial Applications Case studies highlight real-world renewable energy projects, encouraging students to connect theoretical knowledge with practical engineering challenges. 6. Group Work and Project-Based Learning Team-based projects promote collaboration, communication skills, and the application of renewable energy concepts to realistic design problems. 7. Independent and Self-Directed Learning Students are encouraged to engage in self-study through assigned readings, research tasks, and online resources to deepen their understanding of renewable energy topics.
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طرح
النظريات
الأساسية
للموضوع
واعطاء
الأمثلة
النظرية
والعملية
تخصيص
محاضرات
للمناقشة
وحل الأمثلة
واعطاء
الطلاب
مجال
للمشاركة
بحل المسائل
عن طريق
أسلوب
التفكير
الجماعي
اعطاء
المجال
للمناقشة
بين
الطلبة
من
خلال
بعض
المسائل
المتقدمة
والتي
تتطلب
تفكيراً
خارج
الطار
المحاضرات
بما
يعمل
الطالب
محتاجاً
للقراءة
مراجع

	8. Formative Assessment and Feedback Continuous assessment, quizzes, and feedback sessions are used to monitor learning progress and provide guidance for improvement throughout the module.	أخرى غير المقررة والولوج للشبكة الالكترونية لاكتساب المعلومات الاضافية عرض بعض وسائل الايضاح والافلام العلمية التي تخصص بعض انواع أنظمة الاتصالات.
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43. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1			Introduction		
2			Renewable Energy		
3			Global energy demand and sustainability; energy resource classification; role of renewable energy in modern power systems.		
4			Solar Energy Systems		
5			Solar radiation fundamentals; photovoltaic (PV) cells and modules; PV system components; solar thermal system performance analysis.		

6			Wind Energy Systems		
7			Wind characteristics; aerodynamic principles; wind turbines and generators; wind farm layout; power output and efficiency.		
8					
9			Hydropower Systems		
10			Types of hydropower plants; turbine selection; hydraulic performance; environmental and economic considerations.		
11					
12			Biomass and Bioenergy		
13			Biomass resources and bioenergy conversion technologies; biogas systems; biofuels; sustainability aspects.		
14					
15			Geothermal Energy		
			Geothermal resources; power generation methods; direct use applications; advantages and limitations.		

			Energy Storage Systems Electrical, thermal and mechanical energy storage technologies; batteries; pumped hydro; role of storage in renewable energy systems. Power Electronics for Renewable Energy Converters and inverters; grid interfacing; power quality issues; control strategies. Grid Integration of Renewable Energy Grid-connected and standalone systems; microgrids; intermittency and variability; smart grid concepts. Hybrid Renewable Energy Systems Design and analysis of hybrid systems; techno-economic evaluation; reliability and optimization.		
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			Environmental and Economic Assessment Life cycle assessment (LCA) of environmental impacts; cost-benefit analysis; policy and incentives. Case Studies and Applications Practical applications; industrial and residential systems; regional and global renewable energy projects.		
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44. Course Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		