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

2024

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 Baghdad**
Faculty/Institute: **AL–Khwarizmi College of Engineering**
Scientific Department: **Mechatronics Engineering**
Academic or Professional Program Name: **B.Sc.**
Final Certificate Name: ……
Academic System: **Quarterly**
Description Preparation Date: **1/4/2024**
File Completion Date: **1/4/2024**

Signature:
Head of Department Name:

Date:

Signature:
Scientific Associate Name:

Date:

The file is checked by:
Department of Quality Assurance and University Performance
Director of the Quality Assurance and University Performance Department:
Date:
Signature:

Approval of the Dean

1. Program Vision

The scientific department seeks to present academically, scientifically, and even practically in the local and international arena. The reliability of scientific laboratories is within national standards first and international standards second. Apply advanced studying and teaching systems and keeping updated with the latest developments in this field, especially e-learning. Furthermore, studying recent experiences in education and working on apply them in line with the changing standards of scientific and practical requirements. Planning to build postgraduate studies with high standard quality by preparing material requirements from laboratories and others and the scientific needs of researchers, in addition to researchers and supervisors who own a distinguished research line and global scientific publication.

2. Program Mission

The primary goal of the Mechatronics Engineering Department is to train and develop the most highly skilled engineers and leaders in the engineering field of that field. It also aims to balance knowledge in scientific research to benefit the local, regional, and global community. Additionally, the department trains and sharpens students' scientific and cognitive skills while highlighting social and cultural values and meeting local market demands. This objective necessitates adapting and developing the curricula to the various factors, ranging from the shifting demands to the various technological advancements in the scientific domains. A department's desire to realize its vision is what drives it to communicate with the outside world about the most recent advancements in science by attending international conferences and seminars, in addition to hosting many workshops and student events.

3. Program Objectives

Providing graduate engineers with the information and abilities needed for mechatronics system development and design, including applications of mechanical, electrical, electronic, control, and computer engineering. Furthermore, he will possess unique expertise that enables him to create, build, maintain, and use contemporary systems and equipment in a way that advances science. He will also be able to research issues of mechatronics. Graduate an engineer skilled in the application of sophisticated ideas linked to contemporary engineering methods in the field of mechatronics. preparing engineering personnel with a solid background so they can interact with all community members and improve and enrich the needs in Iraq. supplying information and skills that industries and businesses in the domains of robotics, industrial automation, smart systems, medical devices, and other technical and industrial applications require to prepare engineers for the labor market. Developing a scientific engineering personality that can interact with the demands of the government or the private sector of the job market.

4. Program Accreditation

N/A

5. Other external influences

N/A

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements				

College Requirements				
Department Requirements				
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	
2023-2024/ Fourth	MTE446	Digital Control	Theoretical 30	Practical 30

8. Expected learning outcomes of the program

Knowledge	
Understanding of Digital Control Systems:	Students will gain a foundational understanding of the principles and theories behind digital control systems. This includes learning about the discretization of continuous systems, z-transforms, and stability analysis specific to digital systems. This knowledge is crucial for developing control strategies that can be implemented in microcontrollers.
System Simulation	A critical outcome is the ability to simulate and analyze digital systems using Matlab software tools for simulation, which are essential for the design and testing of control strategies without the need for physical prototypes.
Skills	
Proficiency in Digital Control Algorithm Development:	Students will develop the skill to discretize continuous control laws
Use of Development Tools:	A significant skill outcome is becoming proficient with development tools, including simulation software (like MATLAB/Simulink),
Ethics	

Awareness of Safety and Reliability:	Students should understand the paramount importance of designing systems that are safe for users and the environment. This includes acknowledging the potential hazards of malfunctions in control systems and the ethical imperative to minimize such risks through rigorous testing, safety protocols, and fail-safe designs.
Professional Integrity:	Students are taught to uphold high standards of honesty and integrity in their work. This includes accurate reporting of results, acknowledging the contributions of others, and avoiding plagiarism.

9. Teaching and Learning Strategies

Active Learning: Lab Sessions and Simulations: Hands-on labs using digital control systems, software simulations (MATLAB/Simulink), to apply concepts and see the effects of control algorithms.

Assessment for Learning: Implementing a variety of assessment methods, including quizzes, exams, and presentations, to cater to different learning styles and reinforce concepts through multiple formats.

Integration of Technology: Use of Software Tools: Incorporating programming and simulation tools like MATLAB, into the curriculum.

10. Evaluation methods

Quizzes and Examinations:

Quizzes: Frequent quizzes can help reinforce key concepts and ensure students keep up with the material. Quizzes can be both announced and unannounced to encourage regular study habits.

Midterm and Final Examinations: These can include a mix of multiple-choice questions, short answers, and computational problems that require students to apply theoretical knowledge to solve practical problems.

Laboratory Assignments and Reports: Hands-on laboratory experiments where students apply digital control theories and use simulation tools. Assessment is

based on the execution of experiments, the accuracy of results, and the quality of lab reports discussing the outcomes and learnings.

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Assist. Prog.	Electrical Engineering	Control			Yes	

Professional Development

Mentoring new faculty members

Professional development of faculty members

12. Acceptance Criterion

13. The most important sources of information about the program

1. "Digital Control System Analysis and Design" by Philips & Nagle.
2. "Modern Control Engineering" by K. Ogata (5th Edition).
3. "Digital Control of Dynamic System" by Franklin & Powell & Workman (3th edition)

4. "Linear Control system Analysis and Design" by D'Azzo & Houpis (5th Edition).
5. "Computer-controlled System theory and Design" by Astrom & wittenmark (3th edition)

14. Program Development Plan

Regular reviews and feedback strategy should be followed to continuously improve the course content and teaching method.

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	MTE446	Digital Control	Basic	*				*				*			

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

Course Description Form

1. Course Name:
Digital Control
2. Course Code:
MTE446
3. Semester / Year:
First Semester/2024
4. Description Preparation Date:
5. Available Attendance Forms:
6. Number of Credit Hours (Total) / Number of Units (Total)
Weekly 4 hours (Total 60 hours)/ 3 units
7. Course administrator's name (mention all, if more than one name)
Name: Assist Prof Dr Ahmed Mahrous Email: ahmed78@kecbu.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	• **Understand the fundamental principles of digital control systems.** • **Analyze and design digital controllers using various methods.** • **Apply digital control techniques to solve real-world engineering problems.**
9. Teaching and Learning Strategies	
Strategy	1. **Lectures: Covering theoretical concepts, principles, and mathematical foundations.** 2. **Lab Sessions: Hands-on experience with simulation tools and hardware implementation.** 3. **Case Studies: Analysis of real-world applications of digital control systems.**

	4. **Group Projects: Collaborative design and implementation of digital control systems.** 5. **Interactive Discussions: Encouraging student participation and critical thinking.**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	The idea of system control Computer in the Control system			
2,3	8	Hardware requirements for computer control Sampled Data system and the Sampling process The discrete time system The z–transform and the Applications to the z–transform			
4,5	8	Inverse z–transform and applications Digital control system block reduction. Open loop system and closed loop system time response System time response characteristics			
6,7,8	12	Exam1 System stability Discrete Controller design			
9,10	8	Stability analysis technique			
11	4	Exam2			
12,13	8	Controller design			
14	4	Exam3			

11. Course Evaluation

Midterm Examination: Testing theoretical understanding and problem-solving skills.
Lab Reports: Assessment of practical skills and application of learned concepts.

Quizzes: **Group Projects**: Evaluation of collaborative work, design creativity, and implementation skills. **Final Examination**: Comprehensive assessment covering all course topics. **Participation and Attendance**

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	N/A
Main references (sources)	1. "Digital Control System Analysis and Design" by Philips & Nagle. 2. "Modern Control Engineering" by K. Ogata (5th Edition). 3. "Digital Control of Dynamic System" by Franklin & Powell & Workman (3th edition) 4. "Linear Control system Analysis and Design" by D'Azzo & Houpis (5th Edition). 5. "Computer-controlled System theory and Design" by Astrom & wittenmark (3th edition)
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	