

**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: **28/3/2024**

File Completion Date: **28/3/2024**

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 / Third		Engineering Measurements	theoretical	practical
2023-2024 / fourth stage	MTE444	Fundamentals of Robotics	2	1
			30	30

8. Expected learning outcomes of the program

Knowledge

Learning Outcomes 1	<ul style="list-style-type: none">a) Introduction, background, and robot types, Drive technology, robot classification, motion control.b) Number of axis, speed and capacity, operating environment.c) Fundamentals of rotation, composite rotation, homogenous coordinate, translation and rotation, screw transformation.d) Direct Kinematics parameters, normal, sliding and approach vectors. Denavit Hartenberg D–H representation. Robotic arm matrix, arm equations.e) Study Five axis articulated robot (Rhino robot), link coordinate diagram, joint coupling. Four SCARA robot robotic arm matrix. Six axis articulated robot, coordinate diagram, arm Matrix..
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Skills

Learning Outcomes 2	<ul style="list-style-type: none">a) Good knowledge of the principles of robotics and related sciences.b) Technical ability in experiment of work and monitoring and control Robotic system
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Ethics

Learning Outcomes 3	<ul style="list-style-type: none">a) Commitment to the ethics of the university institution.b) Receiving information and cognitive receptivity
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9. Teaching and Learning Strategies

- 1– Classroom education through theoretical lectures
- 2– Learning through and practical lectures
- 3– Preparing scientific reports and research.

10. Evaluation methods

Mid–term exam, Quizzes, class and home assignments, lab reports and seminars.

11. Faculty

Faculty Members						
Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Asst. Prof.	Mechanical Engineering	Laser Applications– Mechanical Engineering			yes	
Doctor	Mechatronics	Robotics			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
<ul style="list-style-type: none"> • Textbooks prescribed by the Ministry of Higher Education and Scientific Research • External scientific sources • Robot Modeling and Control by (Mark W. Spong, Seth Hutchinson, and M. Vidyasagar). • Fundamentals of Robotics Analysis and Control (Robert J. Schilling). • Introduction of Robotics Mechanics and Control (John J. Craig)

14. Program Development Plan
<ul style="list-style-type: none"> • Staying updated with the latest developments in the Robotics field

- Using modern technologies in teaching which have the potential to transform teaching and learning by providing new ways to engage students, individualize instruction, and improve educational outcomes.

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
Third	MCT 321	Engineering Measurements	Basic	x				x				x			
2023-2024/Fourth	MTE444	Fundamentals of Robotics	Basic	√	√	√	√	√	√	√	√	√	√	√	√

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

Course Description Form

1. Course Name:					
Fundamentals of Robotics					
2. Course Code:					
MCT444					
3. Semester / Year:					
first semester / 2024					
4. Description Preparation Date:					
2024					
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: Dr. Ahmed Rahman Jasim Email:Ahmedalmusawi@uobaghdad.edu.iq					
8. Course Objectives					
Course Objectives		To understand the robotic Kinematics. To explain robotic arm design and control equation Describes path planning and trajectory			
9. Teaching and Learning Strategies					
Strategy		Describes path planning and trajectory			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1 1	2 2		- Introduction, background, and robot types, Drive technology, robot classification, motion control. Number of axis, speed and capacity, operating environment. - Fundamentals of rotation, composite rotation,		
2 2	2 2				
3 3	2 2				

4	2		homogenous coordinate, translation and rotation, screw transformation		
4	2		Direct Kinematics parameters, normal, sliding and approach vectors.		
5	2		Denavit Hartenberg D-H representatio		
5	2		Robotic arm matrix, arm equations.		
6	2		Six axis articulated robot , link coordinate diagram, joint coupling.		
6	2		Four SCARA robot robotic arm matrix.		
7	2		axis articulated robot, coordinate diagram, arm Matrix.		
7	2		Inverse Kinematics, solving of robotic arm equation, inverse kinematics problem, tool configuration		
8	2		Singularity		
8	2		Workspace analysis and traject		
10	2		planning, work envelope of five axis articula		
10	2		robot, work envelope of a SCARA robot		
11	2		Workspace fixtures, part feeder		
11	2		, conveyers and Carousels, Fixed tool,		
12	2		The Pick and Place Operation, pick and lift – off point, place and set-down point,		
12	2		Continuous path motion, Trajectory,		
13	2		continuous path control of six axis, continuous path control of four axis		
13	2		Interpolated motion, cubic polynomial parts, linear interpolation and blends.		
14	2		Straight line motion.		
14	2				
15	4				

11. Course Evaluation

Mid-term exam, Quizzes, class and home assignments, lab reports and seminars

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)

N/A

Main references (sources)

Recommended books and references (scientific journals, reports...)

- - Robot Modeling and Control by (Mark W. Spong, Seth Hutchinson, and M. Vidyasagar).
- Fundamentals of Robotics Analysis and Control (Robert J. Schilling).
- Introduction of Robotics Mechanics and Control (John J. Craig)

Electronic References, Websites