




*Republic of Iraq  
Ministry of Higher Education & Scientific Research  
Supervision and Scientific Evaluation Directorate  
Quality Assurance and Academic Accreditation  
International Accreditation Dept.*

## *Academic Program Specification Form for The Academic Year 2020-2021*

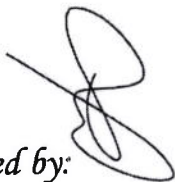
*University: University of Technology  
College: Mechanical Engineering Department – Airconditioning Branch  
Number Of Departments in The College: 5 Departments  
Date Of Form Completion: 1/7/2020*

  
Dean's Name  
*Asst. Prof. Dr. Moayed R.  
Hassan*  
Date: 1/9/2020  
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Dean's Assistant for  
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Date: 1/9/2020  
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The Head of the Branch Name:  
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Date: 15/9/2020

# TEMPLATE FOR PROGRAMME SPECIFICATION

## HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

### PROGRAMME SPECIFICATION

This Program Specification provides a concise summary of the main features of the program and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the program.

1. Teaching Institution	University Of Technology
2. University Department/Centre	Mechanical Engineering Department
3. Program Title	Air-conditioning & Refrigeration Engineering
4. Title of Final Award	B.Sc. in Mechanical engineering / Air-conditioning & Refrigeration
5. Modes of Attendance offered	Semesters
6. Accreditation	none
7. Other external influences	none
8. Date of production/revision of this specification	1/7/2020
9. Aims of the Program	
1. Preparing engineering staff specialized in Air-conditioning & Refrigeration engineering, which has the responsibility to study the needs of the country in the development and progress and able to meet the needs of the labor market in the state institutions and industry sectors. In addition, prepare an educated generation armed with science and adopted to sound basis to bring about radical changes to put scientific knowledge and	

scientific method of thinking and analysis in the service of the goals of the country proficient in follow-up post-graduate studies. Moreover, adapt to the evolution of technology in order to keep pace with the expansion of humanitarian needs.

2. To prepare a Future scientific leaders in Air-conditioning & Refrigeration engineering and work to strengthen the position of the University of Technology in general and the Department of Mechanical Engineering in particular as pioneer in this area.

3. To make students focus and emphasize on strong foundations of scientific knowledge and especially the mechanical engineering and the constant quest for their support in various areas to make them able to solve problems. Development of communication skills necessary for the mechanical engineering and provision of quality services to the community in various aspects because they are the products of the department and the university community and the fundamental article of sustainable development. They directed to choose the best means to expand their activities and deepening scientific and professional specialties.

4. The balance in emphasis between the principles of mechanical engineering in theory and application. Work to provide students with the tools and means of analytical, experimental and computational methodologies to identify engineering problems, formulate, and solve them. Focus on the introduction of modern methods in the learning system that increases the students' ability to design, creativity and innovation. The provision of self-education and continuing education for the community and the dissemination of knowledge engineering in public and private sectors through short courses, workshops, seminars, conferences, counseling and lectures. Upgrading of Graduate Studies and the provision of various accessories and commensurate with the needs of the country. Work to connect the graduate needs to progress sustainable development plan for the country and respond to them and to develop solutions appropriate for applied scientific problems that the industrial sector suffered from, or the development of proposals and controls for them.

5. Provide a suitable academic atmosphere for study and research to contribute to finding solutions to engineering problems using proper techniques and appropriate addition to the active contribution to a deeper and closer relationship with the university community through the implementation of business advisory, and training and development of the faculty members and administrators.

## 10. Learning Outcomes, Teaching, Learning and Assessment Methods

### A. Knowledge and Understanding

- A 1- Provide the mechanical engineering graduate with the ability to think critically and solve problems using resources and time management. Develop the ability to describe Air-conditioning & Refrigeration engineering concepts in scientific and engineering way and do the appropriate changes to it.
- A 2- The ability to engineering analysis and scientific thinking by applying the laws of science, mathematics , engineering and commitment to guidelines and instructions for any effective regulatory framework and to manage the implementation of the project or face the engineering problem and solve , evaluate and submit a proposal or plan for it.
- A 3- The student should be able to speak and write influential in a scientific and engineering manner in both Arabic and English languages.
- A 4- To stick to the ethics of the practice of the profession and the ability to demonstrate professionalism in addition to high- profile commitment to the appearance and behavior.
- A 5- To be aware of International Mechanical Engineering standards and to be able to guess the needs of the market and the application of the concepts of quality management in the engineering work and acquired skills in information technology.
- A 6 - To be interested in protecting the environment from pollution from factory waste, industry and others.

#### B. Subject-specific skills

- B 1 -The ability to apply the techniques of mechanical engineering, taking into account the constraints of industry and commerce.
- B 2 - Analyze engineering problems and put solution for them and the ability to propose suitable alternatives.
- B 3 - Scientific inquiry and evaluation.
- B 4 – Creative engineering discussions and opinion.

#### Teaching and Learning Methods

There are several methods of teaching and learning used in the Air-conditioning & Refrigeration engineering branch. The most important of these methods are: - (theoretical and practical lecture, discussions and dialogues, field visits, seminars for specific topics, students theoretical and practical researches library activities), which help students to access to the following results: -

- 1 - Engineering capability to discriminate between correct information and wrong information.
- 2 - Easy drafting of scientific and ease of debugging.
- 3 - Ability to save and guess.
- 4 - The ability to link the concepts and principles of engineering and instructions.

5 - The ability to recall, communicate and interpreted.

#### Assessment methods

- ❖ Engineering projects and seminars.
- ❖ Scientific discussions, oral dialogues, term and final exams.
- ❖ Homework.
- ❖ Practical activities and case studies.
- ❖ Writing and submitting reports and take notes about what completes the acquisition of engineering expertise in the field visits.
- ❖ Achievement tests to determine the level of the learner to gain information and skills in academic subject that had previously learned from his answers questions and paragraphs that represent the subject content.

#### C. Thinking Skills

- C1- Presentation of engineering or design problems. In addition, to think of possible solutions or developments.
- C2- To encourage the development of thoughtful engineering students in remembering and guessing and stimulating critical thinking before remembering.
- C3- To develop research skills using Internet to expand the horizon of knowledge.
- C4- Use brainstorming to bring out creative ideas some talented students.

#### Teaching and Learning Methods

The ability of the student to analysis, the application and order of knowledge to be able to impose the assumptions and interpretation along with description of solutions.  
The ability for deep and simple learning, to explore knowledge and focus on the application of knowledge to solve the existed problems.  
Put in mind that testing increases the stimulation of the student to study and not a sort of punishment.

#### Assessment methods

We have adopted methods and assessment tools to student learning with high quality. and that in order to maintain the quality of graduates and the scientific reputation of the branch and department, reflected in the university regulations and the requirements of continuous assessment of the students, that there are several types of assessment methods in order to ensure the quality of graduates, which constitutes the final output of the educational process. The most important methods of evaluation are:

- A - objective tests to measure knowledge of the Engineering facts, absorb and apply the scientific knowledge in new habitats and measure and remember that by the following: -
  - True and false questions.
  - Multiple choice questions.
  - Matching items.

- Completion.

B - Engineering tests concerning the following matters : -

- Remember data.

- Understand the scientific material and engineering principles.

- The ability to call connectivity and interpretation.

- The application of knowledge in a simple interpretation of the data, diagnostics and problem solving which is done by the following: -

Communication tests / open questions : -

- Questions that have a definite answers.

- Questions that have indefinite answers.

Which are based on stimulating the student to: -

- have the for free answers.

- Possess skill in organization.

- Possess skill in arranging ideas.

- Do not cheat and stand against.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1 - Communication skills, information technology and develop strategies to work in a team.

D2- The tendency of cooperation and teamwork

D3- Having linguistic skills (speaking and writing proficiency and understanding in Arabic and English) in the art of persuasion, the art of listening and dialogue.

D4- Possession of leadership qualities, the power of memory, the speed of intuitive discernment, the ability to predict and induction.

Teaching and Learning Methods

Done by testing students in theory and oral, classroom, home and laboratory activities / inform them of the experiences of the prior. Preview the problem, issue by video or workshop and request student ideas to process, or improve their performance. Develop and encourage them to take notes and compare Scheduled For example:

Case studies (Graduation Project) in the description includes the scientific facts about engineering problems and students asked to analyze some of the information, and diagnose the problem and describe the mathematical solution.

Encourage the student to answer and for more study.

Assessment Methods

Stated in the previous assessment methods.

<b>6. Program Structure</b>				<b>7. Awards and Credits</b>
<b>Level/ Year</b>	<b>Course or Module Code</b>	<b>Course or Module Title</b>	<b>Credit rating</b>	
<b>The first year</b>	ME111-1	Human Rights and Democracy	1	<b>Bachelor Degree Requires (151) credits</b>
	ME122-1	Programming I	2	
	ME123-1	Mathematics I	2	
	ME134-1	Eng. Drawing and Descriptive Geometry	3	
	ME145-1	Workshops I	-	
	ME136-1	Thermodynamics I	3	
	ME137-1	Engineering Mechanics I	3	
	ME111-2	Technical English Language	2	
	ME132-2	Electrical Engineering	3	
	ME123-2	Mathematics II	2	
	ME134-2	Materials Science and Technology	3	
	ME145-2	Workshops II	-	
	ME136-2	Thermodynamics II	2	
	ME137-2	Engineering Mechanics II	3	
	ME138-2	Engineering Drawing	2	
<b>The second year</b>	ME221-1	Mathematics III	2	
	ME232-1	Mechanical Drawing and CAD	4	
	ME243-1	Strength of Materials I	3	
	ME244-1	Fluid Mechanics I	3	
	ME265-1	Thermodynamics III	3	

	ME236-1	Manufacturing Processes	3	
	ME267-1	Engineering Mechanics III	3	
	ME221-2	Engineering Analysis	2	
	ME222-2	Programming II	2	
	ME243-2	Strength of Materials II	3	
	ME244-2	Fluid Mechanics II	3	
	ME265-2	Air-conditioning I	4	
	ME266-2	Instrumentation	3	
	ME267-2	Electrical and Electronic Technology	3	
<b>The third year</b>	ME341-1	Heat Transfer I	3	
	ME342-1	Theory of Machines I	3	
	ME343-1	Mechanical Design I	3	
	ME344-1	Fluid Mechanics III	3	
	ME365-1	Air-Conditioning II	3	
	ME336-1	Industrial Engineering	2	
	ME327-1	Numerical Analysis	3	
	ME341-2	Heat Transfer II	3	
	ME342-2	Theory of Machines II	3	
	ME343-2	Mechanical Design II	3	
	ME344-2	Fluid Mechanics IV	3	
	ME365-2	Refrigeration	3	
	ME366-2	Equipment Technology I	3	
	ME367-2	Computer Aided Design	2	
<b>The fourth year</b>	ME461-1	Air-Conditioning Systems Design I	3	
	ME462-1	Refrigeration Systems	3	



	ME463-1	Equipment Technology II	3
	ME464-1	Energy Conservation	3
	ME435-1	Automatic Control	3
	ME426-1	Computer Aided Engineering	2
	ME447-1	Project I	2
	ME461-2	Air-Conditioning Systems Design II	3
	ME462-2	Renewable Energies	3
	ME463-2	Equipment Technology III	3
	ME464-2	Food Preservation Engineering	2
	ME465-2	Control of A/C and Refrigeration Systems	3
	ME466-2	Vibrations and Noise	4
	ME447-2	Project II	2

## 8. Personal Development Planning

Generally, the Mechanical engineering department and especially the Air-conditioning & Refrigeration engineering branch concentrate on continuous improvement. The department always look forward to improve the scientific and administrative path and to put down all the difficulties and obstacles that hinder the educational program through the development of human resources for personal development.

The following steps outline the procedures implemented or are in the process of implementation in this area:

1. Improvement and continuous development of faculty members through training programs and workshops inside and outside the department, the university and the country.
2. Increase extra-curricular activities such as conferences and scientific symposia and personal creations and sports locally, regionally and internationally.
3. Encourage faculty members to get the highest-ranking in scientific and administrative fields.
4. Provide Sources and modern scientific books for the library section to keep up with the rapid progress in the engineering sciences.

5. Provide software specialist in mechanical engineering and computers to do so with Internet connections to all faculty.

## **9. Admission criteria.**

The Mechanical Engineering Department subjected to the mechanism of action of the Ministry of Higher Education and Scientific Research - Admission Central, where secondary school graduates of the applied science and bio sections nominated for admission to the department based on graduation rates. In addition to the department accepts some of the students with the top ten grades of technical institutes and others from five percent of the first professional studies and some of the distinguished staff of the Ministries of the State. Students enrolled into branches of the Department of Mechanical Engineering based on the graduation rates of the secondary school. A percentage of the top students in the first term allowed to choose their desired branch.

## **10. Key sources of information about the program**

- ❖ Curriculum approved by the Ministry of Higher Education and Scientific Research, and the guiding evidence.
- ❖ Decisions and recommendations of the scientific committees in the University of Technology and Mechanical Engineering Department.
- ❖ Courses in teaching methods.
- ❖ Courses in civil society organizations.
- ❖ Research on the Internet for similar experiences.
- ❖ Personal experiences.

## Curriculum Skills Map

Please tick in the relevant boxes where individual program learning outcomes are being assessed

				program learning outcomes																		
Year / Level	Course Code	Course Title	Core (C) Title	Knowledge and understanding						Subject-specific skills				Thinking Skills				General and transferable Skills (or) Other skills relevant to employability and personal development				
				A1	A2	A3	A4	A5	A6	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4	
The first year	ME111-1	Human Rights and Democracy	(C)				√															
	ME122-1	Programming I	(C)		√			√				√			√			√				
	ME123-1	Mathematics I	(C)	√	√						√				√							
	ME134-1	Eng. Drawing and Descriptive Geometry	(C)	√							√				√							
	ME145-1	Workshops I	(C)	√					√	√	√			√					√			
	ME136-1	Thermodynamics I	(C)	√	√						√											
	ME137-1	Engineering Mechanics I	(C)	√	√						√	√		√								
	ME111-2	Technical English Language	(C)			√																
	ME132-2	Electrical Engineering	(C)	√	√						√											
	ME123-2	Mathematics II	(C)	√	√						√				√							

	ME134-2	Materials Science and Technology	(C)	√	√					√	√				√					
	ME145-2	Workshops II	(C)	√				√	√	√			√					√		
	ME136-2	Thermodynamics II	(C)	√	√					√										
	ME137-2	Engineering Mechanics II	(C)	√	√					√	√		√							
	ME138-2	Engineering Drawing	(C)	√						√				√						
<b>The second year</b>	ME221-1	Mathematics III	(C)	√	√					√				√						
	ME232-1	Mechanical Drawing and CAD	(C)	√						√				√						
	ME243-1	Strength of Materials I	(C)	√	√	√		√		√			√			√				
	ME244-1	Fluid Mechanics I	(C)	√	√					√					√					
	ME265-1	Thermodynamics III	(C)	√	√					√										
	ME236-1	Manufacturing Processes	(C)	√	√			√		√		√	√							
	ME267-1	Engineering Mechanics III	(C)	√	√					√	√		√							
	ME221-2	Engineering Analysis	(C)	√	√					√				√						
	ME222-2	Programming II	(C)		√			√			√			√				√		
	ME243-2	Strength of Materials II	(C)	√	√	√		√		√			√			√				
	ME244-2	Fluid Mechanics II	(C)	√	√					√					√					
	ME265-2	Air-conditioning I	(C)	√	√			√		√										
	ME266-2	Instrumentation	(C)	√	√					√	√			√						

<b>The third year</b>	ME267-2	<b>Electrical and Electronic Technology</b>	<b>(C)</b>	√	√						√											
	ME341-1	<b>Heat Transfer I</b>	<b>(C)</b>	√	√						√		√		√							
	ME342-1	<b>Theory of Machines I</b>	<b>(C)</b>	√	√						√						√					
	ME343-1	<b>Mechanical Design I</b>	<b>(C)</b>		√	√	√			√	√	√		√	√	√	√			√		
	ME344-1	<b>Fluid Mechanics III</b>	<b>(C)</b>	√	√						√					√						
	ME365-1	<b>Air-Conditioning II</b>	<b>(C)</b>	√	√			√			√											
	ME336-1	<b>Industrial Engineering</b>	<b>(C)</b>	√	√			√			√	√				√						
	ME327-1	<b>Numerical Analysis</b>	<b>(C)</b>	√	√						√				√							
	ME341-2	<b>Heat Transfer II</b>	<b>(C)</b>	√	√						√		√		√							
	ME342-2	<b>Theory of Machines II</b>	<b>(C)</b>	√	√						√						√					
	ME343-2	<b>Mechanical Design II</b>	<b>(C)</b>		√	√	√			√	√	√		√	√	√	√			√		
	ME344-2	<b>Fluid Mechanics IV</b>	<b>(C)</b>	√	√						√					√						
	ME365-2	<b>Refrigeration</b>	<b>(C)</b>	√	√			√			√	√		√								
	ME366-2	<b>Equipment Technology I</b>	<b>(C)</b>	√	√						√		√			√						
	ME367-2	<b>Computer Aided Design</b>	<b>(C)</b>	√	√			√		√	√		√	√				√				

<b>The fourth year</b>	ME461-1	<b>Air-Conditioning Systems Design I</b>	<b>(C)</b>	√	√						√	√		√			√	√				
	ME462-1	<b>Refrigeration Systems</b>	<b>(C)</b>	√	√			√			√	√		√								
	ME463-1	<b>Equipment Technology II</b>	<b>(C)</b>	√	√			√			√	√		√	√				√			
	ME464-1	<b>Energy Conservation</b>	<b>(C)</b>	√	√						√	√	√	√								
	ME435-1	<b>Automatic Control</b>	<b>(C)</b>	√	√						√	√		√								
	ME426-1	<b>Computer Aided Engineering</b>	<b>(C)</b>	√	√						√	√		√	√							
	ME447-1	<b>Project I</b>	<b>(C)</b>	√	√	√		√		√	√	√	√	√	√	√	√	√	√	√		
	ME461-2	<b>Air-Conditioning Systems Design II</b>	<b>(C)</b>	√	√						√	√		√				√	√			
	ME462-2	<b>Renewable Energies</b>	<b>(C)</b>	√	√						√	√	√	√								
	ME463-2	<b>Equipment Technology III</b>	<b>(C)</b>	√	√			√			√	√		√	√				√			
	ME464-2	<b>Food Preservation Engineering</b>	<b>(C)</b>	√	√			√			√	√		√								
	ME465-2	<b>Control of A/C and Refrigeration Systems</b>	<b>(C)</b>	√	√						√	√		√								
	ME466-2	<b>Vibrations and Noise</b>	<b>(C)</b>	√	√						√	√	√	√	√							
	ME447-2	<b>Project II</b>	<b>(C)</b>	√	√	√		√		√	√	√	√	√	√	√	√	√	√	√	√	