

Academic Program MSc Air conditioning and Refrigeration

Academic Program Specification for Doctor of Philosophy of Science in Mechanical Engineering

1. Educational Institution:	University of Technology
2. University Department/Center:	Mechanical Engineering Department
3. Academic Program Name:	MSc in Air conditioning and Refrigeration
4. Final Degree Name:	MSc of Science in Mechanical Engineering / Air conditioning and Refrigeration
5. Study System: Yearly/Courses/Others:	Semester
6. Accredited Accreditation Program:	None
7. Other External Influences:	None
8. Date of Preparation of The Description:	12/5/2024

9. Academic Program Objectives

1. Prepare highly skilled engineering professionals in the field of Air conditioning and Refrigeration engineering who are capable of addressing the country's developmental needs, meeting the demands of the labor market in state institutions and industrial sectors, and fostering an educated generation that can bring about transformative changes by leveraging scientific knowledge and methods to serve the country's goals. These professionals should be adaptable to technological advancements to keep pace with the expanding human needs.
2. Cultivate a new generation of engineers with MSc degrees, nurturing future scientific leaders in the field of Air conditioning and Refrigeration engineering, and striving to strengthen the position of the University of Technology, particularly the Department of Mechanical Engineering.
3. Focus on postgraduate students and build their strong foundations in scientific knowledge, especially in mechanical engineering. Equip them with problem-solving abilities and the necessary skills to excel in mechanical engineering, enabling them to provide high-quality services to the community in various aspects. As the product of the department and the university, these students are the key to sustainable development. Guide them in selecting the most effective research tools to expand their activities and deepen their scientific, research, and professional specializations.
4. Strike a balance between the theoretical and applied principles of mechanical engineering, and provide students with analytical, experimental, computational, and methodological tools to identify, mathematically model, and solve engineering problems. Introduce modern methods into the learning system to enhance students' creativity and innovation capabilities. Elevate the level of studies and ensure the availability of various requirements in proportion to the country's needs. Align postgraduate studies with the country's sustainable development plan, develop appropriate applied scientific solutions to the problems faced by the industrial sector, and propose necessary controls and recommendations.
5. Create an advanced academic environment conducive to study and research, contributing to the development of solutions for engineering problems using appropriate techniques. Actively engage in

deepening and documenting the university's relationship with society through the implementation of advisory work, training, and development of teaching and administrative staff.

10. Required Program Outputs and Methods of Teaching, Learning and Assessment.

A- Knowledge goals

A1- A graduate of a MSc degree in mechanical engineering with a specialization in Air conditioning and Refrigeration possesses the ability to think critically and independently, solve problems, manage resources and time effectively, and describe the Air conditioning and Refrigeration specialization and its concepts in a scientific and engineering manner. They should also be capable of making appropriate changes to adapt to evolving circumstances.

A2- The graduate should demonstrate the ability to analyze engineering and scientific problems by applying basic and advanced laws in science, mathematics, and engineering. They should adhere to guidelines and instructions within the organizational and administrative framework when implementing a project or addressing an engineering problem. This includes solving, evaluating, submitting proposals or plans, and reformulating, translating, or interpreting information as necessary.

A3- The student should possess effective scientific and engineering communication skills, both verbal and written, in Arabic and English.

A4- The graduate should strictly adhere to professional ethics and demonstrate high research and professional competence. They should also maintain a commitment to personal appearance and appropriate behavior.

A5- The graduate should be well-versed in international mechanical engineering standards, capable of assessing market needs, and applying quality management concepts in engineering work. They should also acquire and utilize relevant information technology skills.

A6- The graduate should be dedicated to protecting the environment from pollution caused by factories, industry, and other waste sources. They should actively seek ways to minimize the environmental impact of engineering activities and promote sustainable practices.

B - Skills objectives of the program

B1 - Demonstrate the ability to apply mechanical engineering techniques to Air conditioning and Refrigeration, taking into consideration the industrial and commercial constraints. This includes adapting and optimizing engineering solutions to meet the specific needs and limitations of the industry and market.

B2 - Possess the skills to analyze complex engineering problems and develop effective solutions. This involves breaking down the problem into its constituent parts, identifying the key factors and constraints, and using critical thinking and problem-solving strategies to generate appropriate alternatives. The graduate should be able to evaluate the merits and drawbacks of each alternative and recommend the most suitable solution based on the given criteria.

B3 - Conduct scientific investigations and evaluations using rigorous research methods and analytical tools. This includes formulating research questions, designing experiments, collecting and analyzing data, and interpreting the results. The graduate should be able to critically assess the validity and reliability of the findings and draw evidence-based conclusions.

B4 - Engage in constructive engineering discussions and provide well-informed opinions. This involves actively participating in technical dialogues, presenting ideas and arguments clearly and persuasively, and respecting diverse viewpoints. The graduate should be able to communicate their expertise effectively to both technical and non-technical audiences, and contribute to the exchange of knowledge and best practices within the engineering community.

11 - Teaching and Learning Methods

The MSc stage in Air conditioning and Refrigeration employs various teaching and learning methods, including theoretical and practical lectures, discussions, seminars, research projects, and office activities. These methods help students develop the following skills:

- Distinguishing between correct and incorrect information
- Formulating and correcting scientific ideas with ease
- Memorizing and making informed guesses
- Linking engineering concepts, principles, and instructions
- Recalling, linking, and interpreting information

These skills enable students to think critically, solve problems, conduct research, and apply their knowledge effectively in the field of Air conditioning and Refrigeration.

12 - Evaluation methods

- Engineering projects and seminars: Students engage in hands-on projects and participate in seminars to apply their knowledge and share their findings.
- Scientific debate, oral dialogue, quarterly and final exams: Students participate in discussions, defend their ideas, and demonstrate their understanding through various assessment methods.
- Homework: Assignments help students reinforce their learning and develop independent problem-solving skills.
- Practical activities and case studies: Real-world examples and practical exercises allow students to apply their knowledge to realistic scenarios.
- Writing and submitting reports and taking notes on engineering experiences gained in field visits: Students document their observations and insights from field trips, enhancing their understanding of Air conditioning and Refrigeration in practice.
- Achievement tests: Assessments evaluate students' mastery of course content and skills through questions and problems that cover the subject matter.

These activities and assessments provide a comprehensive approach to learning, enabling students to acquire and apply knowledge effectively in the field of Air conditioning and Refrigeration.