



THE AMERICAN UNIVERSITY IN CAIRO

School of Sciences and Engineering

Department of Mechanical Engineering

**UNDERGRADUATE
MECHANICAL ENGINEERING
PROGRAM**

Bachelor of Science in Mechanical Engineering with Concentrations in Design,
Industrial Engineering, Materials & Manufacturing, Mechatronics and Power



Mechanical engineering involves the application of scientific knowledge for the design and manufacturing of devices and mechanical systems that use or transfer mechanical and thermal energies. The mechanical engineer should strive both to serve the needs of society without unduly damaging the environment and to produce devices and systems that use energy and material resources efficiently.

Mission

As part of AUC, the mission of the mechanical engineering department is to provide a high-quality engineering education within a liberal arts environment. The pursuit of excellence is central to the department's mission, in addition to maintaining high standards of academic achievement, professional behavior and ethical conduct. The primary objective of the program is to equip the students with a strong technical foundation and to expose them to the latest technologies and developments in this broad and challenging field.

Goals

The mechanical engineering program prepares students for entry-level professional practice in the mechanical engineering discipline, both locally and internationally. The program instills in students the desire for lifelong learning that enhances professional growth throughout their careers.

Objectives

The objectives of the mechanical engineering program are to:

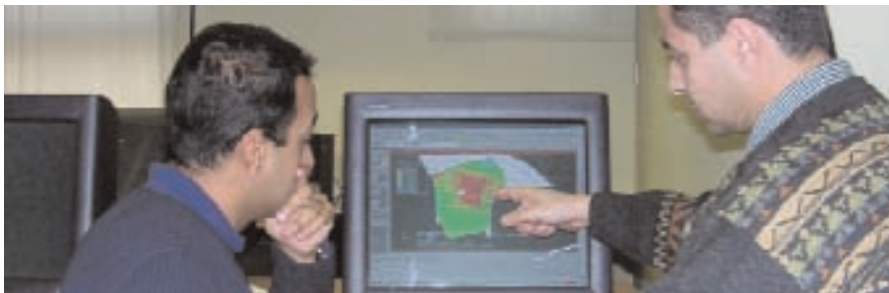
1. Graduate students who have a background in mathematics, basic sciences and engineering sciences, appropriate for mechanical engineering.
2. Introduce students to a broad spectrum of mechanical engineering topics, with concentration in one or more areas of their choice.
3. Develop students' understanding of the context in which mechanical engineering is practiced, locally and globally, including economic and business practices, societal needs, and considerations of public health, safety, environment, culture and ethics.
4. Develop students' abilities to adapt to the ever-evolving engineering tools, including modern computational and experimental methods, throughout a lifelong mechanical engineering profession.
5. Develop students' abilities to solve unstructured engineering problems, think critically, function well in a team and communicate effectively.

Academic Offerings

The Department of Mechanical Engineering offers a Bachelor of Science in mechanical engineering with concentrations in one or more of the following fields.

Power: The power concentration provides the engineering background for optimum use of energy resources, calculation of energy loads, design, selection, and integration of conventional and non-conventional energy systems and components.





Design: The design concentration provides mechanical engineering graduates with additional skills for career success in modeling, analyzing and designing mechanical components and systems using the latest engineering tools. This is accomplished with special courses in finite element analysis, automatic control, robotics, vibrations, systems design and analysis, and integrated design. These courses are supported by state-of-the-art computer software and hardware, in addition to advanced lab facilities.

Industrial Engineering: Industrial engineering is concerned with the analysis, design, improvement, installation and management of integrated systems of people, finances, materials, equipment, energy and information. It draws upon specialized knowledge and skill in the mathematical, physical, physiological and social sciences, together with the principles and methods of engineering analysis and design to specify, predict, evaluate and optimize the outputs of such systems.

Materials and Manufacturing: In materials and manufacturing, students study the fundamentals and practices of engineering materials and their fabrication techniques including state-of-the-art concepts. They learn the interrelationships between the material's performance, its properties, its structure and how it is processed. The concentration courses are regularly updated to reflect recent advances and developments in the field; for example, courses on nanostructured materials, semiconductors and microelectromechanical devices (MEMS) have recently been added to the concentration courses. Graduates of this concentration are equipped with the skills to engineer the structure of a material by controlling its composition, treatment and manufacturing in order to meet the design specifications and achieve the desired levels of performance.

Mechatronics: Mechatronics is an interdisciplinary and intelligent engineering paradigm that synergizes modern engineering sciences and technologies and concentrates on achieving optimum functional synergy from the earliest conceptual stages of the design process. Mechatronics successfully fuses mechanical engineering, electronics, control systems, software engineering, sensors and artificial perception, intelligent systems, intelligent computer control, modeling, system engineering, etc. The mechanical engineer of tomorrow needs to have the interdisciplinary knowledge of modeling and automatic control, sensor technology and intelligence, microprocessor and microcontrollers, software engineering, etc. A mechanical engineer with a mechatronics background can lead interdisciplinary teams and contribute to the development of new high-tech products and processes.

Admission Requirements

Students are admitted to the mechanical engineering program either upon admission to AUC or after successful completion of criteria courses. High-school students with a mathematics or

science background are accepted depending on their high-school grades and the available space in the program. Undeclared and transfer students are admitted to the program upon completing criteria courses. Students are accepted based on their GPA and on available space in the department.

Graduation Requirements

In order to fulfill its mission and objectives, mechanical engineering is designed as a five-year program. A total of 162 credits are required for the Bachelor of Science in mechanical engineering, which are divided into the following categories:

Core Curriculum	30 - 42 credits
Engineering Core Requirements	52 credits
Concentration Requirements	50 credits
Concentration Electives	21 credits
General Electives	0 - 9 credits

Facilities and Specialized Laboratories

The mechanical engineering curriculum is served by well-equipped laboratories of the science departments, in addition to the specialized mechanical engineering laboratories that include:

- Automated Manufacturing Systems Lab
- Automatic Control and Mechanical Vibrations Lab
- CAD and Drafting Labs
- Heat Transfer, Fluid Mechanics and Thermodynamics Labs
- Materials Processing and Testing Labs
- Powder Metallurgy, Metallography and Polymers Labs
- Quality Control Lab
- Scanning and Rapid Prototyping Lab
- Mechanical Workshop
- Solar and Alternative Energy Labs

The AUC Library collection fully supports the program, with materials ranging from recently published textbooks and references to current issues of relevant journals. The library has enormous electronics resources. Students can access the library collection on or off campus.

Extracurricular Activities

Students participate in many extracurricular activities throughout their years of study. They are encouraged to become active members of local and international professional societies and to establish links with industry at all levels.



Mechanical Engineering Club

It is a student activity that serves mechanical engineering students. The goal of the club is to improve different aspects of the students' scientific, technical and cultural backgrounds.

Prospective Jobs

AUC's mechanical engineering graduates are hired by multinational and national companies in the areas of petroleum, food, automobile, steel and cement industries, and home appliances.

Many graduates opt to work in research and development, as well as academic careers nationally and internationally.

Faculty

Al Agha, Salah; professor; PhD 2000, Purdue University
 Aly, Mohamed; associate professor; PhD 2006, McMaster University
 Arafa, Mustafa; professor; PhD 2002, University of Maryland
 El Hagggar, Salah; professor; PhD 1983, Washington State University
 El-Gabry, Lamyaa; associate professor; PhD 2003, Rensselaer Polytechnic Institute
 Elkhodary, Khalil; associate professor; PhD 2010, North Carolina State University
 El-Morsi, Mohamed, associate professor, PhD 2002, University of Wisconsin
 Esawi, Amal; professor; PhD 1995, University of Cambridge
 Fahmy, Sherif; associate professor; PhD 2009, University of Manitoba
 Farag, Mahmoud; professor; PhD 1965, Sheffield University
 Gaafar, Lotfi; professor; PhD 1992, Arizona State University
 Habib, Maki; professor; PhD 1990, Tsukuba University
 Mansour, Mohy; professor; PhD 1990, University of Sydney
 Nassef, Ashraf; professor; PhD 1996, McMaster University
 Salem, Hanadi; professor; PhD 1997, Texas A&M University
 Serag El Din, Mohamed Amr; professor; PhD 1977, Imperial College, London
 Serry, Mohamed; associate professor; PhD 2007, University of Toronto
 Shawki, Tarek; professor; PhD 1985, Brown University
 Younan, Maher; professor; PhD 1975, University of Tennessee
 Youssef, Mostafa; associate professor; PhD 2013, Massachusetts Institute of Technology

Research

Faculty are engaged in research in many areas including computational fluid dynamics, heat transfer, renewable energy, dynamics, vibrations, control, environmental engineering, industrial engineering, materials and process selection, design optimization, synthesis and processing of bulk nanostructured materials, metal and polymer matrix nanocomposites, thin films for wear resistant, high temperature and biomedical applications, nonlinear stress analysis, failure, finite element analysis and mechatronics.





Accreditation

- AUC is accredited in the United States by the Commission on Higher Education of the Middle States Association of Colleges and Schools.
- The Bachelor of Science in mechanical engineering is accredited in Egypt by the Supreme Council of Universities. Graduates of programs accredited by the council are eligible to register as professional engineers in the Egyptian Syndicate of Engineers.
- The mechanical engineering program is accredited by the Engineering Accreditation Commission of ABET (formerly known as the Accreditation Board for Engineering and Technology). The Web site is www.abet.org.

Why Join AUC's Mechanical Engineering Program?

- AUC provides a quality professional education that advances the ideals of American liberal arts and lifelong learning. As freedom of academic expression is fundamental to this effort, AUC encourages the free exchange of ideas and promotes open and ongoing interaction with scholarly institutions throughout Egypt and other parts of the world.
- The university environment is designed to advance proficient use of the tools of learning as well as students' thinking capabilities, language and personal skills.
- Students are trained by outstanding faculty who have PhDs from leading universities in the United States, Canada, Europe and Egypt.
- AUC has one of the best English-language libraries in the Middle East, equipped with state-of-the-art information access technologies.
- The campus includes up-to-date computer facilities and software, as well as well-equipped experimental laboratories in nearly every specialty.
- Students have access to a rich and diverse student life with a broad array of extracurricular activities.
- A new campus in New Cairo that is spacious, technologically advanced and environmentally sensitive offers world-class educational resources.

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