Thesis Option

Students in the thesis option must successfully complete the following requirements:

- three credits of required college core courses
- a minimum of 18 credits in elective courses
- a zero-credit seminar
- nine credits in Master's Thesis

Project Option

Students in the project option must successfully complete the following requirements:

- three credits of required college core courses
- a minimum of 24 credits in elective courses
- a zero-credit seminar
- three credits in Professional Project

Required Courses (12/6 credits)

College Core Courses (3 credits)

Students must successfully complete one of the following courses:

- NGN 500 Advanced Engineering Mathematics
- NGN 505 Random Variables and Stochastic Processes

In addition, all students must successfully complete a seminar course (MCE 695).

Master's Thesis/Professional Project (9/3 credits)

- MCE 698 Professional Project (3 credits—project option)
- MCE 699 Master's Thesis (9 credits—thesis option)

Elective Courses (minimum of 18/24 credits)

Students in the thesis option must successfully complete a minimum of 18 credits in elective courses. Students in the project option must successfully complete a minimum of 24 credits. Students can select elective courses from the following list:

- MCE 550 Mechanical Systems Design
- MCE 552 Modeling and Simulation of Mechanical Systems or
  MTR 530 Modeling and Simulation of Dynamic Systems
- MCE 553 Advanced Thermodynamics
- MCE 554 Advanced Fluid Dynamics
- MCE 594 special topic courses in mechanical engineering
- MCE 650 Advanced Dynamics
- MCE 651 Advanced Engineering Materials
- MCE 652 Advanced Topics in Manufacturing
- MCE 653 HVAC Systems Design
- MCE 655 Advanced Measurements and Design of Experiments
- MCE 694 special topic courses in mechanical engineering
- MCE 696 Independent Study in Mechanical Engineering

With the approval of their advisor and the program director, students in both options may elect to take one course outside the list of elective courses.

Master's Thesis/Professional Project

A student must complete his/her thesis/professional project under the direct supervision and guidance of a principal advisor. This principal advisor serves as the chair of the student's examining committee. The committee also includes two additional faculty members. For the thesis option, one of the additional faculty members must be selected from outside the program. The committee could also include one co-advisor or more.

A complete guide for forming the thesis/professional project committee and for preparing the thesis/professional project is given in the *Office of Graduate Studies Policies and Procedures* document available on iLearn and accessible using the following path: iLearn-Community-Office of Graduate Studies (OGS)-Office of Graduate Studies Policies & Procedures.

For registration details, please refer to Thesis, Final Project and Dissertation under Academic Policies and Regulations section of this catalog.

Master of Science in Mechatronics Engineering (MSMTR)

Lotfi Romdhane, Director

The Master of Science in Mechatronics Engineering (MSMTR) program is committed to being an international, multidisciplinary center of excellence in synergistic applications of the latest techniques in embedded systems, precision mechanical engineering, control theory, computer science and electronics through education, research and outreach. The technological gap between developing and industrialized nations continues to widen at an alarming rate, largely due to the lack of skilled engineers capable of integrating new technologies into existing systems and networks. The mandate of the mechatronics engineering program is to improve this situation by equipping engineers with the design, analysis and synthesis abilities to plan, implement and manage the latest technologies.

The curriculum of the mechatronics program meets the region's needs—both present and future—through the education of engineers and scientists.

Professional jobs considered to be in the mechatronics engineering field are grounded in the multidisciplinary aspects of electrical, mechanical, control, computer and software engineering. The unique skills of mechatronics graduates are becoming increasingly valuable to employers in a variety of areas, including modern industrial installations and systems, computer integrated manufacturing systems, maintenance diagnosis and troubleshooting, defense systems, vehicle design and manufacturing, robotics and many more.

The MSMTR graduate program provides students with state-of-the-art knowledge in their areas of specialization with practical strategies for adapting that knowledge to serve the specific needs of the region. Multidisciplinary engineers are needed now more than ever to meet the demand for a flexible engineering workforce to deal with highly integrated engineering systems.

Mission Statement

The Master of Science in Mechatronics Engineering at AUS is an interdisciplinary program that synergistically integrates advances in science and technology to prepare students for advanced research and applied systems engineering practices. The program hosts a research center equipped with world-class resources enabling hands-on teaching and advanced research, promoting entrepreneurial initiatives to assist students in becoming competent, innovative and responsible professionals.

Program Educational Objectives

Graduates of the MSMTR program will be prepared to:

- lead multidisciplinary projects, which apply the latest techniques for the design and development of smart systems
- provide employers with interdisciplinary skills necessary to utilize cutting-edge technology tools in the design, development, and implementation of modern engineering systems
- develop new technologies in the areas of cyber physical systems, and smart cities
- apply Mechatronics principles in the broad context of engineering system design and address the aspect of commercialization

- address open-ended problems and maintain an attitude of self-learning

Student Outcomes

Upon graduation, an AUS MSMTR graduate should demonstrate the ability to:

- apply advanced engineering tools necessary to identify, model and analyze mechatronics engineering problems
- formulate and propose alternative solutions that satisfy specific performance requirements of a mechatronics system
- design and implement a mechatronics component, process or system and assess its performance
- function effectively in multidisciplinary teams in a leadership role or as an active member
- act professionally and ethically
- recognize contemporary issues and their influence on technology advancement in a global and societal context
- engage in lifelong learning in engineering and related professional areas
- conduct research and development activities in mechatronics and related areas
- communicate effectively through technical presentations and documentations

Admission Requirements

In addition to meeting the university's general graduate admission requirements, applicants must hold a bachelor of science degree in engineering from an independently accredited university recognized by the UAE Ministry of Education's Higher Education Affairs Division and by AUS. Degreed individuals in fields closely related to engineering or a quantitative science may be considered on a case-by-case basis.

Degree Requirements

The formal program of study of the MSMTR program consists of a minimum of 30 credits with two options: the thesis option and the course option. Students must declare the option of their choice by submitting a formal study plan upon completion of 12 credits of approved MTR graduate courses.

To qualify for graduation with an MSMTR degree, students must successfully complete the requirements detailed hereafter with a minimum cumulative grade point average of 3.00.

Thesis Option

Students in the thesis option must successfully complete a minimum of 30 credits, as follows:

- 15 credits in core courses
- a minimum of six credits in elective courses
- nine credits in Master's Thesis

Course Option

Students in the course option must successfully complete a minimum of 30 credits, as follows:

- 15 credits in core courses
- a minimum of 15 credits in elective courses

Prerequisite Discipline-Bridging Course

Students admitted to the MSMTR program, with the exception of students with a Bachelor of Science in Mechatronics Engineering, are required to complete the prerequisite discipline-bridging course MTR 501 Introduction to Mechatronics.

The prerequisite discipline-bridging course does not generate credits toward the completion of the degree.

The prerequisite-discipline course could be waived by the Mechatronics Engineering Admissions Committee, depending on the student's background.

Waiver Policy

The prerequisite discipline-bridging course may be waived if the student has completed comparable course work at the undergraduate level. Students may be required to submit course documentation.

A waiver is only granted after an official, sealed transcript is received by the AUS Office of Enrollment Management/Graduate Admissions. The waiver must be established at the time of admission.

The following rules apply:

- Students may waive the prerequisite discipline-bridging course if similar undergraduate courses have been successfully completed at an accredited university.
- Students with professional experience that indicates mastery of the discipline-bridging course content may be granted a waiver.

Core Courses (15 credits)

Students must successfully complete the following courses:

- MTR 520 Embedded Systems for Mechatronics
- MTR 540 Advanced Control Systems
- MTR 550 Robotics Systems
- MTR 615 Artificial Intelligent Systems
- MTR 690 Mechatronics Design
- MTR 695 Mechatronics Seminar

Elective Courses (minimum of 6/15 credits)

Students in the thesis option must successfully complete a minimum of six credits from the following list of courses. Students in the course option must successfully complete a minimum of 15 credits:

- ELE 544 Advanced Signal Processing
- MTR 610 Automated Manufacturing Systems
- MTR 640 Nonlinear and Intelligent Control Systems
- MTR 644 Electric Drives for Mechatronics Systems
- MTR 645 Image Processing and Computer Vision
- MTR 650 Applied Linear Estimation
- MTR 694 special topic courses in mechatronics engineering
- MTR 696 Independent Study in Mechatronics Engineering
- NGN 500 Advanced Engineering Mathematics

Students in both the thesis option and the course option may elect to take one elective course outside the list of elective courses, with the approval of their advisor and the program director.

Master's Thesis

Students in the thesis option must complete a program of research culminating in a thesis, for at least nine credits, that contributes to a selected area of knowledge.

A student must complete his/her thesis under direct supervision and guidance of a principal advisor. This principal advisor will serve as the chair of the student's examining committee and is appointed no later than the end of the third semester of study in the program. The committee also includes two additional faculty members. One of the additional faculty members must be selected from outside the program. The committee could also include one or more co-advisor.

The thesis must be defended to the satisfaction of the thesis examining committee.

A complete guide for forming the thesis/professional project committee and for preparing the thesis, including the thesis proposal, thesis defense and deadlines, is given in the *Office of Graduate Studies Policies and*

Procedures document available on iLearn and accessible using the following path: iLearn-Community-Office of Graduate Studies (OGS)-Office of Graduate Studies Policies & Procedures.

For registration details, please refer to Thesis, Final Project and Dissertation under Academic Policies and Regulations section of this catalog.

Doctor of Philosophy in Engineering – Engineering Systems Management (PhD-ESM)

Mohamed BenDaya, Director

The PhD in Engineering - Engineering Systems Management (PhD-ESM) degree program addresses fundamental research problems of national and global importance for the 21st century centered on four concentration areas:

- Supply Chain Management
- Sustainable Construction Project Management
- Smart Cities Management
- Engineering Management

Program Mission Statement

The mission of the PhD-ESM degree program is to educate future researchers, practitioners, innovators and academics with cutting-edge knowledge, skills and abilities in engineering systems management that can be utilized in meeting societal needs and shaping contemporary market trends in the UAE, the region and globally.

Program Educational Objectives

Graduates of the PhD-ESM degree program will be prepared to:

- pursue successful academic, industry, and/or government careers
- conduct research independently in multidisciplinary areas
- apply technical knowledge for long-term sustainable and economic development
- act professionally and ethically when practicing of the principles of engineering systems management.

Student Outcomes

Upon graduation, an AUS PhD-ESM graduate should demonstrate the ability to:

- perform advanced research related to ESM areas
- assess economic, environmental, and societal impacts of engineering management systems
- formulate and solve complex technical problems using ESM tools and techniques
- manage highly complex ethical issues related to engineering systems management
- use advanced written and oral communications skills to present research outcomes and evaluate scholarly publications for diverse audiences.

Admission Requirements

In addition to meeting the university's general requirements for admission to PhD degree programs, applicants to the PhD-ESM degree program must meet the following program admission requirements:

- applicants must have completed a relevant Master of Science or Master of Engineering degree with a minimum CGPA of 3.30. Applicants with non-engineering master's degrees may be considered on a case-by-case basis
- applicants must submit an official Graduate Record Examination (GRE) score
- applicants must submit three letters of recommendation, a statement of purpose, and a current vitae/resume. At least two of the letters must be from an academic advisor/faculty familiar with the applicant's background.

Degree Requirements

To qualify for graduation with a PhD-ESM degree, students must successfully complete a minimum of 48 credits with a minimum cumulative GPA of 3.00, as follows:

- a minimum of 24 credits (eight courses) of required and elective coursework:
  - a minimum of six credits (two courses) of required courses
  - a minimum of 18 credits (six courses) of elective courses
  - A zero-credit seminar
- A minimum of 24 credits of research work (Dissertation)

The expected minimum duration for completion of the PhD-ESM degree program is four years. All graduation requirements must be completed within 10 years of admission to AUS as a doctoral student, inclusive of any leave.

Required courses

Students must successfully complete the following required courses:

- ESM 701 Research Methods
- ESM 702 Multivariate Data Analysis
- ESM 795 Doctoral Seminar
- ESM 799 Dissertation (for a minimum of 24 credits)

Elective Courses (minimum of 18 credits)

Students must successfully complete a minimum of six elective courses (for a minimum of 18 credits) selected from the following research areas. The electives courses must be approved by the program director.

Supply Chain Management Research Area

- ESM 710 Advanced Decision Making Analysis
- ESM 711 Deterministic Optimization Techniques
- ESM 712 Advanced Supply Chain Management
- ESM 713 Supply Chain Modeling
- ESM 714 Modeling and Analysis of Logistics Systems
- ESM 794 Special Topics in ESM - Supply Chain Management

Sustainable Construction Project Management Research Area

- ESM 720 Sustainable Development for Engineers
- ESM 721 Sustainable Development and Global Competitiveness
- ESM 722 Sustainable Analytics and Resource Management
- ESM 723 The Living Building
- ESM 724 Sustainable Ecosystems
- ESM 725 Programs and Portfolio Management
- ESM 794 Special Topics in ESM - Sustainable Construction Project Management

Smart Cities Research Area

- ESM 730 Tools for Big Data
- ESM 731 Smart Cities Infrastructure and Services
- ESM 732 Networking Architectures for Smart Cities
- ESM 733 Electronic, Social and Sensor Network Applications for Smart Cities
- ESM 734 Trust and Security for Smart Cities
- ESM 794 Special Topics in ESM - Smart Cities

Engineering Management Research Area

- ESM 710 Advanced Decision Making Analysis
- ESM 740 Advanced Quality Engineering
- ESM 741 Organizational Performance Management
- ESM 742 Strategic Human Resources Management