



*Faculty of Engineering*

**Industrial Systems Engineering Department**

**M.Sc Degree in Engineering Management/ Industrial Systems  
Engineering/ Faculty of Engineering**

**2024/2025**

## Master of Engineering Management (thesis-track)

### Required courses (15 Credit Hours + 9 Credit Hours Thesis):

Course No.	Course Title	Credit Hours	Pre-requisite
0406720	Advanced Engineering Economy	3	Engineering Economics
0406724	Research Methodology	3	Probability, Stochastic Processes and Statistics
0406726	Advanced Project Planning And Scheduling	3	Project Managements
0406730	Advanced Engineering Statistics	3	Probability, Stochastic Processes and Statistics
0406732	Advanced Systems Simulation and Modeling	3	Probability, Stochastic Processes and Statistics
0406708	Thesis	9	Meet the University Requirements

### Elective courses (9 Credit Hours):

Course No.	Course Title	Credit Hours	Pre-requisite
0406776	Advanced Total Quality Management	3	Probability, Stochastic Processes and Statistics
0406740	Special Topics In Engineering Management	3	---
0406741	Industrial Safety Management	3	---
0406742	Systems of Information Management	3	---
0406746	Cost Estimation and Control for Engineers	3	---
0406774	Advanced Production and Operations Management	3	Probability, Stochastic Processes and Statistics
0406773	Advanced Inventory Management and Control	3	Probability, Stochastic Processes and Statistics
0406775	Advanced Engineering Maintenance Management	3	Probability, Stochastic Processes and Statistics
0406738	Selected Research Topics	3	Research Methodology
0406721	Advanced Operations Research	3	Probability, Stochastic Processes and Statistics
0406771	Contracts and Legislations	3	-----
0406772	Artificial Intelligence Integration in Engineering Management	3	Probability, Stochastic Processes and Statistics

### Remedial Courses:

The Graduate Studies Committee in the Department of Industrial Systems Engineering determines the remedial courses for the student in the event that he/she did not study them during the bachelor's degree. The hours of remedial courses are not counted among the credit hours required for the master's degree, and their marks are not included in the cumulative average. The student must complete these subjects during the first year of joining the program, which includes On the following remedial courses:

Course No.	Course Title	Credit Hours
0401109	Probability, Stochastic Processes and Statistics	3
0403302	Engineering Economics	3
0403523	Project Managements	3

**Master of Engineering Management (comprehensive track):****Required (core) courses (24 Credit Hours):**

Course No.	Course Title	Credit Hours	Pre-requisite Or Co-Requisite
0406720	Advanced Engineering Economy	3	Engineering Economics
0406724	Research Methodology	3	Probability, Stochastic Processes and Statistics
0406726	Advanced Project Planning And Scheduling	3	Project Managements
0406730	Advanced Engineering Statistics	3	Probability, Stochastic Processes and Statistics
0406732	Advanced Systems Simulation and Modeling	3	Probability, Stochastic Processes and Statistics
0406776	Advanced Total Quality Management	3	Probability, Stochastic Processes and Statistics
0406774	Advanced Production and Operations Management	3	Probability, Stochastic Processes and Statistics
0406721	Advanced Operations Research	3	Probability, Stochastic Processes and Statistics

**Elective courses (9 Credit Hours):**

Course No.	Course Title	Credit Hours	Pre-requisite Or Co-Requisite
0406740	Special Topics In Engineering Management	3	---
0406741	Safety Management And Engineering	3	---
0406742	Systems Of Information Management	3	---
0406746	Cost Estimation And Control For Engineers	3	---
0406773	Advanced Inventory Management And Control	3	Probability, Stochastic Processes and Statistics
0406775	Advanced Engineering Maintenance Management	3	Probability, Stochastic Processes and Statistics
0406738	Selected Research Topics	3	Research Methodology
0406771	Contracts and Legislations	3	-----
0406772	Artificial Intelligence Integration in Engineering Management	3	Probability, Stochastic Processes and Statistics

**Remedial Courses:**

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Course No.	Course Title	Credit Hours
0401109	Probability, Stochastic Processes and Statistics	3
0403302	Engineering Economics	3
0403523	Project Managements	3

## Course Description

### **(0406720) Advanced engineering economy (3 credit hours)**

The objective of this course is to review the basic concepts in engineering economy such as time value of money, cash flow presentation of projects and dynamic cash flow processes, methods of selection of the economic alternative, decision analysis under risk and uncertainty such as probability analysis, expected value and decision trees, replacement analysis before and after tax, inflation analysis, depreciation analysis and interest analysis of the public projects B/C analysis.

### **(0406721) Advanced operations research (3 credit hours)**

Optimization of functions subject to equality and inequality constraints. Formulation of linear programming problems and solutions by the simplex method. Related topics such as sensitivity analysis, duality theory and network optimization. Applications of linear programming. Introduction to nonlinear programming techniques. Fundamental models and their applications, design of algorithms and their analysis are also covered. Computational aspects of the algorithms will be discussed. Some emphasis is on the use of linear and integer programming in discrete optimization.

### **(0406776) Advanced Total Quality Management (3 credit hours):**

The course will provide an introduction to the fundamental concepts of statistical process control, strategic total quality management, six-sigma and the application of these concepts, philosophies, and strategies to issues arising in government and industry. It will enhance the student's understanding of the complexities of statistical analysis and control-chart interpretation and their work-place application. Also, it will provide skills in diagnosing and analyzing problems causing variation in manufacturing and service industry processes. Provide a basic understanding of "widely-used" quality analysis tools and techniques. It will help in creating awareness of the quality management problem-solving techniques.

### **(0406726) Advanced Project planning and scheduling (3 credit hours):**

The aim of this course is to provide students with the knowledge on project planning techniques via a comprehensive in depth study and review of the different planning techniques in major engineering and industrial projects. It will focus on project scheduling which involves scheduling by critical path method (GERT, CPM, PERT) and line of balance and parallel scheduling, etc. In addition to mathematical programming and simulation via the computer which focuses on real problems in project scheduling in the real life (software application). Upgrading of the network analysis of the work progress. Analytical study of time, cost and performance, the trade-offs of time and cost.

### **0406724 Research Methodology (3 credit hours )**

This course aims to provide a solid foundation in conducting quality research at post-graduate level (especially at Master level) in the fields of science and engineering. Students learn how to carry out different stages of scientific research starting from formulation of research idea and finishing by write up and presenting of a technical report. Scientific research methods and their implications at different stages of the research process will be studied. Emphasis will also be placed on how to locate and make the best use of relevant sources, the development of a positive attitude toward research, the appreciation of scientific values (integrity, ethics, originality and academic freedom) and developing skills in the use of appropriate academic genres (research proposals, different types of report, journal papers, thesis) employing an appropriate format, style and language. The use of information technologies at all stages of research (on – line literature search, data processing written communication and presentations), hypotheses tests, Multivariate analysis techniques, computer role in research, measurement and scaling techniques, methods of data collection, references systems, and other contemporary methods will also be considered together with a range of practical applications.

**(0406730) Advanced engineering statistics (3 credit hours)**

The course provides students with advanced knowledge related to random sampling and the relationships between samples and populations. This includes sampling distribution, test of hypothesis, point and interval estimation, design of experiments, variance analysis, single and multiple factors analysis.

**(0406738) Selected Research Topics (3 credit hours)**

This course aims to provide students with skills on how to design and write an attractive and scientifically valuable scientific research through knowledge of the most important elements of successful research, where they will understand the followings: how to choose the title of the research, how to write the abstract and its most important paragraphs, and give a brief idea of the background of the research topic, the problem of the research, its importance, the objectives of the research, so that they are compatible with the title of the research, the methodology of the research, brief findings of the relevant references, linking them to the research, the steps for implementing the research, how to obtain results, displaying the results of the research, discussing them physically, linking them with the objectives of the research, and comparing them with the results of other researchers, and how to summarizing the results and extracting the important findings into final conclusions, recommendations based on the most important findings, future research to continue the uncompleted research topics and solve the problem from all aspects and finally a short scientific research must write on one of the engineering topics.

**(0406732) Advanced Systems Simulation and Modeling (3 credit hours)**

This course enriches the students background in the discrete event simulation (DES) modeling to understand, model and improve the way of manufacturing and/or service systems operate/work. The students will be also distinguishing between the static and dynamic, Continuous-change and Discrete-change, and deterministic and stochastic simulation models. Therefore, the main emphasis will be given on Monte Carlo simulations and dynamic simulations; Queueing Models; Random-Number Generation; Input Modeling; Random-Variate Generation; Verification, Calibration, and Validation of Simulation Models; Estimation of Absolute and Relative Performances.

**(0406740) Special topics in engineering management (3 credit hours):**

These topics deal with specialized topics of advanced nature in engineering management. Advanced topics in specialized areas shall be selected by the department.

**(0406741) Industrial Safety Management (3 credit hours):**

An introduction to the fundamentals of industrial safety, including toxicology, industrial hygiene, fires and explosions, hazard identification, risk assessment, and regulatory requirements. The student will be able to demonstrate a knowledge and understanding of the elements of industrial safety management; pro-actively identify and analyze safety hazards; demonstrate knowledge and understanding of risk management tools; and understand and appreciate the need for professional integrity and ethical decision making in the professional practice of engineering.

**(0406742) Systems of information management (3 credit hours)**

This course provides the systems of information technology and information systems and its relation in business fields which involve the infrastructure of information technology such as equipment, software and network communication. It also involves the application of information technology which include information and knowledge, decision support and organization systems, neural systems in the field of business and electronic trading. The course will also describe the different stages of information development and effect and information security.

**(0406746) Cost estimation and control for engineers (3 credit hours)**

The aim of this course is to introduce students to the basic principles and special concepts in cost accounting, commodity cost accounts in engineering companies, the list of costs of manufactured and sold goods, the operating order accounting system, the stage cost accounting system, the standard cost accounting system, the problems of distributing the costs of service departments to production departments, and the problems of cost distribution. In addition to the system of accounting for the cost of activities, theories and concepts of costs, pricing decisions, profitability, and preparing and studying bids.

**(0406774) Advanced Production and Operations Management (3 credit hours)**

This course introduces students to the classification of production systems, and discussion of demand characteristics. Applications of mathematical modeling for production planning and master production scheduling and the methods for aggregate planning will also be covered in this course. It also introduces the practical concepts and methods existing in production systems including industrial and service systems. It focuses on production methods and operations that are used in converting the different production systems inputs into outputs. This includes material requirement planning and control, scheduling of production operations, facility planning, forecasting methods, and productivity improvement, the course also introduces basic principles and methods used in production quality management such as quality assurance systems, statistical quality control charts, quality cost and quality improvement.

**(0406773) Advanced Inventory management and control (3 credit hours)**

The course objective is to study the inventory models under certain and uncertain conditions. The economic order quantity model, forecasting demand, just-in-time/lean manufacturing, materials requirements planning, capacity planning and scheduling, and KANBAN, are covered and deeply discussed.

**(0406775) Advanced Engineering Maintenance Management (3 credit hours)**

This course aims to enhance students' understanding of maintenance management. Several topics are introduced in this course to cover various maintenance management and engineering issues, such as:- Maintenance Organization, Maintenance Productivity and Performance Measurement, Methods and Tools in Maintenance, Failure Mode and Effect Analysis, Maintenance Control Systems, Guidelines for Budgeting and Costing Planned Maintenance Services, Simulation-Based Approaches for Maintenance Strategies Optimization, Maintenance Forecasting and Capacity Planning, Integrated Spare Parts Management, Turnaround Maintenance, Maintenance Planning and Scheduling, Applied Maintenance Models, Reliability Centered Maintenance, Total Productive Maintenance, Warranty and Maintenance, Integrated E-maintenance and Intelligent Maintenance Systems, Maintainability and System Effectiveness, Safety and Maintenance, Maintenance Quality and Environmental Performance Improvement: An Integrated Approach, Industrial Asset Maintenance and Sustainability Performance: Economical, Environmental, and Societal Implications, Human Reliability and Error in Maintenance, Human Error in Maintenance.

**0406771 Contracts and Legislations (3 credit hours)**

This course aims to provide the students with the necessary knowledge about the basics of legislation and the general theory of contractual obligations as one of the sources of obligation as well as civil law articles related to projects and engineering contracts in addition to the terms of the contractor contract (Fedic) and explaining the work law and the judgment law in Jordan and the ethics of engineering profession in general.

**0406772 Artificial Intelligence Integration in Engineering Management (3 credit hours)**

This course provides students with a deep understanding of how artificial intelligence (AI) intersects with the field of engineering management. Students will be introduced to cutting-edge AI technologies, such as machine learning, natural language processing, and robotics. Learning how to leverage these technologies to optimize various aspects of engineering management, including project planning, resource allocation, risk assessment, decision-making processes, etc. Python software will be employed to learn supervised and unsupervised learning techniques such as hidden Markov models, support vector machines, generative/discriminative learning, parametric/non-parametric learning, neural networks, clustering, dimensionality reduction, and kernel methods.