COLLEGE OF ENGINEERING AND TECHNOLOGY

(ALEXANDRIA)

GRADUATE STUDIES:

(Addendum)

Master of Engineering Programs

(M.Eng.)

2009
OVERVIEW

The Master of Engineering in Engineering Management program at the Arab Academy for Science, Technology and Maritime Transport (AASTMT) is designed to accommodate graduate students with different engineering backgrounds.

In addition, it is an extremely attractive program to working engineering professionals who are seeking to advance to positions of greater managerial and technical responsibility.

The program is based on an integrated approach to the management of product, process and information technology and provides the opportunity to develop expertise in these areas.

ENGINEERING MANAGEMENT

Engineering Management focuses on effective decision making in engineering and technological organizations. Addressing the needs of engineers and scientists moving into management positions, Engineering Management complements their technical backgrounds with the human aspects, organizational and financial issues, project considerations, resource allocation, and extended analytical tools required for effective decision making and program management.

This program is designed for technically qualified individuals who plan to assume a management role in project or program-oriented environments in industry or government. It provides the analytical, organizational, and managerial skills to bridge the gap between a technical specialty and technical management.

THE NEED FOR ENGINEERING MANAGEMENT EDUCATION

The emerging discipline of Engineering Management has experienced an explosive growth pattern during the past few decades. The reasons for this pattern can be identified at three levels.

The Individual Level

Engineers who move to management positions as a result of their technical success have become aware that their technical skills are not adequate in dealing with the complexities of their management responsibilities.

The Industry Level

The critical importance of engineering skill and knowledge is well recognized in the management of engineering systems.

The National Level

The scarcity of raw materials, declining productivity and increased competition have imposed challenges to technological leadership and shifted priorities toward the development of new technologies and the management of these systems.
A large portion of engineers assume some form of management role during their professional career performing management duties ranging from the indirect supervision of a small staff to the management of entire engineering organizations.

Although prepared for technical responsibilities, engineers have received little or no formal training for decisions beyond their specialties above those they had acquired as engineering specialists. These new capabilities are necessary to prepare them for decision-making roles in broad areas while maintaining identity in their technical background. It has become clear that success as an engineer is a necessary but insufficient condition to manage technical people, technical projects, technical organizations, technical resources and technical systems.

In response to engineers’ need for a technically oriented management education, a number of universities are now offering Engineering Management Programs designed for engineers and scientists who are moving toward technical management positions, but not away from their technical backgrounds. These programs prepare engineers for much broader responsibilities in the technological system. The strong growth pattern observed in the Engineering Management Programs during the past decade is still continuing. Engineers now have an opportunity to prepare themselves for a smooth transition from technical specialties to leaders in technical management.

**ADMISSION REQUIREMENTS**

To join the program of M.Eng. in Engineering Management, the following minimum prerequisites are required:

- A Bachelor's degree (or higher) in an engineering area.
- A maximum of three Pre-Master's Courses: depending on each student's background (with backgrounds other than industrial engineering). The number of Pre-Master's courses required by each student is determined by the department’s Graduate Program Coordinator (Academic advisor).
Program Detailed Structure

M.Eng. Program
M.Eng. in Engineering Management

Program Structure

M.Eng. in Engineering Management
Master’s Courses

**TEN COURSES ARE NECESSARY**

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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>IM711</td>
<td>Materials Properties and Selection Criteria</td>
<td>3</td>
</tr>
<tr>
<td>IM712</td>
<td>Engineering Materials for New Applications</td>
<td>3</td>
</tr>
<tr>
<td>IM713</td>
<td>Manufacturing Systems Engineering</td>
<td>3</td>
</tr>
<tr>
<td>IM714</td>
<td>Non-Destructive Testing of Materials</td>
<td>3</td>
</tr>
<tr>
<td>IM715</td>
<td>Computer Integrated Manufacturing</td>
<td>3</td>
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<tr>
<td>IM721</td>
<td>Manufacturing Systems Management and Analysis</td>
<td>3</td>
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<tr>
<td>IM722</td>
<td>Applications of Artificial Intelligence in Industry</td>
<td>3</td>
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<tr>
<td>IM723</td>
<td>Advanced Operations Management</td>
<td>3</td>
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<tr>
<td>IM724</td>
<td>Industrial Ergonomics and Human Factors Engineering</td>
<td>3</td>
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<tr>
<td>IM726</td>
<td>Advanced Techniques of Operations Research</td>
<td>3</td>
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<tr>
<td>IM727</td>
<td>Special Topics in Industrial Engineering</td>
<td>3</td>
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<tr>
<td>IM728</td>
<td>Industrial Facilities Planning and Design</td>
<td>3</td>
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<tr>
<td>IM729</td>
<td>Discrete Systems Simulation</td>
<td>3</td>
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<tr>
<td>IM731</td>
<td>Health and Safety Management</td>
<td>3</td>
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<tr>
<td>IM732</td>
<td>Warehouse and Distribution Management</td>
<td>3</td>
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<tr>
<td>IM733</td>
<td>Supply Chain Management</td>
<td>3</td>
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<tr>
<td>IM734</td>
<td>Supply Chain Design</td>
<td>3</td>
</tr>
<tr>
<td>IM735</td>
<td>Strategic Management for Engineers</td>
<td>3</td>
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<tr>
<td>IM736</td>
<td>Advanced Maintenance Management</td>
<td>3</td>
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<tr>
<td>IM737</td>
<td>Human Resource Management</td>
<td>3</td>
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<tr>
<td>IM738</td>
<td>Advanced Project Management</td>
<td>3</td>
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<tr>
<td>IM739</td>
<td>Advanced Management of International Business</td>
<td>3</td>
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<tr>
<td>IM742</td>
<td>Design and Statistical Analysis of Experiments</td>
<td>3</td>
</tr>
<tr>
<td>IM743</td>
<td>Advanced Reliability Engineering</td>
<td>3</td>
</tr>
<tr>
<td>IM744</td>
<td>Productivity and Quality Improvement</td>
<td>3</td>
</tr>
<tr>
<td>IM745</td>
<td>Systems Engineering</td>
<td>3</td>
</tr>
<tr>
<td>IM746</td>
<td>Lean Six Sigma</td>
<td>3</td>
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<tr>
<td>IM747</td>
<td>Quality Management</td>
<td>3</td>
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<tr>
<td>IM751</td>
<td>Marketing Issues for Engineers</td>
<td>3</td>
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<td><strong>Subtotal</strong></td>
<td><strong>10 Courses * 3 Credit Hours</strong></td>
<td><strong>30</strong></td>
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# M.Eng. in Engineering Management

## Program Structure

### Applied Research:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>IM 799</td>
<td>Applied Research</td>
<td>6</td>
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Subtotal: 6 Credit Hours

<table>
<thead>
<tr>
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<th></th>
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<tbody>
<tr>
<td></td>
<td>36</td>
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</table>

### M.Eng. in Engineering Management

Pre-Master's Courses (Non-Credited)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>IM341</td>
<td>Engineering Statistics</td>
<td>0</td>
</tr>
<tr>
<td>NE364</td>
<td>Engineering Economy</td>
<td>0</td>
</tr>
<tr>
<td>IM425</td>
<td>Operations Research</td>
<td>0</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Total</th>
<th>3 Courses * 0 Credit Hours</th>
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<tbody>
<tr>
<td></td>
<td>0</td>
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</table>
Course Detailed Structure

Course Code: IM 341
Course Title: Engineering Statistics
Credit Hours: 0

Course Description

Course Objectives
- To enable students to use statistical tools to manipulate and present data.
- To build up student capability to construct and manipulate statistical and probability models in order to solve engineering and management problems.

Course Topics
- Introduction to statistics. Data and their role in engineering and management graphical presentation of data. Histograms
- Position parameters of data, mean, median, quartiles, percentiles, the box plot
- Dispersion parameters of data, range variance, coefficient of variation, interquartile range
- Applications of descriptive statistics
- Theory of probability, random experiments, sample space, events, probability of events. Frequency definition of probability, axiomatic definitions of probability, De Morgan laws and addition rules
- Conditional probability, multiplication rule, total probability
- Bayes' theorem and its applications
- Discrete random variable and mass functions, cumulative probability distributions, mean and variance and discrete random variables
- Well-known probability distribution of discrete random variables, uniform, binominal and geometric distribution their mean and variance
- Poisson's probability distribution and its applications to event arrivals problems
- Continuous random variables, probability density functions, mean, and variance of continuous random variables. Uniform distribution
- Normal distribution and its applications in management and engineering
- Exponential distribution. Introduction to statistical estimation
- Sampling distribution, introduction

References
Course Code : NE 364
Course Title : Engineering Economy
Credit Hours : 0

Course Description
A study of basic concepts emphasizing analysis of aggregate economy. Examination of the processes of price determination and calculation of optimum demand for maximum profit. Basic principles of money-time relationship. Methods of investment assessment and fundamental techniques of comparison of investment opportunities. Theories of depreciation of physical facilities and cost recovery systems.

Course Objectives
- Introduction basic cost concepts and economic environment.
- Familiarization of the principles of money time relations and basics of investments opportunities assessment and evaluation.

Course Topics
- Introduction and overview
- Cost concepts and the economic environment
- Principles of money – time relations, the concept of economic equivalence
- Cash flow diagrams: Interest formulas and uniform series
- Cash flow diagrams: Uniform gradient series and geometric sequence
- Nominal and effective interest rates, continuous compounding and continuous cash flows
- Applications and effective interest rates, continuous compounding and continuous cash flow
- Applications of engineering economy: Methods of investment assessment
- Comparing alternatives: Useful life is equal to the study period
- Comparing alternatives: Useful life is shorter than the study period
- Comparing alternatives: Useful life is longer than the study period
- Depreciation: Historical Methods
- Depreciation: Cost recovery systems

References
Course Detailed Structure

Course Code : IM 425
Course Title : Operation Research
Credit Hours : 0

Course Description
Basic concepts and fundamentals of management science, problems addressed by operations research problem formulations in linear programs, graphical solution of linear programs, simplex method, big M technique, two phase technique, sensitivity analysis, transportation model, network planning, critical path and PERT methods.

Course Objectives
- To promote the scientific approach to solve management problems.
- To build up capability to construct mathematical models of practical problems and solve them.
- To acknowledge the role of computer technology in solving problem of operations research.

Course Topics
- Introduction to operations research and its role in management
- Formulation of problems into linear programs with variables with single subscripts
- Formulation of problems into linear programs with variables with double and multiple subscripts
- Graphical solutions of linear programs
- The simplex method to solve problems with constraints \( \leq \)
- The simplex method to solve problems with constraints \( \geq, = \), Big M technique
- The two-phase technique
- Sensitivity analysis of optimal solution obtains by simplex method
- Transportation model, formulation and initial solutions
- Transportation model, optimization technique
- Network planning, deterministic technique
- Probabilistic approach, project evaluation and review technique (PERT)
- Applications of PERT

References
Course Code: IM 711
Course Title: Materials Properties and Selection Criteria
Credit Hours: 3

Course Description
The use of different materials in designing a component or a particular application of materials is critical. The use of the suitable material involves providing the adequate properties and requirements in terms of mechanical, physical and environmental conditions. The selection process is a fairly complicated task; however, it can be made easy by using special techniques and charts which collate different properties and parameters influencing the selection.

Course Objectives
- To provide the students with the basic knowledge about structure and properties of different engineering materials.
- To introduce the students to the different classes of engineering materials in addition to new materials.
- To enable the students to understand the concept of designing with materials and the important criteria used in selecting materials for a particular application.

Course Topics
- Different types of engineering materials
- The effect of composition and processing on materials properties
- The concept of structure-property relationships
- How to select a suitable materials, property charts
- Other factors affecting the selection such as cost

References
Course Code :  IM 712
Course Title :  Engineering Materials for New Applications
Credit Hours :  3

Course Description
Designing of new engineering materials for a particular application is a complicated task. It involves a combined experimental and modelling approach with a thorough understanding of how structure can be affected by original chemical composition and processing of materials. New classes of materials are a result of much research work focusing on changing the composition and processing conditions and relating the obtained structure to final improved properties.

Course Objectives
- To provide the students with the basic knowledge about structure and properties of engineering materials.
- To introduce the students to the newly developed classes of materials and the concept of designing new materials.
- To enable the students to conceive the effect of microstructure and how to tailor it in order to achieve newly improved properties for engineering materials.

Course Topics
- Classical engineering materials
- The effect of composition and processing on materials properties
- The concept of structure-property relationships
- Modelling the behaviour of engineering materials
- Designing new materials
- New classes of engineering materials, comparison to traditional engineering materials

References
Course Code : IM 713
Course Title : Manufacturing Systems Engineering
Credit Hours : 3

Course Description
A manufacturing system is a collection or arrangement of operations and processes used to make desired product(s). The manufacturing system includes the actual equipment composing the processes and the arrangement of those processes. Control of a system applies to total control of the whole, not of the individual processes or equipment. All the users of the manufacturing system must understand how it works (behaves). The entire manufacturing system must be controlled in order to regulate levels of inventory, movement of material through the plant, production (output) rates, and product quality.

Course Objectives
 This course introduces the fundamental of design, planning and control of manufacturing system aided by computers. Integration and interfacing of computerized manufacturing systems, programmable logic controllers and sequential programming, sensor implementation strategies, automated fixturing, robotic work cell creation, performance modelling of automated manufacturing systems, group technology and flexible manufacturing systems, etc. will be addressed.

Course Topics
 Trends in manufacturing systems
 Evolution of manufacturing systems
 System defined and design
 Manufacturing and production systems
 Classification of manufacturing systems
 Automation
 Robotics

References
 Katdundo Hitomi, “Manufacturing System Engineering”. Taylor and Francis
Course Detailed Structure

Engineering Management

Course Code : IM 714
Course Title : Non-destructive Testing of Materials
Credit Hours : 3

Course Description
The student will be able to perform metal surface inspection. Knowing the theory behind different inspection techniques, detecting material flaws.

Course Objectives
- The NDT course is to provide theory lectures and practical training around understanding basic principles of NDT.
- Performing calibrations, measuring samples and performing non-destructive testing using different NDT techniques.

Course Topics
- Understanding principles of NDT Current.
- Inspection and measurement of samples.
- Calibrating instruments.
- Understanding manufacturing and welding discontinuities.
- Preliminary test using NDT techniques such as Ultrasonic, Dye penetrate, magnetic flux and Eddy Current.
- Preparing test report

References
Course Code : IM 715
Course Title : Computer Integrated Manufacturing
Credit Hours : 3

Course Description
This course will study the technology associated with computer integrated manufacturing (CIM). The course will include computer-aided design (CAD), product data management (PDM), computer-aided engineering (CAE), and integrated manufacturing systems.

Course Objectives
- The course aims to provide the most advanced, comprehensive, and balanced coverage of the subject of integrated manufacturing systems. Also, the module covers the different CAD tools and the means to their integration. The objective of the course are:
  - Understanding the basic functional units of integrated manufacturing systems and its importance to the manufacturing enterprise.
  - Identifying the different design elements and production engineering.
  - Understanding the enabling processes and systems for modern manufacturing.
  - Know the different issues in integration of manufacturing systems.

Course Topics
- The Manufacturing Enterprise.
- Design Automation: CAD and PDM.
- Application of CAD to Manufacturing Systems.
- Selecting CAD Software for an Enterprise.
- Product Data Management
- Design Automation: CAE.
- Design for Manufacturing and Assembly.
- CAE Analysis and Evaluation.
- Production Engineering Strategies.
- The role of artificial intelligence in manufacturing

References
Course Detailed Structure

Course Code : IM 721
Course Title : Manufacturing Systems Management and Analysis
Credit Hours : 3

Course Description
The analysis of manufacturing systems with an emphasis on factory operations. Interaction between the different performance measures of a manufacturing system. Management of manufacturing systems variability.

Course Objectives
- Providing the student with an ability of analysing and understanding the underlying behaviour of most manufacturing systems.
- To review the elementary concepts required for describing manufacturing systems.
- To enable the student to identify the points of leverage in a plant, evaluate the impacts of the proposed changes, and coordinate improvement efforts.
- To provide the student with the ability to bring together the disparate components of a system into an effective whole.

Course Topics
- The production system and role of inventory
- Multistage production systems and models
- Lean manufacturing and the Just-in-Time philosophy
- Science of manufacturing
- Basic factory dynamics
- Variability in manufacturing systems
- Analysing the influence of variability on manufacturing systems’ performance
- Push and pull production systems
- The human element in operations management
- Supply chain management

References
Course Code : IM 722
Course Title : Applications of Artificial Intelligence in Industry
Credit Hours : 3

Course Description
Emphasis on model integration and using computational intelligent approaches to solve problems across many areas of an industrial firm. Models and computational intelligence tools and techniques applicable to different basic functional areas within any enterprise, ranging from design of parts and process planning to manufacturing systems design and production management. Examples and actual case studies based on actual industrial projects.

Course Objectives
- To gain basic knowledge of the different artificial intelligence techniques used industry.
- To present recent advances in modelling and applying computational intelligent methods to enterprises.
- To become familiar with a number of available AI packages and how to use these packages in addressing different issues in actual industries.

Course Topics
- Introduction to the different AI techniques
- Knowledge-based systems
- Setup reduction
- Production planning and scheduling
- Selection of manufacturing equipment
- Layout of machines, facilities, and warehouses
- Inventory space allocation
- Supplier evaluation
- Data mining

References
Course Detailed Structure

Course Code: IM 723
Course Title: Advanced Operations Management
Credit Hours: 3

Course Description
Capacity planning – Forecasting - Facility location – Aggregate planning – Inventory Management – Production systems – and facility layout – Materials management.

Course Objectives
- To get acquainted with advanced tools of planning of operations.
- To raise student’s capability of using microcomputers for solving problem of operations management.

Course Topics
- Capacity planning and modification
- Forecasting
- Facility location
- Aggregate planning
- Inventory management systems
- Production systems and facility layout
- Material management

References
Course Code : IM 724
Course Title : Industrial Ergonomics and Human Factors Engineering
Credit Hours : 3

Course Description
Basic concepts of ergonomics and their application to design of human-machine systems and products. Consideration of human behavioural and biological capabilities and limitations in design for human efficiency, safety and comfort. Systems development cycle; human-machine function allocation; task and skill analysis; systems evaluation; anthropometry. Design of control and display systems, instrument panels, workplaces, seating and tools.

Course Objectives
- To enhance the ergonomic knowledge base of students.
- To become familiar with the different ergonomics design applications of ergonomics in industry.
- To be trained on the design and analysis of occupational systems and consumer products.

Course Topics
- Engineering Anthropometry and Workspace Design.
- Biomechanics at Work.
- Work Physiology.
- Stress and Workload.
- Safety, Accidents, and Human Error.
- Ergonomic Models, Methods, and Measurements.
- Designing to Fit the Moving Body.
- The Office (Computer) Workstation.
- Human-Computer Interaction.
- Selection, Design, and Arrangement of Controls and Displays.
- Designing for Special Populations.

References
Course Code : IM 726
Course Title : Advanced Techniques of Operations Research
Credit Hours : 3

Course Description
Theory of games and its applications, stochastic inventory systems, probabilistic dynamic programming, and nonlinear programming. Stochastic programming, goal programming.

Course Objectives
- To provide students with mathematical model to solve managerial and technical problems.

Course Topics
- Theory of games and its application
- Probabilistic dynamic programming
- Stochastic inventory systems
- Nonlinear programming
- Stochastic programming
- Goal programming

References
Course Code : IM 727
Course Title : Special Topics in Industrial Engineering
Credit Hours : 3

Course Description
Content may vary from semester to semester.

Course Objectives
- The main objective of this course is to cover current topics of research interest in industrial engineering.

Course Topics
- Content may vary from semester to semester

References
- Content may vary from semester to semester.
Course Detailed Structure

Course Code : IM 728
Course Title : Industrial Facilities Planning and Design
Credit Hours : 3

Course Description
Principles and techniques for planning and designing production facilities and material handling systems. Design and analysis of models and algorithms for facility location, vehicle routing, and facility layout problems. Emphasis will be placed on both the use of computers and the theoretical analysis of models and algorithms.

Course Objectives
- To learn the different requirements and functions needed for facilities design.
- To know the different methods of developing alternative facility designs.
- To become familiar with the different facilities systems, specifically material handling equipment.
- To be trained on different quantitative approaches for facilities planning.
- To know how to prepare and present a facility.

Course Topics
- Strategic facilities planning and design
- Material handling equipment
- Material handling problem-solving procedure
- Office layout techniques and space requirements
- Algorithmic approaches to facility layout
- Location, allocation, and location-allocation models
- Use of computers and the theoretical analysis of models and algorithms
- Presenting a finalized facility plan

References
Course Code : IM 729
Course Title : Discrete Systems Simulation
Credit Hours : 3

Course Description
Modern methods for simulating discrete event models of complex stochastic systems. Systems exhibiting randomness are modelled and statistically analyzed using a state-of-the-art simulation language. Applications include improvement of existing and design of new production and service systems.

Course Objectives
 To provide students the basic modelling and simulation concepts and tools for analysing and improving the performance of industrial systems.
 To learn how to use a simulation package and apply it in actual industries.
 To apply what you have learned to a specific problem (project).

Course Topics
 Overview of Modelling and Simulation
 Discrete-Event Modelling and Simulation Principles
 Queuing Models
 Input Modelling
 Verification and Validation of Simulation Models
 Output Analysis
 Modelling and Simulation of industrial Systems
 Available Commercial Simulation Packages
 Use of a Simulation package in Evaluation and Decision Making of existing Industrial Systems

References
 Banks, J. et al.; "Discrete-Event System Simulation", Prentice-Hall.
 Bennett, B. S. Simulation Fundamentals. Prentice-Hall.
Course Detailed Structure

Engineering Management

Course Code : IM 731
Course Title : Health and Safety Management
Credit Hours : 3

Course Description
Safety information system, safety utilities, Ergonomics, Health standards, Fire fighting, Evacuation plans.

Course Objectives
- To demonstrate the importance of the health and safety regulations in the organization.
- To define the resources needed for the health and safety program.
- To get familiarized with the classification process for the workplace hazards.
- To be trained on the emergency and disaster preparedness.

Course Topics
- Safety versus health
- Safety roles in corporate structure
- Safety resources
- Accident analysis
- Hazard classification
- Process safety and disaster preparedness
- Construction safety.

References
Course Code : IM 732
Course Title : Warehouse and Distribution Management
Credit Hours : 3

Course Description
Warehouse Issues, Equipment and processes Warehouse layout and planning Cross-docking Measuring warehouse efficiency.

Course Objectives
- Introducing the students to the warehouse rationale, material flow and warehouse management system
- Provide in-depth analysis of operations and design of warehouses and distribution networks, measuring warehouse efficiency
- Illustrating the different modes of storage and the different concepts of warehousing
- Understanding the concepts underlying warehouse layout, storage and handling equipment, and order picking,

Course Topics
- Warehouse Rationale, material flow and warehouse operations
- Warehouse Management systems, storage and handling equipment
- Warehouse layout, pallets, design of a fast-pick area
- Pieces geometry and slotting
- Order picking, piece picking and pick-path
- Cross-docking
- Measuring warehouse efficiency, activity profiling, and benchmarking
- Introducing warehousing around the world

References
Course Detailed Structure

Engineering Management

Course Code : IM 733
Course Title : Supply Chain Management
Credit Hours : 3

Course Description
Supply chain definition and supply chain elements. Technological infrastructure that supports supply chains. Different types and operation methods of a supply chain. Supply chain mapping and analysis Supply chain performance measurement and control Logistics outsourcing, reverse logistics, and green supply chains.

Course Objectives
- Introducing the students to logistics and supply chain management problems, performance measures and operation methods
- Understanding the concepts underlying fleet management, vehicle routing, crew scheduling and related problems.
- Grasping the different qualitative issues in distribution network structuring, centralized versus decentralized network control, variability in the supply chain, strategic partnerships, and product design for logistics will be considered through discussions and cases.

Course Topics
- 21st century supply chains and lean logistics
- Market distribution, procurement, and manufacturing strategies
- Supply Chain main Key performance indicators (KPIs)
- Supplier evaluation, selection, and measurement
- Supply chain performance measurement and evaluation
- Organizational and relationship management

References
- Lambert, D.M, (2005), Supply Chain Management: Processes, Partnerships, Performance, Supply Chain Management Institute, Sarasota, FL.
Course Detailed Structure

Course Code : IM 734
Course Title : Supply Chain Design
Credit Hours : 3

Course Description
Supply chain configuration and design requirements. Differentiating supply chain models according to different methods of manufacturing. Supply Chain Network Optimization. Supply Chain Ontology. Developing a SCOR thread diagram for different types of supply chains.

Course Objectives
- Introducing the students to logistics and supply chain design and optimization, supply chain modelling, mapping and analysis with respect to cost reduction and maximum performance and utilization of the global supply chain components.
- Understanding the concepts underlying fleet management, vehicle routing, crew scheduling and related problems.
- Grasping the different qualitative issues in distribution network structuring, centralized versus decentralized network control, variability in the supply chain, strategic partnerships, and product design for logistics will be considered through discussions and cases.

Course Topics
- 21st century supply chains and lean logistics
- Enterprise resource planning and execution systems
- Planning and scheduling in supply chains
- Operational purchasing integration
- Supplier evaluation, selection, and measurement
- Supply chain network optimization
- Warehouse design, distribution and transportation models design

References
Course Code: IM 735
Course Title: Strategic Management for Engineers
Credit Hours: 3

Course Description
Study of all functional areas of an enterprise to provide strategic direction to an organization. Strategy for effective management in the new millennium. A developed framework for understanding the interrelation of accounting, finance, operations, engineering, human resources and marketing.

Course Objectives
- Exposes engineers to various functional areas of an enterprise and how each interrelates for success.
- Strategies are taught to enable students to recognize and overcome obstacles of today’s global market.

Course Topics
- Strategic management, course overview, expectations, goals and objectives
- Overview of the business environment and globalization
- Defining the company’s mission and social responsibility
- Evolution of the competitive marketplace, local, regional, national and international
- Marketing strategies, marketing industrial vs., consumer products
- Total quality management, ISO quest for quality or trade barrier
- Organizational structure, balance sheets, income statements, breakeven analysis and effective utilization of depreciation
- Financial strategies, balance sheets, income statements, break-even and effective utilization of depreciation
- Human resource assets, capitalism, compensation, performance review.
- Assembling a professional management team, compatibility vs. complimentary style/skill
- Differentiation in learning style

References
Course Detailed Structure

Engineering Management

Course Code: IM 736
Course Title: Advanced Maintenance Management
Credit Hours: 3

Course Description
The course introduces the advanced maintenance types and techniques. The course focuses on management of maintenance and its factors such as scheduling, planning, criticality, cost and techniques. Participants should be able to define, understand and discuss the following items: Various types of maintenance organizations – equipment life expecting – expecting failure rates – preventive and predictive (TPM) – introduction to computerized maintenance management system (CMMS) – case studies.

Course Objectives
- This course is designed to provide students with latest procedures associates with
- Organizing maintenance resource.
- Analyzing failures.
- Setting and conducting a maintenance plan
- Planning spare parts.
- Estimating and controlling maintenance costs
- Computerizing maintenance planning and measurement operations

Course Topics
- Introduction to maintenance management
- Types of maintenance organizations
- Statistical application related to maintenance study
- Preventive maintenance (PM): definition, routine, major criticality, planning, scheduling
- Predictive maintenance (PDM)
- Total productive maintenance (TPM) and its implementation
- Facility maintenance project planning and control
- Computerized maintenance management system (CMMS)

References
- Matthew P. Stephens, Productivity and Reliability–Based Maintenance Management, Pearson, Prentice Hall, 2004
Course Code : IM 737
Course Title : Human Resource Management
Credit Hours : 3

Course Description
The strategic Role of Human Resource Management, planning for conducting job analysis, job description and specification, Personnel planning and recruitment, Employee testing and selection, Basic testing concepts including validity and reliability, Basic types of interviews- improve performance as an interviewer, Mid-term Exam, Training and developing employees., Perceivers used to determine pay rates for employees, pay for performance and financial incentives, Types of benefits provided by employers- both mandatory and optional, Manager careers and fair treatment, Appraising performance, Labour relations and collective bargaining.

Course Objectives
- The student undertaking this course should be able to:
- Discuss the importance of HR management and the basic methods of conducting job analysis.
- Discuss eight methods used for recruiting job candidate.
- Describe the overall selection and testing process and the basic types of interviews.
- Describe the basic training process.
- Determine pay rates for employees.

Course Topics
- The strategic role of HR management
- Job analysis
- Personnel planning and recruiting
- Employee testing
- Interviewing
- Orientation and training
- Developing managers
- Managing quality and productivity
- Appraising performance.
- Establishing pay plans
- Financial incentives
- Benefits and Services

References
Course Code: IM 738
Course Title: Advanced Project Management
Credit Hours: 3

Course Description
Study of the field of project management as applied to technology intensive, product development projects. Emphasis on the basics of project management success in a high risk technology environment.

Course Objectives
- Enables the student to:
- Recognize the project management culture.
- Apply and match techniques of project management to the needs of the organization.
- Establish basic organization policies to enable effective project management techniques.
- Apply appropriate project management leadership strategies.

Course Topics
- The project management body of knowledge
- The project management context, link to strategy
- Requirements planning and requirements management
- Project planning methodology model, project life cycle
- Project scheduling and use of work breakdown structure
- Project control and earned value analysis.
- Project management applied to business process re-engineering. The impact of culture
- Project leadership

References
Course Detailed Structure

Engineering Management

Course Code : IM 739
Course Title : Advanced Management of International Business
Credit Hours : 3

Course Description
This course introduces the strategic topic of international business and operations and the motives for companies to become international. It provides deep understanding of the current global economic, political and financial environment, which are the key elements for the management of Multinational enterprises. The course also presents the classical theories of international trade and the theory of economic integration together with the role of governments to control trade and economy under market philosophy.

Course Objectives
- Understand the basic international economic, political and financial terms and functions.
- Introduce the new waves of global environment and ways of managing an international company.
- Study current international issues and how it would affect local economic environments for example stock market, inflation, exchange rates, institutional agreements, GATT, Oil prices, etc.
- Provide hands-on experience on analyzing a country’s current economic indicators and future course of action to overcome obstacles.
- Concentrate on real case studies from past experience of international companies.
- Encourage students to discuss and present case studies from readings, new clips, Internet, and magazine articles about lessons and experience they have throughout lectures.

Course Topics
- An overview of international operations
- The International Political Environment
- The International Economic Environment
- International Trade theory
- Government Influence on Trade
- Economic Integration
- Foreign Direct Investment
- The world Financial Environment
- The Impact of Multinational Enterprises

References
Course Code: IM 742
Course Title: Design and Statistical Analysis of Experiments
Credit Hours: 3

Course Description

Course Objectives
- To enable student to apply the finding of statistical analysis and experimental design in his master’s course projects.

Course Topics
- Tests of hypotheses
- Statistical significance
- Design of single factor experiments
- Factorial design
- Robust design
- Optimization Experiments
- Non-parametric statistics.

References
- D.C. Montgomery, *Design and Analysis of Experiments*. 
Course Detailed Structure

Course Code: IM 743
Course Title: Advanced Reliability Engineering
Credit Hours: 3

Course Description
Introduction, Depiction of fundamentals formulas of reliability and failure probability, failure probability distribution, systems reliability (series, parallel, complex) System redundancy (K-out of N, standby) Failure tree analysis, Failure Mode Effect and Criticality, Reliability Testing, Warranty Analysis, Reliability centered maintenance.

Course Objectives
- To create awareness towards problems of system failures, reliability and safety.
- To model mathematically the failure probabilities for different types of systems.
- To apply methods of statistical analysis to data reliability tests.

Course Topics
- Failure time Distributions
- System Reliability
- Reliability Testing
- Reliability Improvement
- Reliability in Design
- FMECA and FTA

References
Course Code : IM 744
Course Title : Productivity and Quality Improvement
Credit Hours : 3

Course Description
Introduction, project identification, Planning and separating, Performance measurements, problem analysis and selections, Inspection capability, Corrective and preventive action matrix, process control procedures, process control implementation, problem profanation, Defect accountability, Measurement of effectiveness.

Course Objectives
- To provide a systematic approach to statistical process control implementation for productivity and quality improvement.
- To provide an integrated action plan for improving quality, productivity and profits through emphasizing the statistical techniques, problem solving techniques, productivity and quality improvement attitude and quality planning.

Course Topics
- Introduction, project identification
- Planning and reporting, performance measurements
- Problem analysis and solution
- Inspection capability, process capability
- Corrective and preventive action matrix
- Process control procedure, process control implementation
- Problem prevention, Defect accountability, Measurements of effectiveness.

References
- Deming, W.D., Quality, productivity and Competitive position, Center for Advanced Engineering Study, Cambridge, Massachusetts, USA. 1982.
Course Detailed Structure

Course Code : IM 745
Course Title : Systems Engineering
Credit Hours : 3

Course Description
Definitions of a system, attributes, relationships, concurrent engineering, quality deployment in systems engineering, operational feasibility in systems engineering.

Course Objectives
 To introduce different techniques and tool in systems engineering and design.
 To enable students to undertake the tasks of concept design of system using different software packages.

Course Topics
 Definition of systems and their classification
 Concurrent engineering and its implementation in systems engineering
 Quality function deployment
 Operational feasibility of systems reliability, maintainability, man ability

References
Course Detailed Structure

Engineering Management

Course Code: IM 746
Course Title: Lean Six Sigma
Credit Hours: 3

Course Description
Students of this course will develop a broad understanding of Lean/Six Sigma principles and practices, build capability to implement Lean/Six Sigma initiatives in manufacturing operations, and learn to operate with awareness of Lean/Six Sigma at the enterprise level.

Course Objectives
- Develop a broad understanding of Lean/Six Sigma principles and practices.
- Build capability to implement Lean/Six Sigma initiatives in manufacturing operations.
- Operate with awareness of Lean/Six Sigma at the enterprise level.

Course Topics
- Lean Thinking
- Six Sigma Principles and Systems Change Principles
- Reducing Defects with Six Sigma
- Transactional Six Sigma
- Reducing Variation with Six Sigma
- Sustaining Improvement.
- Laser-Focused Process Innovation.
- Making Lean Six Sigma Successful.
- Visualizing and Improving the Process
- Measurement System Analysis.
- Design for Lean Six Sigma.
- Statistical Tools for Lean Six Sigma
- Simulation-Based Lean Six-Sigma Application

References
Course Detailed Structure

Engineering Management

Course Code: IM 747
Course Title: Quality Management
Credit Hours: 3

Course Description
Students of this course will develop a broad understanding of Quality Management and the recent developments in the field: Improvement Approaches, Six Sigma, and new challenges in Quality Management; the latest information on the ISO 9000 series of quality management system series standards; combined with up-to-date tools, techniques and quality systems.

Course Objectives
- To provide insight into diverse ways of understanding and applying total quality.
- To familiarize the student with the broad array of tools, techniques and philosophies regarding quality management.

Course Topics
- Philosophy and concepts of quality management
- Tools and techniques of quality management
- Implementing quality management
- Organizing for quality management
- Quality Management Systems
- Designing and assuring quality
- Continuous improvement of the quality system
- Six Sigma Management and Tools

References
Course Code : IM 751
Course Title : Marketing Management
Credit Hours : 3

Course Description
Strategic marketing, types of market and buyer behaviour, product strategies, marketing decision (price, channel, advertising, sales force) market research and international marketing.

Course Objectives
- To demonstrate the role of marketing in the company.
- To explore the relationship of marketing and other functions.
- To help the student in making marketing decisions in the context of general management.
- Focuses on concepts of demand, environment, consumer behaviour and marketing mix including product design, pricing, promotion and distribution.

Course Topics
- Introduction to marketing
- Marketing mix and marketing strategy
- Market segmentation
- Product analysis
- Pricing
- Promotional mix
- Distribution.

References