ARAB ACADEMY FOR SCIENCE, TECHNOLOGY
AND MARITIME TRANSPORT

COLLEGE OF ENGINEERING
AND TECHNOLOGY

(GRADUATE STUDIES)

Master of Science Programs

STATUS REPORT

ALEXANDRIA

2012

INDUSTRIAL AND MANAGEMENT ENGINEERING

M.SC. PROGRAMS

OVERVIEW

The Master of Science in Industrial and Management Engineering 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. The program has a unique structure that is divided into two distinct areas:

1. Industrial Engineering.
2. Engineering Management.

INDUSTRIAL ENGINEERING

Industrial Engineering is one of the six major engineering disciplines yet few people outside of engineering understand what Industrial Engineers do. The professional society for Industrial Engineers, the Institute of Industrial Engineers (IIE), defines Industrial Engineering as:

> *Industrial Engineering is concerned with the design, improvement, and installation of integrated systems of people, materials, and equipment. It draws upon specialized knowledge and skill in the mathematical, physical, and social sciences, together with the principles and methods of engineering analysis, to design, specify, predict, and analyze the results obtained from such systems.*

JOBS AND DUTIES OF THE INDUSTRIAL ENGINEER

Industrial Engineers make things work better, safer, and more economically. Unlike the other engineering disciplines that focus their attention purely on the technical aspects of a system, the Industrial Engineer incorporates human and economic considerations in system design.

Industrial engineers design processes and systems that improve quality and productivity. Using knowledge of engineering, mathematics, business administration, and management, industrial engineers focus on the way products and services are made and performed. Though a combination of technical abilities, people skills, and business know-how, they analyze, design, build, and manage systems. Industrial Engineers integrate combinations of people, information, materials, and equipment that produce innovative and efficient organizations. In addition to manufacturing, Industrial Engineers work and consult in every industry, including hospitals, communications, e-commerce, entertainment, government, finance, food, pharmaceuticals, semiconductors, sports, insurance, sales, accounting, banking, travel, and transportation.

With its diversity, Industrial Engineering appeals to a wide cross section of employers and you will have the opportunity to work in lots of different types of businesses. The most distinctive aspect of industrial engineering is the flexibility that it offers.

Whether it's reducing passenger waiting time for a roller coaster ride, scheduling the use of an operating room, developing a plan for distributing a product worldwide, or manufacturing superior automobiles – it's all in a day's work for an industrial engineer.

As an Industrial Engineer, you will:

- Work with people to make things better, faster, safer, and more rewarding.
- Help a company save money and stay competitive.
- Reap personal and professional satisfaction year after year.
- Work with all levels of a business or organization.

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.Sc. in I.M.E. (Industrial Engineering), the following minimum prerequisites are required:

- A Bachelor's degree (or higher) in Industrial Engineering or equivalent field.
- A Research Methodology course.

To join the program of M.Sc. in I.M.E. (Engineering Management), the following minimum prerequisites are required:

- A Bachelor's degree (or higher) in an engineering area.
- A Research Methodology course.
- Pre-Master's Courses: depending on each student's background (with backgrounds other than industrial engineering). Eight Pre-Master's non–credited courses are required to be covered before joining the core of the Master's Program.

The number of Pre-Master's courses required by each student is determined by the department's Graduate Program Coordinator.

Program Detailed Structure

M.SC. PROGRAMS

M.Sc. in Industrial and Management Engineering

GROUP (A): INDUSTRIAL ENGINEERING

Master's Courses

EIGHT COURSES ARE NECESSARY

Course Code	Course Title	Credit Hours
IM711	Materials Properties and Selection Criteria	3
IM712	Engineering Materials for New Applications	3
IM713	Manufacturing Systems Engineering	3
IM714	Non-Destructive Testing of Materials	3
IM715	Computer Integrated Manufacturing	3
IM721	Manufacturing Systems Management and Analysis	3
IM722	Applications of Artificial Intelligence in Industry	3
IM723	Advanced Operations Management	3
IM724	Industrial Ergonomics and Human Factors Engineering	3
IM726	Advanced Techniques of Operations Research	3
IM727	Special Topics in Industrial Engineering	3
IM728	Industrial Facilities Planning and Design	3
IM729	Discrete Systems Simulation	3
IM732	Warehouse and Distribution Management	3
IM733	Supply Chain Management	3
IM734	Supply Chain Design	3
IM738	Advanced Project Management	3
IM742	Design and Statistical Analysis of Experiments	3
IM743	Advanced Reliability Engineering	3
IM744	Productivity and Quality Improvement	3
IM746	Lean Six Sigma	3
Subtotal	**8 Courses * 3 Credit Hours**	**24**

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RESEARCH THESIS:

Course Code	Course Title	Credit Hours
IM 701	Master's Research Thesis (Part 1)	6
IM 702	Master's Research Thesis (Part 2)	6
Subtotal	**2 Parts * 6 Credit Hours**	**12**

Total	**36**

M.Sc. in Industrial and Management Engineering

GROUP (B): ENGINEERING MANAGEMENT

Pre-Master's Courses (Non-Credited)

CORE PRE-MASTER'S COURSES:

Course Code	Course Title	Credit Hours
IM341	Engineering Statistics	0
NE364	Engineering Economy	0
IM425	Operations Research	0
Subtotal	**3 Courses * 0 Credit Hours**	**0**

ELECTIVE PRE-MASTER'S COURSES:
FIVE COURSES ARE NECESSARY

Course Code	Course Title	Credit Hours
IM342	Statistical Analysis and Design of Experiments	0
IM322	Production and Operations Management (1)	0
IM533	Human Resource Management	0
IM534	Computer Applications in Industry	0
IM538	Marketing Management	0
IM539	International Business Management	0
IM545	Total Quality Management	0
IM546	Reliability Engineering	0
Subtotal	**5 Courses * 0 Credit Hours**	**0**

M.Sc. in Industrial and Management Engineering

GROUP (B): ENGINEERING MANAGEMENT

Master's Courses

EIGHT COURSES ARE NECESSARY

Course Code	Course Title	Credit Hours
IM723	Advanced Operations Management	3
IM729	Discrete Systems Simulation	3
IM731	Health and Safety Management	3
IM733	Supply Chain Management	3
IM735	Strategic Management for Engineers	3
IM736	Advanced Maintenance Management	3
IM737	Human Resource Management	3
IM738	Advanced Project Management	3
IM739	Advanced Management of International Business	3
IM742	Design and Statistical Analysis of Experiments	3
IM743	Advanced Reliability Engineering	3
IM744	Productivity and Quality Improvement	3
IM745	Systems Engineering	3
IM746	Lean Six Sigma	3
IM747	Quality Management	3
IM751	Marketing Issues for Engineers	3
Subtotal	**8 Courses * 3 Credit Hours**	**24**

RESEARCH THESIS:

Course Code	Course Title	Credit Hours
IM 701	Master's Research Thesis (Part 1)	6
IM 702	Master's Research Thesis (Part 2)	6
Subtotal	**2 Parts * 6 Credit Hours**	**12**

Total	**36**

Courses

DETAILED STRUCTURE

GROUP (B)

Course Code : **IM 322**

Course Title : **Production and Operations Management 1**

Credit Hours : **0**

Course Description

Production, operations and productivity concepts – Production, operation decision making – Systems design, capacity and investment – Facility location and layout – Planning for goods and services – Process planning and selection – Forecasting demand – Aggregate demand – Aggregate planning and master scheduling.

Course Objectives

- Using quantitative models for demand forecasting.
- Grasping the different issues related to the design of goods and services.
- Learning the different process strategies.
- Understanding the basics of effective capacity planning.
- To able to evaluate and select among different facility locations.
- To learn the basic layout strategies.

Course Topics

- Introduction to Operations Management and Productivity Challenge
- Qualitative Forecasting Models
- Quantitative Forecasting Models
- Design of Goods and Services
- Process Strategy
- Capacity Planning
- Location Strategies
- Layout Strategy

References

- Render, B. and Heizer, J.; "*Principles of Operations Management*", Prentice-Hall

GROUP (B)

Course Code : **IM 341**

Course Title : **Engineering Statistics**

Credit Hours : **0**

Course Description

Introduction to statistical sciences, descriptive statistics and inferential statistics. Methods of graphical presentation of data, histogram, box plot, position parameters, mean, median, quartiles. Dispersion parameters, variance. Fundamentals of probability distributions for discrete and continuous variables sampling distributions.

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

- D.C. Montgomery, G.G. Runger, *Applied Statistics and Probability for Engineers*, Wiley.

GROUP (B)

Course Code : **IM 342**

Course Title : **Statistical Analysis Design and of Experiment**

Credit Hours : **0**

Course Description

Revision of engineering statistics, sampling distributions, point estimators, confidence interval estimations. Testing of hypothesis, linear regression, and introduction to design of experiments, single and multiple factors experiments.

Course Objectives

- To study how design and analysis of statistical experiments can aid engineers in the optimization of engineering systems having no objective function.

Course Topics

- Introduction to Statistical Analysis
- Introduction to Factorial Design
- The 2k Factorial Design
- Blocking and confounding in 2k Factorial
- Partial Confounding
- The Fractional Factorial Design
- Applications of FFD
- Replications
- The Factorial Experiments with Random Effects
- Approximate F-tests
- Approximate Confidence Intervals
- Signal to noise ratios
- Response Graph and Response Tables
- Inner/Outer Orthogonal Arrays
- Experimental Design Strategy
- Applications

References

- Douglas C. Montgomery and George C. Runger, *Applied Statistics and Probability for Engineers*, 4th Ed., Wiley, 2006

GROUP (B)

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

- E.L. Grant, W.G. Ireson, R.S. Leavenworth, *Principles of Engineering Economy*, 6th Edition, Wiley, New York
- Chan S. Park, *Contemporary Engineering Economics*, 2nd Ed., Addison Wesley.

GROUP (B)

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 (≤)
- The simplex method to solve problems with constraints (≥, =), 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

- Taha, H.; "*Operations Research*". Prentice Hall.

GROUP (B)

Course Code : **IM 533**

Course Title : **Human Resource Management**

Credit Hours : **0**

Course Description

Managers and their personnel concepts – personnel administration and resource policies – organizational planning and management development – managing and working in a changing world – motivation and team work – recruitment and selection – training and appraisal – worker participation in production problems wages, incentives and services.

Course Objectives

- Organize the need to coordinate activities associated with employees and define measures of employee effectiveness.
- Recognize environment al pressures, both external and internal, which contain human resource management policies and their implementation.
- Model human resource requirements to meet defined organizational objectives.

Course Topics

- Human Resources Management, an overview
- The environment of human resource management
- Job analysis and human resource planning
- Recruitment
- Internet Recruitment
- Selection
- Training and development
- Career planning and development
- Performance appraisal
- Compensations and benefits
- Safe and health work environment
- Labour management relations
- Internal employee relations

References

- Mond, Noe, Premeaux, "*Human resource management*" 8th ed., Prentice Hall
- Toring Ton, Hall, *Personnel management*, Prentice Hall
- Buchman, Huczynski, *Organization Behavior*, Prentice Hall

GROUP (B)

Course Code : **IM 534**

Course Title : **Computer Applications in Industry**

Credit Hours : **0**

Course Description

Spreadsheet modelling: introduction - spreadsheet modelling rules - using basic MS Excel functions and add-ins. Spreadsheet industrial engineering applications: Breakeven analysis - evaluation of alternatives - Forecasting - Inventory control - Regression analysis - MS pivot tables - MS solver - spreadsheet formulation of linear programming problems - spreadsheet optimization - goal seek analysis - using MS Project to model and solve PM problems.

Course Objectives

- Increase the knowledge of IE students in computer applications.
- Give hands-on experience in fields related to industrial applications of computer systems.
- Provide real life case studies to industrial engineering students.
- Provide hands on and extensive experience with spreadsheets

Course Topics

- Introduction to different computer applications.
- Introduction to spread sheets and Excel basic functions
- Basic inventory control models
- Introduction Spreadsheet optimization
- Linear programming applications
- Data analysis using spread sheets
- Introduction to Project planning
- Project planning using MS Project
- Project costing using MS project
- Project execution and control using MS Project
- Multiple projects planning and integration with MS Excel
- Introduction to computer and spreadsheet simulation
- Introduction to discrete event simulation

References

- Bernard W. Taylor, *Introduction to Management Science*, Student CD Package, 8th Ed., Prentice Hall

GROUP (B)

Course Code : **IM 538**

Course Title : **Marketing Management**

Credit Hours : **0**

Course Description

The evaluation of markets and marketing – The marketing environment – demand and market study – buyer behaviour; consumer and organizational markets. The marketing mix – marketing information system – development of new products and services – product life cycle – pricing and promotional distribution systems – development and marketing plan.

Course Objectives

- To enable the student to analyze the marketing process into its fundamental components.
- To master some techniques such as AHP in market segmentation and in selection of optimum promotion policies.
- To give students an access to methods of pricing.
- To introduce the basic concepts of supply chain management.

Course Topics

- The marketing management process
- Marketing information systems
- Market segmentation and Targeting
- Product development and product life cycle
- Application of AHP in product development
- Pricing techniques
- Pricing strategies and policies
- Promotional mix
- Communication systems
- Methods of estimation of promotion budgets
- Distribution systems
- Supply chain management

References

- T.C. Kinneat, *Marketing Research*; McGraw Hill
- D.W. Graven, *Marketing*; Addison Wesley
- M.W. Pride, *Marketing*; Houghen-Miffiln

GROUP (B)

Course Code : **IM 539**

Course Title : **International Business Management**

Credit Hours : **0**

Course Description

Introduction. International business environment. International trade and foreign investments. Foreign exchange. Import and export. Operations and human resource management.

Course Objectives

- To gain basic knowledge about the means of managing international business.
- To understand the effect of different environmental frameworks on international business.
- To know the theories and institutions related to trade and investment.
- To understand the dynamics of international business-government relationships.
- To be able to evaluate and select overlaying tactical alternatives.

Course Topics

- Introduction to Course
- Overview of International Business Management
- Cultural Environments Facing Business
- Political Environments Facing Business
- Economic Environments Facing Business
- International Trade Theory
- Government Influence on Trade
- Regional Economic Integrations and Cooperative Agreements
- Foreign Direct Investment
- Government Attitudes Toward Foreign Direct Investment
- Country Evaluation and Selection
- Global Manufacturing and Supply Chain Management

References

- Daniels, Radebaugh, and Sullivan; "*International Business: Environments and Operations*"; Prentice Hall.

GROUP (B)

Course Code : **IM 545**

Course Title : **Total Quality Management**

Credit Hours : **0**

Course Description

History and evolution of quality, definition of quality, basic concept of total quality management, philosophies of leading sags of quality Deming, Juran, Ichikawa, Crosby, Tagushi, Chigo Chingo characteristics of quality distribution parameters, relationship between quality parameters, some statistical process control tools, continuous sampling plans process capability, quality cost.

Course Objectives

- Introduction and primary elements of quality management.
- Process orientation, customer focus, management commitment.
- Use of statistics and quality master.
- Company wide dynamics.

Course Topics

- What is quality management? Why quality management?
- Primary elements of quality management
- Implementing quality management
- Implementing quality management
- Quality Masters
- Company wide dynamics
- Supervisory level dynamics
- Maximizing individual performance
- Organizing for quality management
- Group technologies
- Statistical tools
- Specialized techniques

References

- *Total quality management. A cross functional perspective*, ASNOK
- H. Cstin, Haccourt Brace, "*Total Quality Management*" College Publishers, 1994.

GROUP (B)

Course Code : **IM 546**

Course Title : **Reliability Engineering**

Credit Hours : **0**

Course Description

Principles of reliability, failure rate and its relation to reliability, probability distribution of the time to failure, exponential and Weibull distributions, reliability of systems, series and parallel systems, stand by redundancy, systems mean time to failure, mean residual life, reliability in design. Failure mode effect analysis, failure tree analysis, reliability testing and analysis, warranty problems.

Course Objectives

- To enable students to build up their capabilities in the domain of reliability analysis and testing.
- To apply the findings of this subject into systems engineering.

Course Topics

- Review of probability concepts
- Failure probability distributions
- Systems Reliability.
- Reliability Improvement:
- Replacement.
- Warranty.
- Preventive maintenance.
- Failure Mode Effect and Criticality Analysis.
- Failure Tree Analysis.

References

- El Sayed A. El Sayed; *Reliability Engineering*, Addison Wisley Longman, 1996.

GROUP (A)

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

- Ashby, M., Shercliff, H. and Cebon, D., "*Materials: engineering science, processing and design*", 1st ed., Butterworth-Heineman, 2007.
- Ashby, M.F., "*Materials Selection in Mechanical Design*", Pergamon Press, 2005.
- Budinski, K.G. and Budinski, M.K., "*Engineering Materials: Properties and selection*, 8th ed., Prentice Hall, 2005.

GROUP (A)

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

- Ashby, M., Shercliff, H. and Cebon, D., "*Materials: Engineering Science, Processing and Design*", 1st ed., Butterworth-Heineman, 2007.
- Jacobs, J.A. and Kilduff, T.F., "*Engineering Materials Technology: Structures, Processing, Properties, and Selection*", 5th ed., Prentice Hall, 2005.

GROUP (A)

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

- Ronald Askin and Charles Stand ridge, "*Modelling and Analysis of Manufacturing Systems*". John Wiley.
- Katdundo Hitomi, "*Manufacturing System Engineering*". Taylor and Francis
- J. T. Black; "*The design of the factory with a future*". McGraw Hill.

GROUP (A)

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

- Mix, P. E.; "*Introduction to Non-destructive Testing: A Training Guide*". 2nd Ed., Wiley, 2005.
- McEvily, A. J.; "*Metal Failures: Mechanisms, Analysis, Prevention*", Wiley, 2001.
- Raj, R. and Jayakumar, T.; "*Practical Non-destructive Testing*", Woodhead publishing.

GROUP (A)

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

- James A. Rehg and Henry W. Kraebber, "*Computer Integrated Manufacturing*", Prentice Hall.
- Mikell P. Groover, "*Automation, Production Systems, and Computer-Integrated Manufacturing*", Prentice Hall.

GROUP (A)

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

- Hopp, W. J. and Spearman, M. L.; "*Factory Physics*". McGraw-Hill, 2001.
- Askin, R. G. and Goldberg, J. B.; "**Des***ign and Analysis of Lean Production Systems*", Wiley, 2002.
- Nahmais, S.; "*Production and Operations Analysis*". 5th Ed., McGraw-Hill, 2005.

GROUP (A)

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

- Kusiak, A.; "*Computational Intelligence in Design and Manufacturing*", Wiley, 2000.
- Konar, A.; "*Artificial Intelligence and Soft Computing*". CRC Press, 2000.

GROUP (A and B)

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

- Marks, J.G. "*Operation Management, Theory and Problems*". McGraw Hill.
- Weiss, H.J and Gershon, M.E., "*Production and Operations Management*". Allyan and Bacon, Inc.

GROUP (A)

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

- Lee, J., Liu, Y. D., and Gordon-Becker, S.; "**Intr***oduction to Human Factors Engineering*". 2nd Edition, Prentice Hall, 2004.
- K.H.E. Kroemer, H.B. Kroemer, and K.E. Kroemer-Elbert; "*Ergonomics: How to Design for Ease and Efficiency*". 2nd Edition, Prentice Hall, 2001.

GROUP (A)

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

- Hiller and Liberman; "*Operations Research*". McGraw-Hill.

GROUP (A)

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.

GROUP (A)

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

- Tompkins, J. A., White, J. A., Bozer, Y. A., and Tanchoco, J. M. A.; "*Facilities Planning*", Wiley
- Meyers, F. E. and Stephens, M. P.; "*Manufacturing Facilities Design and Material Handling*". 3rd Edition, Prentice Hall, 2005.

GROUP (A and B)

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.
- Kelton, W. D., et al.; "*Simulation with Arena*", McGraw-Hill.
- Bennett, B. S. *Simulation Fundamentals*. Prentice-Hall.

GROUP (B)

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 work place 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

- C. Ray Asfahl; "*Industrial Safety and Health Management*". Pearson Prentice Hall, 2003.

GROUP (A)

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

- Bartholdi III, J and Hackman S., T., "*Warehouse and Distribution Science*"; Supply Chain and Logistics Institute at the Georgia Institute of Technology, 2008.
- Emmett, S.; "*Excellence in Warehouse Management, how to minimize cost and maximize value*" Purchasing and Supply Chain Management", Wiley, England, 2005, ISBN: 978-0-470-01531-5

GROUP (A and B)

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

- Bowersox, D. J., Closs, D. J., and Cooper, M. B.; "*Supply Chain Logistics Management*". McGraw Hill, 2002.
- Monczka, R., Trent, R., and Handfield, R.; "*Purchasing and Supply Chain Management*". 2nd Edition, South-Western Thomson Learning, 2002.
- Lambert, D.M, (2005), *Supply Chain Management: Processes, Partnerships, Performance*, Supply Chain Management Institute, Sarasota, FL.
- Simchi-Levi, D., Kaminsky, P. and Simchi-Levi, E., (2004), *Managing the Supply Chain: the Definitive Guide for the Business Professional,* McGraw-Hill, New York, NY.

GROUP (A)

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

- Simchi-Levi, D., Kaminsky, P., and Simchi-Levi, E., "*Designing and Managing the Supply Chain*". 2nd Edition, McGraw Hill, International Edition, 2002.
- Monczka, R., Trent, R., and Handfield, R.; "*Purchasing and Supply Chain Management*". 2nd Edition, South-Western Thomson Learning, 2002.

GROUP (B)

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

- Pearce and Robinson; "*Strategic Management Formulation, Implementation and control*". 7th Edition.

GROUP (B)

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
- Frank Herbaty, *Handbook of maintenance management*, NOYES publications, 1990.
- Joseph D. Patton, Jr., *Preventive maintenance*, Instrument society of America, Prentice Hall, 1983.
- Anthony Kelly, *Maintenance strategy*, 1998.

GROUP (B)

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

- Dessler, G., "*Human Resource Management*". Prentice - Hall.

GROUP (A and B)

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

- James P. Lewis, "*The project Manager Desk reference. A comprehensive guide planning, scheduling, evaluation, control and systems*". McGraw Hill, 1995.

GROUP (B)

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

- Daniels, J. D., Radebaugh, L. H., and Sullivan, D. P.; "*International Business: Environments and Operations*". 10th Edition, Prentice-Hall, 2004.

GROUP (A and B)

Course Code : **IM 742**

Course Title : **Design and Statistical Analysis of Experiments**

Credit Hours : **3**

Course Description

Hypotheses Testing – Single Factor Experiments – Factorial design – Robust design – nonparametric statistics.

Course Objectives

- To enable student to apply the finding of statistical analysis and experimental design in his master's thesis.

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, Runger, *Applied Statistics and Probability for Engineers*, Wiley.
- D.C. Montgomery, *Design and Analysis of Experiments*.

GROUP (A and B)

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
- 0

References

- El-Sayed A. El-Sayed, "*Reliability Engineering*", Addison Wisley.
- John P. Bentley, "*Introduction to Reliability and Quality Engineering*", Addison Wisley.

GROUP (A and B)

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

- John L. Hardesky, *Productivity and quality Improvement - A practical guide*, McGraw-hill international. Ed., Industrial Engineering Series, 1988
- Deming, W.D., *Quality, productivity and Competitive position*, Center for Advanced Engineering Study, Cambridge, Massachusetts, USA. 1982.
- Grant, E.L. and Richard Leavenworth, *Statistical Quality Control*, McGraw-Hill, New York, 1979.

GROUP (B)

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

- Blanchard, B. S. and Fabrycky, W. J.; "*Systems Engineering and Analysis*", 4/E, Prentice Hall, 2006.
- Sterman, J., "*Business Dynamics: Systems Thinking and Modeling for a Complex World*", 1st Edition, McGraw-Hill, 2000.
- Pidd, M.; "*Systems Modelling: Theory and Practice*", Wiley, 2004.

GROUP (A and B)

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

- Bass, I.; "*Lean Six Sigma Using SigmaXL and Minitab*". McGraw-Hill, 2009.
- Martin, J.; "*Lean Six Sigma for Supply Chain Management*". McGraw-Hill, 2006.
- George, M., Rowlands, D. and Kastle, B.; "*What Is Lean Six Sigma?*" McGraw-Hill, 2003.
- El-Haik, B. and Al-Aomar, R.; "*Simulation-based Lean Six-Sigma and Design for Six-Sigma*", Wiley, 2006.

GROUP (B)

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

- Summers, D. C. S.; "*Quality Management*". 2nd Edition, Prentice Hall, 2009.
- Goetsch, D. L. and Davis, S. B.; "*Quality Management*". 5th Edition, Prentice Hall, 2006.
- Foster, S. T.; "*Managing Quality: Integrating the Supply Chain*". 3rd Ed., Prentice Hall, 2007.
- Dale, B. G., van der Wiele, T., and van Iwaarden, J.; "*Managing Quality*", 5th Ed., Wiley, 2007.

GROUP (B)

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

- Philip Kotter; "*Marketing Management, Analysis, Planning, Implementation, and Control*". Prentice Hall, 1990.

Faculty Members

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- **ABDEL-RAZEK KANDEIL**
  Ph.D. (1979) Carleton University, Canada
  Materials and Manufacturing Engineering

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  Ph.D. (1970) Soviet Union
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  Industrial Planning

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  Systems Modelling and Analysis

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  Measurements and Quality Engineering

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  Material Science and Engineering