



B.Sc. in Industrial Engineering Course Descriptions

IND 212 ENGINEERING DESIGN AND DRAFTING (2: 2-2)

Introduction to design: role of design in engineering, problem analysis, conceptual design and analysis, systems approach and detailed design including design for product life cycle. Technical drawing in compliance with engineering standards: orthographic and auxiliary views, sections, dimensioning and tolerancing, assembly and working drawings. Sketching and CAD-based methods. A team-based design project will provide an overview of real design situations.

IND 301 ENGINEERING ECONOMICS (3: 3-0)

Engineering economic decision making based on comparisons of the worth of alternative courses of action with respect to expected costs and benefits. Topics to be covered include comparison methods of present, annual worth of cash flow, and internal, external rates of return, depreciation, taxes, inflation and replacement analysis.

Pre-requisite : FES 103.

IND 303 WORK ANALYSIS AND ERGONOMICS (3: 3-1)

General IE functions are introduced. Operation process chart, flow process chart, flow diagram, worker and machine process chart, and gang process chart are considered as recording and analysis tools. Principles of motion economy and motion study are discussed for manual work design. Work measurement tools covered include predetermined time systems: MTM-1, MTM-2, MTM-3, Maynard Operation Sequence Technique (MOST) and introduction to computer-based MOST; time-study systems: fundamentals of continuous and snap-back techniques for stop-watch, datamyte and palm-pilots; and analytical systems: work sampling and standard data development. A work-system design project is introduced requiring the integration and analysis of the topics covered.

Pre-requisite : IND 212

IND 305 MANUFACTURING PROCESSES (3: 3-1)

An overview of manufacturing processes and methods with emphasis on understanding of the physical fundamentals of processes. The course will cover Material Removal Processes, Metal-Casting Processes and Equipments Forming and Shaping processes and Shaping Processes for Plastics. Introduction to areas of Engineering Metrology, Quality control, and related subjects. Labs will be used to demonstrate the operation and capabilities of machine tools and devices used in engineering Metrology.

Pre-requisite : FES 240, FES 270

IND 307 THERMOFLUIDS (3: 3-1)

The scope and limitations of thermodynamics, macroscopic-approach heat, work, energy and first law. Properties and state of simple substances and fluids. Control-mass and control-volume energy analysis. The second law of thermodynamics, entropy limiting cycle efficiencies, criteria for equilibrium. Conservation equations for the flow of fluids. Application to one dimensional fluid flow.

Pre-requisite : FES 240, FES 230

IND 2312 INTRODUCTION TO ENGINEERING MANAGEMENT (3: 3-0)

This study of the theories and practices of Management begins with an understanding of the environment in which they operate. This includes the task of the worker, the typical industrial organization, the formation and operation of a trade union. Case studies and in-plant assignments may be employed. The latest management theories and applications will be examined. The Japanese industrial organization and the new role of Management will be studied .

IND 314 ALGORITHMS AND WEB-BASED SYSTEMS (3: 3-1).

The first part of this course is concerned with the design and analysis of algorithms. Topics include algorithm analysis and design, data structures, basic algorithms for searching and sorting, recursion, list processing. Students will be writing programs in C. The second part of this course is an introduction to web programming. Topics include HTML fundamentals and CGI-PERL scripting. Assignments will involve programming online search routines and web-based industrial engineering applications.

Pre-requisite : FES 111, FES 201

IND 316 ELECTRIC CIRCUITS (3: 3-1)

Fundamentals of electricity and electronics for non-electrical engineering students. Passive electrical components and electrical power sources. Characteristics of electric circuits, both d.c. and a.c. Circuit analysis and theorems. Steady-state, transient, and resonant modes. Dependant sources and amplifiers. The operational amplifier in various small-signal and large-signal situations. Instrumentation applications using resistive input transducers

Pre-requisite : FES 241

IND 318 FACILITIES DESIGN (3:3-0)

Principles and practices in layout and material handling for design of industrial and service facilities. Analytical treatment of facilities location, physical layout, material flow and handling. Integration of product, process and functional design of facilities. Use of design projects for applying fundamental concepts.

Pre-requisite : IND 303

IND 401 OPERATIONS RESEARCH I (3: 3-1)

Study of the basic principles of Operations Research with special emphasis on the paradigms associated with linear programming and queuing theory. These include generic modelling; mathematical modelling; the "max", "min", and "mixed case" simplex algorithms; sensitivity analysis; duality; "assignment", "transportation" and "transshipment" models; and basic principles and models associated with queuing or "waiting-line" problems.

Pre-requisite : IND 312, IND 318

IND 403 MODELING AND SIMULATION (3: 3-1)

Simulation models of discrete and continuous, deterministic and stochastic systems in terms of procedural behaviors. Dynamic simulation models will also be studied. Formulating and implementing simulation models, verification and validation of models, analysis of input and output data, statistical techniques for comparing alternative systems. Computer simulation languages and simulators will be introduced.

Pre-requisite :...IND 314

IND 405 QUALITY ASSURANCE (3: 3-0)

Introduction to the design of experiments as well as statistical quality control. Topics on experimental design include single-factor experiments, block designs, factorial designs, 2-factor experiments and Taguchi's approach to parameter design. Topics on quality control include product flow chart, cause-effect diagram, Pareto Analysis, statistical process control, acceptance sampling and Taguchi's approach to quality.

Pre-requisite : FES 102

IND 412 PRODUCTION AND INVENTORY SYSTEMS (3: 3-0)

Features of production/service systems, methods of modeling their operation and their control system. Topics include aggregate planning, forecasting techniques, work-force and operations scheduling and material requirement planning. Models and techniques for managing inventory systems. The deterministic and stochastic inventory models and lot sizing in continuous and periodic review systems will be included. Analytical approaches in the solution of system problems will be studied

Pre-requisite :IND 401.

IND 414 PROJECT MANAGEMENT (3: 3-0)

Examination of the fundamentals of project management using a life-cycle approach, from idea generation to termination/close phase. Human, mathematical, engineering and managerial issues surrounding project management. Project screening and selection, evaluation methods of projects, project structures, management and control, project scheduling, resource management, life-cycle costing, research and development projects, computer support for project management, and project termination.
Pre-requisite :...IND 301, IND 312

IND 416 COMPUTER AIDED MANUFACTURING (3: 3-2)

Integration of automation components into manufacturing systems. Topics include actuators, sensors, computerized data acquisition (including vision systems), automated guided vehicle systems, automated storage and retrieval systems, robots and their peripheral equipment. Analysis and discussion of operational issues in computer integrated manufacturing.

Pre-requisite :IND 305

IND 418 LAW AND PROFESSIONALISM (3: 3-0)

Study and analysis of the engineering profession, business corporations and organization, Tort liability and contract law, legal and ethical aspects of engineering practice, business contract law and conflict resolution, intellectual and industrial property, employment and labour law including occupational health and safety, WHMIS, corporate social responsibility, environmental considerations and sustainable development, international standards and trade. Topics will be tailored to local conditions.

Pre-requisite :completion of years 1-2

TECHNICAL ELECTIVES**IND 451 INFORMATION SYSTEMS (3:3-1).**

First order logic, knowledge representation, structured analysis and design technique (SADT), database systems from a systems analyst perspective as a foundation in design and analysis of information systems (IS). Management principles as the framework of data collection and implementation of IS will be discussed. Spreadsheet software and some programming in C or Pascal will be required.

Pre-requisite :FES 111, IND 314

IND 452 DECISION SYSTEMS (3: 3-1)

Analytical approaches to decision-making. Topics to be covered include decision structuring, influence diagrams, decision trees, subjective probability, utility theory, multiple objective decision-making, and multiple participant decision making.

IND 454 RISK ASSESSMENT (3: 3-1)

Introduction of reliability engineering and risk assessment for engineering systems. Topics to be covered include reliability functions, reliability distributions, analysis of failure data, reliability of systems, probabilistic risk assessment, design for reliability, maintenance, reliability testing, and organizational aspects of engineering system safety.

Pre-requisite: FES 103

IND 456 FLEXIBLE MANUFACTURING SYSTEMS (3: 3-1)

Overview of the planning, design, implementation, and control of flexible manufacturing systems. Concept of flexible manufacturing and types of manufacturing systems such as cellular manufacturing and the application of various artificial intelligence techniques to the design of cellular manufacturing systems. Basic components of flexible manufacturing systems: selection of automated material handling systems, part type selection and tool allocation models, workpieces and tools routing, capacity planning, and scheduling for flexible manufacturing systems.

Pre-requisite :IND 416

IND 460 PRODUCT DESIGN AND DEVELOPMENT (3:3-2)

Importance of Product Development. Quality Function Deployment. Functional Decomposition. Modularization. Intellectual Property. Case Studies and Project.

Pre-requisite: IND 305, IND 412

IND 462 STATISTICAL MODELS AND DESIGN OF EXPERIMENTS (3:3-0)

Descriptive and Inferential Statistics, Data Representation, Probability Theory and Random Distributions, Point and Interval Estimations, Hypothesis Testing, Analysis of Variance, Randomized Blocks, Latin Squares and Related Designs, Incomplete Block Designs, Factorial Designs, Fractional Factorial Designs, Regression Analysis and Goodness of Fit Tests, Response Surface Methods, Taguchi Methods - Loss Function and Optimization. **Pre-requisite:** FES 103, FES 111, FES 203

IND 464 KINEMATICS AND DYNAMICS OF MECHANISMS AND ROBOTS (3:3-2) Components of Mechanism. Planar Kinematics Analysis and Modeling. Linkage Design. Dynamics of Planar Systems. Spatial Mechanisms. Industrial Robotics. Manipulator Kinematics. Trajectory Planning. Manipulator Dynamics and Control. Case Studies.

Pre-requisite: FES 202, IND 116, IND 205

MGT 101 INTRODUCTION TO BUSINESS MANAGEMENT: An introduction to the principal concepts and theories of international business management. The course examines globalization's impact on the organization, operations, strategies and future opportunities of international business. Fundamental management concepts applicable to all businesses, both international and domestic, are examined.

ACT 2001 FINANCIAL ACCOUNTING: An in depth examination of the development of financial statements, and the assessment of their uses and limitations. Particular attention is given to accounting problems and practices involving merchandising, inventories, and cash.

Pre-requisite: MGT 101