DEPARTMENT OF INDUSTRIAL ENGINEERING AND ENGINEERING MANAGEMENT

- Undergraduate Courses
- Postgraduate Courses

Undergraduate Courses:

IEEM 001 Academic and Professional Development I [0 credit]
A compulsory one-year course for IEEM students. This course aims to provide academic and professional advising to students and to develop their technical and non-technical communication skills. Industrial and academic seminars will be offered. Graded P or F.

IEEM 002 Academic and Professional Development II [0 credit]
A compulsory one-year course for IEEM students, which is a continuation of IEEM 001. Graded P or F.

IEEM 003 Academic and Professional Development III [0 credit]
A compulsory one-year course for IEEM students admitted prior to 1999-2000, which is a continuation of IEEM 002. Graded P or F.

IEEM 099 Industrial Training [0 credit]
For students of the IEEM Department only. A practical training course of a total duration of about ten weeks covering safety, CAD, drawing, basic metal cutting and fitting practice, electronic product assembly techniques, database applications, internet for industrial and commercial applications plus three additional modules in one of the following areas - machining and metal work; electrical and electronic practice; or computer applications. Graded P or F.

IEEM 101 Industrial Engineering and Modern Logistics [3-0-0:3]
For non-IEEM students only. Trace the evolution of technology management ideologies and techniques, and their synergy with industry development, from manufacturing in early days to logistics and supply chain management lately. Use case studies throughout to illustrate how industrial engineers solve problems in their functional domains.

IEEM 110 Computing in Industrial Applications [2-0-3:3]
Introduction to microprocessor technologies and computer hardware with industrial applications. Computer systems for industrial control. Local area networks and communication. C programming primarily by self-study.

IEEM 115 Product Design and Communication [2-0-3:3]
Fundamentals of product design from an industrial engineering perspective, including market research and communication, process design and evaluation, design for manufacturability/assembly, design for usability and safety, aesthetics design, and design for reuse. Methods and theories of design and case studies are presented.

IEEM 120 Engineering Management [3-0-0:3]
(Students of the Departments of CENG and IEEM admitted in 2000-01 academic year should follow this course.) For Science and Engineering students only. Techniques relating to managing engineering activities; engineering managerial functions, productivity assessment/improvement, managing the quality function and communications. *Exclusion*: IEEM 220

IEEM 141 Logistics and Freight Transportation Operations [3-1-1:3]
Introduction to intermodalism, globalization, third-part logistics, carrier logistics, shipper logistics, manufacturing logistics, supply chain management, and rules, conventions and practices in various transportation modes. Discussion of characteristics, issues, and practices of air cargo systems, surface transportation systems, sea freight operations, and terminal operations.

IEEM 151 Engineering Probability and Statistics [3-1-0:4]
This is a systematic introduction to basic probability theory and statistics for engineering, including data collection and analysis, sample space and sampling methods, calculus of probability, conditional probability, expectation, moments, discrete and continuous probability distributions, point and interval estimation, hypothesis testing and linear regression analysis. *Exclusions*: BISC 215, ISMT 111, MATH 241, MATH 244 *Prerequisite*: AL Pure Mathematics/AL Applied Mathematics or MATH 001/006/011

IEEM 201 Operations Research I [3-1-0:3]
Introduction to deterministic optimization modeling and algorithms. Topics include linear programming, dynamic programming, network flows, and some nonlinear models. Application softwares. *Exclusions*: IEEM 202, ISMT 271

IEEM 202 Introduction to Operations Research [2-1-0:2]
This course provides elementary introduction to deterministic models in operations research. Topics cover linear programming, dynamic programming network flows, and some nonlinear programming. The focus of this course is more an applications and less on theories. *Exclusions*: IEEM 201, ISMT 271

IEEM 213 Ergonomics in Work Place Design [2-0-3:3]
Introduction to ergonomics, biomechanics and work physiology. Cumulative trauma disorders. Work environment stressors and their reduction in the workplace. Introduction to tool design. *Prerequisite*: IEEM 151

IEEM 215 Manufacturing Processes I [2-0-3:3]
Machine tools, tools and tooling. Machining, fabrication, joining, assembly, and welding. Experiments in cutting tool performance involving tool geometry, speed, surface finish, tool life and production economics associated with those variables. Concepts of NC, CNC.

IEEM 220 Engineering Management [3-0-0:3]
Techniques relating to managing engineering activities; engineering managerial functions, productivity assessment/improvement, managing the quality function and communications. *Exclusion*: IEEM 120

IEEM 223 Engineering Economy [3-0-0:3]
Application of microeconomics to engineering and managerial decision making. Basic accounting cash flow analysis of capital investment. Present worth, rate of return, taxes and depreciation, capital budgeting, cost accounting, risk and uncertainty. *Exclusions*: ECON 110, ECON 111, ECON 113 (prior to 2004-05), ECON 115, ECON 191, SOSC 144

IEEM 225 Operations Research II [3-1-0:3]
Poisson process, Markov process, and Markov decision processes; inventory theory, reliability, queueing theory. Application softwares. *Prerequisite*: IEEM 151 or MATH 244

IEEM 227 Quality Engineering [3-1-1:3]
Control charts and statistical on-line quality control methods, off-line quality control and parameter design, modern quality philosophy and Taguchi method. *Exclusion*: ISMT 263 *Prerequisite*: IEEM 151 or MATH 244

IEEM 230 Industrial Data Systems [2-0-3:3]
Fundamental concepts on database, network, object-oriented methodology, and system integration; design and development of database systems for productions (e.g. MRP), manufacturing (e.g. CAPP), and management (e.g. BPR). *Exclusions*: ISMT 226, COMP 231 *Prerequisites*: COMP 102 and COMP 103

IEEM 241 Routing and Fleet Management [3-1-0:3]
Applications and algorithms for network optimization, vehicle routing, shortest path problems, maximum flow problems, matching models and dynamic vehicle allocation. *Prerequisite*: IEEM 201

IEEM 245 Logistics Planning and Service Management [3-0-0:3]
Supply management, purchasing, store management, distribution of goods and services, pricing; productivity in services, training and services logistics. *Exclusion*: ISMT 366

IEEM 300 Special Topics [0-4 credit(s)]
Selected topics of current interest. May be repeated for credit if different topics covered.

IEEM 310 Integrated Production Systems [3-1-0:3]
Basic concepts and techniques in design and operational control of integrated production systems, including MRP, JIT, forecasting, production planning, inventory control, and shop floor control and scheduling. *Exclusions*: ISMT 161, ISMT 162 *Prerequisites*: IEEM 201 and IEEM 225

IEEM 311 Engineers in Society [1-0-0:1]
[Previous Course Code: ENGG 311] For Engineering students only. This is a series of seminars presented by professionals from social and engineering sectors and faculty members on topics including the introduction to local industry, responsibility and accountability of a profession in engineering, professional ethics, the impact of information technology revolution on society and engineering, legal aspects of engineering, business fundamentals, project management, product engineering and quality assurance, and environmental and occupational risk management. Graded P or F.

IEEM 313 System Simulation [3-2-0:3]
Design of continuous and discrete simulation models, statistical foundations and methodology, generation of random variables, simulation experiments, test of hypotheses, analysis of simulated time series, programming languages. *Pre-/Corequisite*: IEEM 225

IEEM 317 Product Design and Lifecycle Management [2-0-3:3]
This course covers different aspects of product development management. Topics include innovation management, techniques for idea generation, CAD, product lifecycle management, rapid prototyping and organizing and managing the development teams. Also projects and business plans will be carried out in the course.

IEEM 320 Facilities Layout and Material Handling [3-0-1:3]
Facility location, process and material flow analysis, space allocation and plant layout, computerized layout planning, material handling equipment, material handling system design. *Prerequisite*: IEEM 201

IEEM 331 Electronic Commerce [3-0-3:3]
Introduction to contemporary technology (such as EDI, Internet/Intranet/Extranet, Digital Library, Client/Server, etc.) of electronic commerce and practical applications in manufacturing, transportation and service industry. *Exclusions*: IEEM 300J, ISMT 231 *Prerequisite*: COMP 102 or COMP 104

IEEM 341 Global Supply Chain Management [3-0-0:3]
[Previous Course Code: IEEM 300G] An introduction to the design, development, and management of integrated logistics supply chain systems, including inventory management, distribution channels, and information systems. Emphasis on the impact of e-business on companies and industries, especially how the Internet changes the

way in which goods and services flow through the value chain from manufacturers to customers. *Exclusions*: EEMT 530, ISMT 367 *Pre-/Co-requisite*: IEEM 310

IEEM 365 Cognitive Engineering and Human Performance [2-0-3:3]
Introduction to cognitive engineering and human performance. Perception, psychophysics, attention, time-sharing, workload and their implications on human performance.

IEEM 391 Logistics Management Project I [0-0-9:3]
A final year project related to transportation logistics management supervised by a faculty member. A project proposal and a final report are required. Graded PP.

IEEM 392 Logistics Management Project II [0-0-9:3]
Continuation of IEEM 391. A project report and a final report are required. *Prerequisite*: IEEM 391

IEEM 395 Industrial Engineering Special Project [1-4 credit(s)]
A special project supervised by a faculty member. A project proposal and a final report are required. May be repeated for credit if the projects cover different topics.

IEEM 397 Industrial Engineering Project I [0-0-9:3]
A final year project supervised by a faculty member. A project proposal and a final report are required. May be graded PP.

IEEM 398 Industrial Engineering Project II [0-0-9:3]
Continuation of IEEM 397. A project report and a final report are required. *Prerequisite*: IEEM 397

Postgraduate Courses:

IEEM 507 Operations Research Applications [3-0-0:3]
This course covers various applications of Operations Research. It focuses on integrating problem identification, problem definition, modeling, software usage, analysis, report writing, and presentation skills. Topics covered include mathematical programming, sensitivity analysis, dynamic analysis, dynamic programming, inventory models, network models, and forecasting models. *Exclusions*: IEEM 300H, IEEM 301 *Prerequisite*: IEEM 201 or equivalent

IEEM 511 Information System Design [2-0-3:3]
Systems engineering methodology applied to the design of information systems for the management of all types of organizations. Data base management systems. Different phases of system design and implementation.

IEEM 513 Manufacturing System Design [2-0-3:3]
Application of contemporary systems engineering tools and methodolgy to design relevant manufacturing systems from enterprise level to integrate with various modules such as shop floor, warehouse, logistics and others.

IEEM 517 Advanced Production Planning and Control [3-0-1:3]
Operation mission and modern production planning and control systems. MRP, JIT , and OPT methods. Integrated processes and systems design. Software packages will be introduced through a simulated company environment. *Exclusion*: ISMT 561

IEEM 523 Deterministic Models in Operations Research [3-0-0:3]
This course focuses on the theory and the use of deterministic optimization models for real life decision making problems. It covers linear, integer, combinatorial and nonlinear programming. *Prerequisite*: IEEM 201

IEEM 525 Stochastic Models in Operations Research [3-0-0:3]
Poisson processes, renewal processes, Markov processes. Fundamental concepts and applications of these stochastic processes demonstrated through examples in queueing, inventory and reliability models. *Background*: MATH 244

IEEM 526 Design and Analysis of Engineering Experiments [3-0-0:3]
Fundamental principles of planning, designing, and analyzing statistical experiments. Probability distributions, tests of hypotheses, analysis of variance, and the applications using randomized block, factorial, and fractional factorial experimental designs. *Background*: MATH 244 *Exclusion*: EESM 526

IEEM 531 Total Quality Management [3-0-0:3]
Strategic importance and economic impacts of quality, managerial issues in planning and designing quality assurance systems, control of quality systems, employee involvement, statistical concepts in design for quality, inspection, process control, and ISO 9000. *Exclusion*: EESM 531

IEEM 532 Design for People [3-0-0:3]
Application of ergonomic principles to the manufacturing environment. Introduction to work, workstation, tool and equipment design. Other topics include cumulative trauma disorders and their prevention, job and task analysis and lifting. *Background*: IEEM 213

IEEM 538 Technical Management [3-0-0:3]
Fundamental aspects of technical management in a knowledge based economy. Topics include defining technology strategy and program objectives, planning, staffing, budgeting, organization, motivation, leadership, implementation, review and evaluation, and promoting innovation and entrepreneurship.

IEEM 550 Global Manufacturing [3-0-0:3]
Planning and Design of Supply Chain and Product Development. Apply information technology for remote management. Students will engage in real life projects. Requires instructor's consent for course enrollment.

IEEM 552 Human-Computer Systems [3-0-0:3]
Theoretical paradigms in human-computer interaction and their application to interface designs. Human information processing in multiple-task situations. Physical, social and cognitive foundations of human-computer interaction.

IEEM 555 Financial Engineering [3-0-0:3]
Modeling, analysis, and computation of derivative securities. Applications of stochastic differential equations. Numerical techniques: finite-difference, binomial method, and Monte Carlo. Case studies and applications. *Background*: Advanced calculus, probability models and stochastic processes. *Exclusion*: FINA 598

IEEM 557 Network Optimization in Transportation Systems [3-0-0:3]
Modeling and algorithms for network problems in transportation systems, including shortest routing, linear and nonlinear flow problems, decomposition methods, dynamic routing strategies, traffic equilibrium, and vehicle management. *Background*: IEEM 201

IEEM 575 Computer-Aided Manufacturing [2-0-3:3]
CAD, Surface and solid models, Numerical control of 3- and 5- axis machines, CAM. *Exclusions*: MECH 552, MESF 552

IEEM 600 Special Topics in Manufacturing Systems [1-3 credit(s)]
Selected topics of current interest. May be repeated for credit if different topics covered.

IEEM 610 Special Topics in Systems Engineering/Operation Research [1-3 credit(s)]
Selected topics of current interest. May be repeated for credit if different topics covered.

IEEM 620 Special Topics in Engineering Management [1-3 credit(s)]
Selected topics of current interest. May be repeated for credit if different topics covered.

IEEM 630 Special Topics in Transportation Logistics Management [1-3 credit(s)]
Selected topics of current interest. May be repeated for credit if different topics covered.

IEEM 680 Departmental Seminar [1-0-0:0]
Series of seminars by faculty and guest speakers, repeated every semester. Research postgraduate students are expected to attend regularly and register for at least two semesters. Graded P or F.

IEEM 685 Advanced Seminar [2-0-0:0]
An in-depth study of a current research area in Industrial Engineering and Engineering Management. Offerings are announced each semester. Graded P or F.

IEEM 690 Research Project [1-3 credit(s)]
An independent research project carried out under the supervision of a faculty member. This course is only available for exchange, visiting and visiting internship students.

IEEM 695 Independent Study [1-3 credit(s)]
Selected topics in industrial engineering and engineering management studied under the supervision of a faculty member. Graded P or F. (Only one independent study course may be used to satisfy the course requirements for any postgraduate program in the Department of Industrial Engineering and Engineering Management.)

IEEM 698 MSc Industrial Engineering Design Project [0-0-12:6]
Independent research project carried out under the supervision of a faculty member. Should be relevant to industrial applications of IE disciplines. Normally taken at end of program.

IEEM 699 MPhil Thesis Research
Master's thesis research supervised by a faculty member. A successful defense of the thesis leads to the grade Pass. No course credit is assigned.

IEEM 799 Doctoral Thesis Research
Original and independent doctoral thesis research. A successful defense of the thesis leads to the grade Pass. No course credit is assigned.