

## Industrial Engineering: Course Descriptions

01206221	<b>Applied Probability and Statistics for Engineers</b> Prerequisite: 01417168 Probability, expected value and common probability distributions, sampling distributions, statistical inference for one-and-two sample problems, regression analysis, analysis of variance and their applications to industrial systems.	3(3-0-6)
01206222	<b>Applied Mathematics for Industrial Engineers</b> Prerequisite: 01417267 Mathematical model building, numerical linear algebra, fourier series and transform, closed form and numerical solutions for ordinary and partial differential equations, analysis of linear system under random parameters.	3(3-0-6)
01206223	<b>Introduction to Experimental Design for Engineers</b> Prerequisite: 01206221 Design of experiment, analysis of variance, multiple linear regression analysis, factorial experiment, fractional factorial experiment.	3(3-0-6)
01206251	<b>Engineering Economy</b> Analysis of economic aspects for engineering decisions under certainty and uncertainty, methods of measurement of equivalent value based on total investment analysis and incremental investment analysis, applications of replacement analysis, break-even analysis and government project analysis including effects of income taxes.	3(3-0-6)
01206311	<b>Manufacturing Processes I</b> Prerequisite: 01213211 Fundamental of manufacturing processes: foundry, forming, welding, powder metallurgy, hot and cold forming, cutting, turning, shaping, drilling, milling, surface finishing, gear manufacturing, rapid prototyping. Measurement and inspection.	3(3-0-6)
01206312	<b>Industrial Study</b> Industrial plant visits, data collection and analysis for problem solving, and reporting with presentations.	1(0-3-2)
01206321	<b>Operations Research for Engineers I</b> Prerequisite: 01206221 Techniques for solving deterministic problems: mathematical modeling, linear programming and dual problems, network models, inventory models, transportation and transshipment problems, assignment problems. Techniques for solving non-deterministic problems: decision making under uncertainty and risk, Games theory, critical path method for project management.	3(3-0-6)
01206322	<b>Quality Control</b> Prerequisite: 01206221 Quality concepts, evolution of quality control methods, quality planning and control in production process, statistical quality control, control charts, process capability, quality inspection, sampling, and quality improvement tools, reliability engineering in manufacturing, quality assurance, quality engineering, and related quality standards.	3(3-0-6)
01206341	<b>Industrial Work Study</b> Prerequisite:01206221	3(3-0-6)

	Principles of elements of works, analysis of production process by using of production process chart, flow process, man-machine chart, micro motion study, SIMO chart, work improvement and job design including applications of principles of motion economy, standardization of works operations, work sampling, time study principles, direct time study and elemental time data, determination of allowance factor and the use of standard time in establishing various production-based incentive schemes.	
01206342	<b>Production Planning and Control</b> Prerequisite: 01206321 Production planning and control system, forecasting techniques, inventory management, cost and profit analysis for decision making, production scheduling, production control, modern techniques in production planning and control.	3(3-0-6)
01206343	<b>Industrial Plant Design</b> Prerequisite: 01206341 Industrial plant design and layout techniques: plant location, product analysis, factors and causes influencing new layout; data collection and analysis; developing and presentation of layout considering employees, equipment, supporting system, material handling system, storage, and environmental surrounding.	3(3-0-6)
01206361	<b>Computer Applications for Industrial Engineers</b> Prerequisite: 01206321 Problems in industrial engineering and operational research, analysis and solving all or parts of the problems by applications of computer programs available, presentation by oral and written reports.	3(3-0-6)
01206362	<b>Automatic Production System</b> Prerequisite:01205201 Structure and work principle of measuring instrument for pressure, flow rate, and temperature. Pneumatic and electrical pneumatic systems. Hydraulic and electrical hydraulic systems. Programming of Programmable Logic Controller for controlling electrical pneumatic and electrical hydraulic systems. CNC machines.	4(3-3-8)
01206381	<b>Industrial Engineering Laboratory</b> Prerequisite: 01206221 Laboratory on work study, quality control, statistical experiment, use of measuring equipment in industry and mechanical machinery, plastic and other metal forming.	1(0-3-2)
01206390	<b>Co-operative Education Preparation for Engineers</b> Principles and concepts of co-operative education. Preparation for working with others; ethics in profession; communication and human relation; work safety and first-aid techniques; work planning and management; efficiency, effectiveness and evaluation of work; report writing and presentation.	3(3-0-6)
01206399*	<b>Internship</b> Internship for Industrial Engineering in private enterprises, government agencies, government enterprises or academic places at least 240 hours and at least30 workdays.	1

01206401	<b>Introduction to Safety Engineering</b> Basic principles of accidents, safety and safety management, technology and safety in workplaces, principles and methods for preventing fire accident in industries, safety laws in factories and occupational health management system.	1(1-0-2)
01206411	<b>Industrial Instrumentation and Measurement</b> Prerequisite: 01206221 The characteristics and use of analog and digital instrumentation applicable to industrial engineering problems, basic measurement theory, concepts of mechanical, electrical sensors, transducers, signal conditioning and recording devices, analysis of experimental data using statistical methods.	3(3-0-6)
01206412	<b>Tool Engineering</b> Prerequisite: 01206311 Theory of metal cutting, cutting tools, coolants, measurement standard, metrology, accuracy in measurement, jig and fixture, punch and die design.	3(3-0-6)
01206413	<b>Industrial Pollution</b> Prerequisite: 01206311 Industrial pollution; air pollution, waste water, solid waste, hazardous waste and noise with emphasis on sources, cause and effects, control, treatment and disposal methods, environmental management system, waste minimization, duties and punishment according to Thailand's environmental laws.	3(3-0-6)
01206414	<b>Manufacturing Processes I</b> Prerequisite: 01206311 Selection of materials, machines and manufacturing processes, production planning and control, quality control and measurement, selection of supporting equipment and systems, numerical control, automation, computer aided for flexible manufacturing.	3(3-0-6)
01206421	<b>Simulation</b> Prerequisite: 01206321 Stochastic simulation, Monte Carlo techniques, random number generation techniques, verification of simulation model, and computer application to simulation problems.	3(3-0-6)
01206422	<b>Industrial Quality Assurance</b> Prerequisite: 01206322 Quality assurance principles, market and customer needs and requirements, product development and management, sourcing and supplier relation, quality assurance in manufacturing process, customer service and relations, product liability and warranty, consumer protection, quality cost and information system, quality audit.	3(3-0-6)
01206423	<b>Advanced Experimental Design for Engineers</b> Prerequisite: 01206223 Quality improvement techniques, relationship between factors in the industrial systems and their problems, statistical analysis and design of control in industrial work, advanced mathematical models, response surface methodology, and Taguchi method.	3(3-0-6)

- 01206424 **Quality Engineering** 3(3-0-6)  
 Prerequisite: 01206322  
 Quality engineering concepts, product design and specification, process design and planning, engineering process control, inspection and gauging, metrology technologies and calibration, measurement system analysis, engineering quality improvement, applications of computer in quality engineering.
- 01206425 **Operations Research for Engineers II** 3(3-0-6)  
 Prerequisite: 01206321  
 Techniques for solving non-linear programming problems: binary programming, integer programming, geometric programming, dynamic programming, branch and bound technique. Queuing theory. Techniques for solving probabilistic problems: Markov chain and simulation model.
- 01206431 **Industrial Management** 3(3-0-6)  
 Industrial organization and management concepts and theories of management, problem analysis and problem-solving process, organizational theories, function of management, controlling and performance evaluation, motivational tools, leadership, ethics and responsibility of engineers, behavior modification and interpersonal skills.
- 01206432 **Management Information System for Engineers** 3(3-0-6)  
 Prerequisite: 01206361  
 The role of the information system in the management and decision-making process, detailed development of management information systems through planning, design and implementation, introduction to information theory, the value of information, the information system and changes in the organization, examples and applications.
- 01206441 **Engineering Risk Analysis** 3(3-0-6)  
 Prerequisite: 01206221 and 01206251  
 Engineering risk management, types and classification of risk from both internal and external factors, tools and techniques for system analysis, internal control system reduce and prevent error of designed system.
- 01206442 **Energy Management** 3(3-0-6)  
 Prerequisite: 01206341  
 Energy conservation in industrial plants; audit and analysis of energy consumptions of lighting, air-conditioned, heat energy, air compression, and electrical systems; materials and products balance chart; techniques for energy conservation; value engineering applications in energy conservation.
- 01206443 **Ergonomics** 3(3-0-6)  
 Prerequisite: 01206341  
 Concepts of products and services designs, process design, injury prevention and workplace design; principles of anthropometry, human sensory, physiology and psychology of human being emphasis on customers and blue-and white-collar workers in organizations.
- 01206444 **Industrial Forecasting** 3(3-0-6)  
 Prerequisite: 01206221

	General approaches to forecasting and analysis of industrial trends, quantitative and statistical methods, industrial projects development, case study and forecasting simulation.	
01206445	<b>Inventory Control</b> Prerequisite: 01206321 Study of inventory systems: deterministic and probabilistic models, fixed versus variable reorder interval, dynamic and multistage models, statistical forecasting of demands and lead times, effects on the inventory models.	3(3-0-6)
01206446	<b>Value Engineering</b> Prerequisite: 01206311 Introduction to value engineering methodology, applications of value engineering methodology to product analysis, product design and manufacturing processes, study of material costs in order to achieve cost improvement without loss of product value, case studies and problems discussion.	3(3-0-6)
01206447	<b>Productivity Measurement and Management</b> Prerequisite: 01206341 Concepts, tools, and techniques for productivity measurement at the organizational, functional and individual levels; measure index, information grouping and reporting, information analysis for decisions and improvement. Integrating productivity with performance measurement: profitability, quality, quality of work life, innovation, effectiveness, and efficiency.	3(3-0-6)
01206448	<b>Shop Floor Control</b> Prerequisite: 01206341 Concepts of modern production control, production control system, techniques and process of production planning and control with emphasis on manufacturing scheduling.	3(3-0-6)
01206451	<b>Industrial and Commercial Laws</b> The relationship between laws and business, the laws relating to industrial and commercial operation: factory laws, hazard-material laws, labor laws, environmental laws, laws of production and industrial product standards, and laws relating to engineering profession.	3(3-0-6)
01206452	<b>Industrial Cost Analysis</b> Prerequisite: 01206221 Basic concepts of financial accounting, financial analysis and cost accounting. Cost concepts, traditional costing and activity – based costing, cost estimation, cost-volume-profit analysis, master budgeting, and capital budgeting. Cost system, job costing, process costing, and cost allocation.	3(3-0-6)
01206453	<b>Industrial Project Feasibility Study</b> Prerequisite: 01206251 Basic knowledge for preparation, analysis and appraisal of industrial projects feasibility study in various aspects in marketing, techniques, management, financing, economic, impacts and other related aspects with emphasis on quantitative and qualitative approaches.	3(3-0-6)
01206461	<b>System Engineering</b> Prerequisite: 01206221	3(3-0-6)

	Applications of life-cycle or concurrent engineering for system design for products, services, and management-based systems, a design process, operational requirements, maintenance and support policies, design for system reliability, maintainability, logistic support, human factors, economic feasibility, produce-ability, and retirement, design management issues risk, and supply and consumer chain.	
01206462	<b>Logistics System Design and Management</b> Prerequisite: 01206321 Analysis of the physical and non-physical flows for the supplier - producer - customer chain and for the functional units in a producer organization, understanding of system life-cycle, roles and importance of logistics, design and planning for implementing a logistic, ability to analyze logistic problems for corrective and preventive decision making.	3(3-0-6)
01206463	<b>Enterprise Resources Planning</b> Prerequisite: 01206342 and 01206361 Enterprise Resources Planning (ERP) as enterprise functions integrator. ERP system architecture, relationships with financial and accounting. Applied production planning and control theory in information system. ERP life cycles including implementation, operation, and maintenance. Business process improvement using ERP. Enterprise performance measurement and management.	3(3-0-6)
01206464	<b>Supply Chain Management and Modeling</b> Prerequisite: 01206321 Elements of supply chain networks. Mathematical modeling and network problems. Distribution network design. Facility location and allocation problem. Forecasting techniques. Inventory and warehouse management. Sourcing decision problem. Transportation system design, Vehicle routing problem. Traveling salesman problem. Information technology management.	3(3-0-6)
01206471	<b>Maintenance Engineering</b> Prerequisite: 01206221 Maintenance concepts, failure statistics and causes analysis, preventive maintenance system, planning and control of maintenance activities, spare parts controls, human resources for maintenance works, maintenance performance measurement and system appraisal for improvement.	3(3-0-6)
01206472	<b>Industrial Safety</b> Prerequisite: 01206311 or 01213215 Industrial safety laws, accident prevention techniques, relationship of safety designs to production efficiency, risk analysis, principles of industrial environmental control, safety management system and industrial psychology and first aid techniques.	3(3-0-6)
01206490	<b>Co-operative Education</b> On the job training as a temporary employee in order to get experiences from the assignment.	6
01206495	<b>Industrial Engineering Project Preparation</b> Preparation of project proposal, literature review, and progress report.	1(0-3-2)

01206496	<b>Selected Topics in Industrial Engineering</b> Selected topics in industrial engineering at the bachelor's degree level. Topics are subject to change each semester.	1-3
01206497	<b>Seminar</b> Presentation and discussion on current interesting topics in industrial engineering at the bachelor's degree level.	1
01206498	<b>Special Problems</b> Study and research in industrial engineering at the bachelor's degree level and compile in written reports.	1-3
01206499	<b>Industrial Engineering Project</b> Prerequisite:01206495 Projects of practical interest in various fields of industrial engineering.	2(0-6-3)