

# INDUSTRIAL ENGINEERING (INDSTENG)

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## **INDSTENG 2130 Fundamentals of Industrial and Systems Engineering 3 Credits**

Introduction to the field of industrial and systems engineering and associated specialties. Fundamental topics on manufacturing processes and systems, operations research, methods engineering, human factors, facilities design, quality and management. Introduction to real-world problem formulation and solution using economics, linear algebra and statistical concepts. Professional ethics will be discussed using case studies.

**Components:** Class

**Prereqs/Coreqs:** P. Sophomore Standing and C- or higher in (MATH 2450 or MATH 2530 or GENENG 1500) or mathematics proficiency level of 40

## **INDSTENG 3130 Industrial Engineering Computer Applications 3 Credits**

Spreadsheets, databases, Statistical Analysis Software, and computer programming. Emphasis on using the computer and computer software as a tool to solve Industrial Engineering problems and to facilitate Industrial Engineering activities.

**Components:** Class

**Prereqs/Coreqs:** P. C- or higher in both INDSTENG 2130 and MATH 2640

## **INDSTENG 3530 Operations Research I 3 Credits**

Basic methodology and techniques of operations research. Emphasis on application and problem solving models; linear programming, sensitivity analysis, nonlinear/classical optimization, queuing theory; Markov processes; dynamic programming.

**Components:** Class

**Prereqs/Coreqs:** P. C- or higher in MATH 4030

## **INDSTENG 3630 Work Measurement and System Design 3 Credits**

Principles and techniques of work design, operation analysis and job design. Work methods and analysis; predetermined time systems; stopwatch time studies; work sampling; standards development. Safety and ergonomic considerations in work design will be emphasized.

**Components:** Class, Laboratory

**Prereqs/Coreqs:** P. C- or better in MATH 4030

## **INDSTENG 3730 Engineering Management 3 Credits**

Fundamental concepts of management including management skills, functions, roles and theories; project management techniques; transition from engineer to manager; ethics in engineering; intellectual and property rights; and product liability.

**Components:** Class

**Prereqs/Coreqs:** P. Junior standing

## **INDSTENG 3780 System Safety Engineering 3 Credits**

Principles of safety engineering and safety management with an emphasis on OSHA standards. Common hazard situations are presented for anticipation, identification, and evaluation. Safety management, plans, and programs are discussed with an emphasis on development and implementation. Risk assessment concepts and tools are introduced.

**Components:** Class

**Prereqs/Coreqs:** P. Junior standing or consent of instructor

## **INDSTENG 3830 Engineering Design of Systems 3 Credits**

Fundamental concepts in classifying systems; application of the systems life cycle and design processes in modeling and analyzing engineering systems. Analysis and modeling must include systems requirement analysis, functional analysis, technical performance measures, and system design models. Application areas like decision making, risk analysis, etc. may be covered.

**Components:** Class

**Prereqs/Coreqs:** P. C- or better in INDSTENG 2130

## **INDSTENG 3950 Industrial Engineering Cooperative Education 2 Credits**

Work experience in industry under the direction of the College of Engineering, Mathematics and Science Cooperative Education and Internship Program. During co-op the student is expected to be away from his/her studies at UW-Platteville and work for an industry for a semester and summer. Credits do not fulfill graduation requirements.

**Components:** Field Studies

## **INDSTENG 3970 Industrial Engineering Internship 1 Credit**

Work experience in industry under the direction of the College of Engineering, Mathematics and Science Cooperative Education and Internship Program. NOTE: This program is separate and distinct from the cooperative education program and is principally designed to cover the summer work experience. Internship is designed to provide experiential learning experience to the student during the summer period. Credits do not fulfill graduation requirements.

**Components:** Field Studies

**Prereqs/Coreqs:** P. Junior standing

**INDSTENG 4030 Production and Operations Analysis 3 Credits**

Analysis and design of production control procedures including inventory and scheduling. Operations management techniques including forecasting and aggregate planning. Project planning using CPM/PERT.

**Components:** Class

**Prereqs/Coreqs:** P. C- or higher in both INDSTENG 3130 and INDSTENG 3530

**INDSTENG 4130 System Simulation and Analysis 3 Credits**

Applications of computer simulation of discrete systems with emphasis on model formulation; instruction in at least one simulation language. Emphasis on input data analysis, model development, model validation, statistical analysis of output, and experimental design.

**Components:** Laboratory, Class

**Prereqs/Coreqs:** P. C- or higher in MATH 4030

**INDSTENG 4230 Facilities Design 3 Credits**

Design principles and analytical procedures for facility location, development of an overall functional relationship plan, materials receipt accounting, processing and storage areas. Discussion of manufacturing and service-oriented facilities. Application of IE principles to optimization of site selection and facility design. Facilities covered include automated manufacturing systems, flexible manufacturing systems, modular design and office space design. Application of computerized layout techniques is emphasized.

**Components:** Class

**Prereqs/Coreqs:** C. INDSTENG 3630

**INDSTENG 4330 Material Handling and Warehousing 3 Credits**

Procedures and techniques for analysis of material handling and warehousing problems. Principles of materials handling; systematic handling analysis; productivity analysis; unit load design; automatic identification techniques; selection/use of common and state-of-the-art equipment and techniques; design of materials handling systems; safety procedures in materials handling.

**Components:** Class

**Prereqs/Coreqs:** P. C- or higher in both INDSTENG 3530 and GENENG 2820

**INDSTENG 4430 Quality Engineering 3 Credits**

Emphasis on modern Total Quality Management philosophies, Statistical Process Control methods and tools for problem solving and ongoing process improvement. Acceptance sampling procedures and standards, experimental design including Taguchi techniques, quality audits. Economic aspects of quality decisions, basic concepts in reliability analysis. Basics of ISO 9000.

**Components:** Class

**Prereqs/Coreqs:** P. C- or higher in MATH 4030

**INDSTENG 4440 Human Factors Engineering 3 Credits**

Introduction to the basic theories on physical and cognitive ergonomics and engineering anthropometry. Considerations of human capabilities, environmental effects and safety standards in work design for industrial systems. Applications of fundamental human-performance modeling techniques in industrial and service sectors.

**Components:** Laboratory, Class

**Prereqs/Coreqs:** P. C- or higher in MATH 2740

**INDSTENG 4530 Operations Research II 3 Credits**

Advanced operations research topics including integer programming, nonlinear optimization, decision making under uncertainty using different decision criteria and application of optimization techniques in machine learning methods like regression, logistic regression, and decision trees.

**Components:** Class

**Prereqs/Coreqs:** P. C- or better in INDSTENG 3530

**INDSTENG 4540 Human Performance and System Design 3 Credits**

Design of the interface between human and elements of a complex system. Concentration on perception and cognitive aspects of work including sensory perception, learning, and judgment. Characteristics of complex systems and necessary support for human operators. Error minimization. Application of human-system performance considerations in product design.

**Components:** Class

**Prereqs/Coreqs:** P. C- or higher in INDSTENG 3630

**INDSTENG 4610 Machining and Metrology 3 Credits**

Introduction to the concepts and basics of traditional and advanced machining processes and the principles and methods of conducting accurate measurements using different measuring tools and apparatuses to engineering students. This course is intended to give students the opportunity to gain hands-on experience in traditional and advanced cutting machines, GM coding, CNC machining, and using different measuring tools and equipment.

**Components:** Laboratory, Class

**Prereqs/Coreqs:** P. C- or better in MECHENG 3040 or consent of instructor

**INDSTENG 4630 Manufacturing Systems Design 3 Credits**

Principles and procedures related to the design, implementation, documentation and control of manufacturing systems. Consideration of transfer line, numerical control systems, flexible automation, robotics, and manufacturing support activities such as cost, quality, and materials control. Introduction to CAD/CAM and CIM.

**Components:** Laboratory, Class

**Prereqs/Coreqs:** C: INDSTENG 3130 and MECHENG 3040

**INDSTENG 4750 Principles and Applications of Project Management 3 Credits**

Systems perspective of scope definition, and management of scope, time human resources, communications, and risk, as it applies to industrial engineering projects. (Spring)

**Components:** Class

**Prereqs/Coreqs:** P: C- or higher in INDSTENG 3730 or INDSTENG 4730

**INDSTENG 4830 Engineering Continuous Improvement 3 Credits**

Introduction to value engineering and lean techniques. Applications of engineering valuation. Basic principles of function analysis. Discussion of lean tools including value stream mapping.

**Components:** Class

**Prereqs/Coreqs:** P: Junior standing

**INDSTENG 4930 Industrial Systems Design 3 Credits**

This is the capstone design course, the culmination of the IE program; requires knowledge and application of all the IE principles to comprehensive industrial project design and development. The project will involve the application of more than one of the following methodologies to case studies or industrial projects: facilities location and design; production planning and control; materials handling; evaluation of alternatives; economic analysis; quantitative models; cost, inventory and budgeting controls, system specifications, safety considerations. Students should take this course in their last semester.

**Components:** Laboratory, Class

**Prereqs/Coreqs:** C: INDSTENG 4230 and INDSTENG 4030

**INDSTENG 4980 Current Topics in Engineering 1-3 Credits**

In-depth study of a current topic of interest to the engineering profession. The topic will be identified in the course title.

**Components:** Laboratory, Class

**Prereqs/Coreqs:** P: consent of instructor

**INDSTENG 4990 Independent Study 1-3 Credits**

Advanced study in the area of specialization.

**Components:** Independent Study

**Prereqs/Coreqs:** P: senior standing