Industrial engineering is an engineering discipline devoted to the design, installation, improvement and control of integrated systems of people, materials, and facilities in a wide range of organizations that produce goods or render services. Like other engineering fields, industrial engineering is concerned with solving problems through the application of specialized knowledge in mathematics and science, as well as the principles of engineering. An important characteristic of industrial engineering is its systems approach to integrate the basic resources of production and service systems and other relevant resources, such as information and energy, in such a way as to create a smooth, efficient and competitive operation within an enterprise. Industrial and systems engineers are needed in virtually all types of enterprises, ranging from industries such as manufacturing, distribution, logistics, transportation, and construction; service sectors such as health care, telecommunications, retail, banking, and engineering consulting to government agencies, military, and non-profit organizations.

The mission of the Industrial Engineering program is to serve the state, nation, and global community by educating industrial engineering students to be well founded in engineering fundamentals and to have the knowledge and skills required to design, develop, improve, implement and control sophisticated production and service systems in an environment characterized by complex technical and social challenges. Throughout this educational process, students will be instilled with the highest standards of professional and ethical behavior. It is the intent of the undergraduate industrial engineering program to equip its graduates to achieve the following accomplishments a few years after graduation:

1. Graduates will be successful in improving operations by solving complex industrial engineering problems.
2. Graduates will demonstrate professional leadership.
3. Graduates will be instilled with the motivation and ability to accomplish professional life-long learning.

The undergraduate program in Industrial Engineering at Texas A&M University is accredited by the Engineering Accreditation Commission of ABET, www.abet.org.

Industrial Engineering students may participate in the Undergraduate Minor Program offered by Texas A&M. This program is usually comprised of 15 to 18 hours, some of which may be substituted as technical electives. The most common minors are math, business and economics. The department also has a Fast Track Program for academically qualified students who want to take selected graduate courses and receive both graduate and undergraduate credit by meeting specific requirements. The department encourages students to participate in industrial internships or the Cooperative Education Program to acquire practical experience to complement their industrial engineering education. Internships are generally encouraged during the summer months only. Students who participate in the Co-op program during three academic semesters may count the three credit hours as a technical elective in their curriculum.

Graduate degrees including the Master of Science (MS), Master of Engineering (M.Eng.), and Doctor of Philosophy (PhD) are also offered by the department in addition to the Bachelor of Science in Industrial Engineering. For graduate degree information, please see the Texas A&M University Graduate Catalog.

Before commencing course work in the major, students must be admitted to the major or have the approval of the department.

**Majors**

- Bachelor of Science in Industrial Engineering

**Minors**

- Industrial Engineering Minor

**Certificates**

- Data Center Operations Engineering Certificate
- Engineering Systems Management Certificate

**Courses**

ISEN 101 Introduction to Industrial Engineering
Credit 1. 1 Lecture Hour.
Introduction to industrial engineering; overview of the curriculum; presentations by faculty and industry to familiarize with the department and the scope of industrial engineering applications.

ISEN 220 Introduction to Production Systems
Credits 3. 3 Lecture Hours.
Introduction to manufacturing and production systems; overview of various aspects of manufacturing systems; includes using Excel and VBA in coding and evaluating models related to production systems and other industrial engineering applications.

Co-requisites: MMET 181; STAT 211.
Prerequisite: CSCE 206.

ISEN 285 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Problems of limited scope in industrial engineering approved on an individual basis intended to promote independent study.

Prerequisite: Approval of department head.

ISEN 302 Economic Analysis of Engineering Projects
Credits 2. 2 Lecture Hours.
Principles of economic equivalence; time value of money; analysis of single and multiple investments; comparison of alternatives; capital recovery and after-tax analysis of economic projects.

Prerequisite: MATH 152.

ISEN 303 Engineering Economic Analysis
Credits 3. 3 Lecture Hours.
Principles of economic equivalence; time value of money; analysis of single and multiple investments; comparison of alternatives; capital recovery and tax implications; certainty; uncertainty; risk analysis; public sector analysis and break-even concepts.

Prerequisite: MATH 152.

ISEN 314 Statistical Control of Quality
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Quality control with statistical principles applied to quality problems, including statistical analysis, density and distribution functions, control chart concepts, and process capability analysis; laboratory exercises for exposure to basic metrology and applied statistics for quality control applications in discrete-item manufacturing systems; introduction to six-sigma principles including DMAIC and variance reduction strategies.

Prerequisite: STAT 212.
ISEN 315 Production Systems Planning
Credits 3.3 Lecture Hours.
Principles, models, and techniques for planning, analysis, and operation of integrated production and distribution systems; application of non-linear optimization and linear, integer, and dynamic programming models and solution methods as appropriate to capacity planning, aggregate planning, inventory planning and control under deterministic and stochastic demands, push (MRP) and pull (JIT) material flow management, production lot sizing, supply chain planning, assembly line balancing, and scheduling.
Prerequisites: ISEN 220; MATH 304.
Corequisite: ISEN 420.
ISEN 316 Production Systems Operations
Credits 3.3 Lecture Hours.
Analytical principles of manufacturing systems design, analysis and control; emphasis on stochastic analysis; role of variability and impact on cycle time; push versus pull production strategies including Kanban and constant wip control; probability, queuing theory, Little's Law, heavy traffic approximations, queuing networks, and lean engineering principles.
Prerequisites: ISEN 220, ISEN 424; MATH 304.
ISEN 333 Project Management for Engineers
Credits 3.3 Lecture Hours.
Basic project management for engineering undergraduates; project development and economic justification; estimating; scheduling; network methods; critical path analysis; earned value management; recycling and rework; project organizational structures; project risk assessment; resource allocation; ethics; characteristics of project managers.
Prerequisite: Junior or senior classification in Dwight Look College of Engineering.
Cross Listing: CVEN 333 and MEEN 333.
ISEN 360 Lean Thinking and Lean Engineering in the Process Industries
Credits 3.3 Lecture Hours.
Philosophical, managerial, and operational principles of lean thinking within the context, tools, and practices of lean engineering; emphasis on the pharmaceutical and process industry; design of lean systems, lean cell design, modeling of lean manufacturing systems, and operation of manufacturing cells; queuing network theory for the analysis of lean systems.
Prerequisites: STAT 211; junior or senior classification for students other than INEN majors.
ISEN 411 Engineering Management Techniques
Credits 3.3 Lecture Hours.
Techniques relating to managing engineering activities; engineer's transition into management; engineering managerial functions; motivation of individual and group behavior; productivity assessment/improvement; managing the quality function and communications.
Prerequisite: Senior classification in industrial engineering.
ISEN 414 Total Quality Engineering
Credits 3.2 Lecture Hours. 3 Lab Hours.
Principles of total quality engineering; total quality management philosophy, engineering approaches for designing quality into products and processes; off-line experimentation methods for the robust design; emphasis on teamwork and continuous quality improvement.
Prerequisite: STAT 211; junior or senior classification.
ISEN 416 Facilities Location, Layout and Material Handling
Credits 4.3 Lecture Hours. 3 Lab Hours.
Analytical treatment of facilities location, physical layout, material flow and handling, combined with heuristic algorithms to assist in the design of production/service facilities; fundamental concepts applied through a sequence of design projects.
Prerequisites: ISEN 315; ISEN 316 or registration therein.
ISEN 420 Operations Research I
Credits 3.3 Lecture Hours.
Development and application of fundamental deterministic analytical methods including linear programming, integer programming, dynamic programming and nonlinear optimization.
Prerequisite: MATH 304 or equivalent.
ISEN 421 Operations Research II
Credits 3.3 Lecture Hours.
Development and application of probabilistic analytical methods including Markov chains, queuing systems and digital simulation modeling.
Prerequisites: MATH 304 or equivalent; STAT 212.
ISEN 424 Systems Simulation
Credits 3.2 Lecture Hours. 3 Lab Hours.
Systems simulation structure, logic and methodologies; generation of random numbers and random variates; system simulation languages, models and analysis; applications to a variety of systems such as transportation, supply chain modeling, manufacturing and service systems.
Prerequisite: STAT 212.
ISEN 425 Design and Analysis of Industrial Systems with Simulation
Credits 3.2 Lecture Hours. 3 Lab Hours.
In-depth study into the design-modeling and subsequent analysis of contemporary production/service systems; factory/service systems are modeled using the ARENA/SIMAN V simulation-animation language; emphasis is placed on the critical analysis of alternative flow designs of modeled systems using flow and economic parameters to assess system improvement.
Prerequisites: ISEN 303 and ISEN 424.
ISEN 430 Human Factors and Ergonomics
Credits 3.3 Lecture Hours.
Human biological, ergonomic, and psychological capabilities and limitations; techniques and procedures for developing and applying the principles of human factors engineering to systems design; stresses interdisciplinary nature of the subject.
Prerequisite: Junior or senior classification.
ISEN 440 Systems Thinking
Credits 3.3 Lecture Hours.
Systems thinking process, systems of systems and the fundamental considerations associated with the engineering of large-scale systems, or systems engineering including systems modeling, design and the system development process.
Prerequisites: MATH 304 or approval of instructor; junior or senior classification.
ISEN 450 Healthcare Systems Engineering
Credits 3.3 Lecture Hours.
Explores components of healthcare system, existing problems in healthcare systems; need for engineering to analyze healthcare system problems; application of industrial engineering tools in improving healthcare system; role of industrial engineering in addressing healthcare policy issues.
Prerequisites: ISEN 314, ISEN 420, ISEN 424, or approval of instructor; junior or senior classification.
ISEN 459 Industrial Engineering Systems Design  
Credits 3. 1 Lecture Hour. 6 Lab Hours.  
Capstone design course emphasizing modeling, analysis and design of industrial, manufacturing, and service systems; integrates knowledge gained from all required industrial engineering courses in a comprehensive design project, to be taken in the final semester of undergraduate studies.  
Prerequisites: ISEN 314, ISEN 316, ISEN 416.

ISEN 485 Directed Studies  
Credits 1 to 6. 1 to 6 Other Hours.  
Permits work on special project in industrial engineering. Project must be approved by department head.  
Prerequisite: Senior classification in industrial engineering.

ISEN 489 Special Topics in...  
Credits 1 to 5. 1 to 5 Lecture Hours. 0 to 5 Lab Hours.  
In-depth study of areas of current student interest and recent advances; normally used for first time offering of new courses.  
Prerequisite: Approval of instructor.