

INDUSTRIAL ENGINEERING TECHNOLOGY

Courses

IET 230. Work Measurement. 3 Hours

Fundamentals of work simplification, motion economy, and productivity improvement using the techniques of time-and-motion study. Setting of labor standards using the techniques of stop watch, pre-determined time, standard data, and work sampling. .

IET 230L. Work Measurement Laboratory. 1 Hour

The application of real-world time-and-motion-study techniques such as operation process, worker-machine, and assembly charts. Calculations for time standards, production efficiency, line balance, cost reduction, labor, and equipment. A written and oral report on a team project. Three hours of laboratory each week. Prerequisites: MTH 137. Corequisites: IET 230.

IET 316. Quantitative Analysis. 3 Hours

Introduction of the mathematical techniques used to support decision making and managerial analysis. Probability theory, decision theory, linear programming, queuing theory, matrix algebra, differential and integral calculus, and differential equations. Prerequisites: MTH 169; SET 153L. Corequisites: MTH 207 or MTH 367 (may be taken concurrently).

IET 317. Industrial Economic & Financial Analysis. 3 Hours

Comparison of manufacturing or service industry projects and investments based on their economic value. Quantification of costs and benefits; analysis using present worth, annual worth, and rate of return methods. Basic monetary concepts, including balance sheets, income statements, amortization charts, etc. The course will culminate in the development of a Business Plan for a new product designed by the student team. Prerequisites: SET 150 or MTH 168 or MTH 148.

IET 318. Statistical Process Control. 3 Hours

Statistics and probability theory applied to produce control charts (\bar{x} -bar, R, s, p, u, and c) to monitor processes. Interpretation and application of these charts. Problem solving techniques, Pareto analysis, and modern quality management techniques. Prerequisites: MTH 168, MTH 207 or MTH 367.

IET 319. Quality Improvement Methods. 3 Hours

Study of problem-solving methodologies and techniques. Team development. Students will learn to use Pareto diagrams, force field analysis, cause and effect diagrams, process mapping, and other problem-solving tools. Quality costs, product liability, and ethics are also covered. Prerequisite(s): IET 318.

IET 320. Design and Analysis of Experiments. 3 Hours

This class introduces students to analytic methods for experimental design. It concerns the design, collection, and analysis of experiments both in manufacturing and service systems. Students will examine the proper analysis for a given experimental design and set of assumptions. Topics will include one-way and factorial designs, fractional factorial designs. Students will learn both computational and software-based analytic methods. Prerequisites: MTH 207 or MTH 367.

IET 321. Quality Management. 3 Hours

This course provides students with an understanding of managing a total quality environment to improve quality, increase productivity and reduce costs. The course covers Total Quality Management implementation strategies, requirements of ISO 9000, QS 9000, and the Malcolm Baldrige award. Prerequisites: IET 318; MTH 207 or MTH 367.

IET 322. Data Analytics. 3 Hours

Data analytics help to enhance productivity through the application of quantitative and qualitative techniques to extract and categorize data to identify and analyze data patterns. Data analytics demand an integrated set of skills such as statistics, machine learning, and mathematics. This course will introduce students to some of the tools and basic principles of data analytics. Among the techniques, tools, and concepts that students will be introduced to are data collection, analysis of exploratory data, descriptive modeling, predictive modeling, evaluation and effective communication of analytical outcomes. Prerequisite(s): IET 316.

IET 323. Project Management. 3 Hours

This course is intended to prepare students to understand and be able to apply the principles of project management to processes they encounter in their jobs. Topics include the role of project manager, planning the project, work breakdown structure, scheduling project, project control and evaluation, earned value analysis, study of the structure, techniques, and application of project management including mathematical models, decision-making, styles of management, ethics, and communications. Students will also work on a team project with written and oral presentations. Prerequisites: CMM 100, Junior or Senior status.

IET 330. Cost Estimating and Control. 3 Hours

Study of the fundamentals of cost estimating of labor, material, and overhead for products, projects, operations, and systems. Semester team projects, written and oral. Study of job order and process cost accounting, activity based costing, and cost-volume-profit relationships. Prerequisites: IET 317 and IET 332.

IET 332. Facilities Layout Design. 3 Hours

Design of manufacturing and service facilities for the most efficient flow of raw materials, work-in-process, and completed stock through a work place. Facilities layout, material handling, and warehousing in relation to trends toward reduced inventory, smaller lot sizes, and just-in-time. Prerequisite(s): MCT 110L.

IET 335. Process Simulation and Analysis. 3 Hours

Introduction to analysis of business, service and industry systems using a simulation software package. Topics covered include creation of simulation models in two and three dimensions that model processes and how to gather the appropriate input data and analyze the output data from the simulation software. Prerequisites: MTH 367 or MTH 207.

IET 335L. Process Simulation and Analysis Lab. 1 Hour

Introduction to analysis of business, service and industry systems using a simulation software package. Topics covered include creation of simulation models in two and three dimensions that model processes and how to gather the appropriate input data and analyze the output data from the simulation software. Prerequisite(s): SET153L and Junior or Senior status.

IET 400. Selected Topics. 1-4 Hours

Self-paced research course. Preparation of a documented written research project on an engineering technology subject. May not be taken more than once. Prerequisite(s): Permission of department chairperson.

IET 401. Global Regulatory and Legal Framework of Quality in Industry and Business. 3 Hours

This course is geared to students interested in broadening their understanding of the legal and regulatory framework established to ensure quality in the development of products in science and technology. This course will provide an overview of regulations for the pharmaceutical, medical device, biotech, animal health, and consumer goods industries. Students will be introduced to fundamental concepts in the regulations related to clinical trial development, management, ethics, data integrity, data security, privacy, change control and validation.

IET 402. Product Development and Validation in Life Sciences. 3 Hours

This course will give students an understanding of the processes used in the pharmaceutical, medical device, and pharmaceutical industries for the development of new products. Students will learn the scientific principles used in such developments that ensure that products meet quality standards. This course, the second in a series of courses which will better prepare students for employment in the quality health science areas. Instructors will explore how rigorous human factor engineering studies and clinical trials provide essential inputs into the product development process. The students will be introduced to concepts such as gap analysis, risk assessment, master plan, process characterization, installation qualification, operational qualification, measurement system analysis, repeatability and reproducibility (data collection / analysis), performance qualification/validation. In a world of innovative technology, it is critical that the students gain an understanding of computer system and software validation to ensure the quality of data generation, data storage, and digital processes used in manufacturing and products with digital components using technical and practical aspects expected in the regulated life science industries. Prerequisites: MED 401 or IET 401 or ISE 401.

IET 403. Risk and Failure Analysis in Quality Science. 3 Hours

This course will dive into the nuances of the life science industries related to the specific regulations that apply to consumer health products. Importantly, it is desired that students take this course while on internship at a life science company such that they can experience a failure while learning all that is required for acceptable resolution. Through the use of historical risk analysis techniques, such as FMEA, Fault Tree, and 5 Why's, students will be able to analyze a holistic set of data (in-production, across product lines, across equipment, human variability, on-market, on-stability, validation studies, change control, etc.) that will lead to scientifically justified investigations supported by evidence, and the identification of effective corrective and preventative actions (CAPA). Prerequisites: MED 401 or IET 401 or ISE 401.

IET 408. Lean Management and Six Sigma. 3 Hours

This course reviews the tools used to improve business performance, such as increasing process efficiency and reducing variation and waste. The course is designed around the rigorous approach known as DMAIC and covers a wide variety of problem-solving strategies based on statistics, optimization, and project management. The course elegantly integrates Six Sigma methodologies with lean enterprise principles, such as Kaizen, poka-yoke, and pull-push systems. The topics covered in this course are used both in manufacturing and service industry including hospitals, banks, and retailers. At the end of this course, students will be equipped to help organizations achieve their operational excellence. Prerequisite(s): Junior or senior status.

IET 409. Lean Management. 3 Hours

Study of the principles and current practices of optimizing production using Lean Manufacturing concepts. Just-In-Time, Takt Time, Kaizen, set-up reduction, pull systems, focused factories, standard operations, total productive maintenance, and defect-free manufacturing. Prerequisite(s): Junior or senior status.

IET 410. Design for Six Sigma for Engineers. 3 Hours

Product development methodology for the development of robust products, processes and services; methods for collecting and statistically analyzing the voice of the customer; development of product concepts; experimentation for designing in quality; product modeling to reduce risk through robust design; data driven decision-making for continuous improvement in products, service design, and process design. Prerequisites: MTH 207 or MTH 367, IET 408.

IET 415. Global Supply Chain Management. 3 Hours

This course is intended to educate students on the fundamental roles played by supply chain management in the Global economy. Students will gain knowledge on the management of local and global supply chain functions and their impact on industries, customers, and suppliers. Students will learn to optimize supply chain resources to reduce cost and improve revenue. Students will learn to utilize data and contemporary tools to make informed decisions in a global supply chain environment. Prerequisite(s): Junior or Senior status.

IET 420. Industrial & Environmental Safety. 3 Hours

Application of safety techniques and principles to identify and correct unsafe situations and practices. Study of system safety, failure modes and effects analysis, fault tree analysis, preliminary hazard analysis, hazardous materials and practices, OSHA, health and personal protection.

IET 423. The IET in Service Organizations. 3 Hours

Case studies, articles, guest speakers, and projects to provide insight into how industrial engineering technology skills and training can be applied to service industries including hospitals, banks, and eating and retailing establishments. IET major; junior status. Prerequisite(s): Junior or Senior status.

IET 426. Systems Engineering Foundation. 3 Hours

There is a need for engineering professionals to understand the benefits of following a sound systems engineering approach when designing and improving systems. This course addresses systems engineering concepts and processes, explaining activities and tools for developing system solutions to meet customer needs. Using the online Systems Engineering Body of Knowledge as the guiding topics such as systems thinking, concept of operations, requirements analysis, design, testing, and life-cycle sustainment are discussed. The design lifecycle models including the Vee model along with the different system types of product, service, enterprise, and system of system will be discussed. The interdisciplinary and cross-functional nature of systems engineering is also emphasized along with the systems engineering management planning. Prerequisites: Junior or Senior standing.

IET 435. Human Factors. 3 Hours

Methods to improve the interface between humans and their environment. Human characteristics are studied to determine the best way to design the task, product, work station, or other environmental features to accommodate the human. Written and oral projects. Prerequisite(s): IET 230 and (Junior or Senior status).

IET 446. Six Sigma Green Belt. 3 Hours

Learn, practice, and use six-sigma tools in preparation of a final certification project in a commercial business situation. Use, analyze and solve an identified business variation problem to achieve industry recognized certification.

IET 490. Senior Project. 3 Hours

Advanced study and research of the product realization process focusing on conceptual design, embodiment design, final design, and prototyping or other design verification. Students work on externally sponsored engineering projects in multidisciplinary teams that perform engineering analysis that includes safety, ergonomics, environmental, cost and sociological impact of their designs. Prerequisites: IET 323; IET 408; IET 435. Corequisites: IET 335; IET 330.

IET 493. Honors Thesis. 3 Hours

Selection, design, investigation, and completion of an independent, original research study resulting in a document prepared for submission as a potential publication and a completed undergraduate thesis. Restricted to students in University Honors Program.

IET 494. Honors Thesis. 3 Hours

Selection, design, investigation, and completion of an independent, original research study resulting in a document prepared for submission as a potential publication and a completed undergraduate thesis. Restricted to students in University Honors Program. Prerequisites: IET 493.