INDUSTRIAL TECHNOLOGY AND PACKAGING (ITP)

ITP Courses

**ITP 137. Electrical/Electronic Systems. 4 units**
Term Typically Offered: TBD
Electrical and electronic circuit fundamentals. Essential information for technical managers regarding the theory and of AC and DC circuits and devices in manufacturing and electronic products. Understanding of inductance, capacitance, resistance, and integrated circuit components. Decision and problem solving skills developed. 3 lectures, 1 laboratory. Formerly IT 137.

**ITP 150. Industrial Power Systems. 4 units**
Term Typically Offered: F, W, SP
A survey of various industrial power systems including electrical, electronics, mechanical, fluid power and thermal power systems. Labs include fundamentals of electrical/electronic circuits and fluid power systems. 3 lectures, 1 laboratory. Formerly IT 150.

**ITP 211. Industrial Safety and Quality Program Leadership. 4 units**
Term Typically Offered: F, W
Effective program development and leadership to implement safety and quality process improvement. Application of industrial leadership, knowledge, skills and methods to develop and implement total safety and quality management programs. Class project includes the oral presentation. 3 lectures, 1 activity. Formerly IT 311.

**ITP 233. Product Modeling and Communication. 4 units**
Term Typically Offered: F, W, SP
Fundamental theory and practice of digital modeling with emphasis on hands-on use of two dimensional and three dimensional modeling software commonly used in industry. Includes part/assembly modeling, geometric dimensioning/tolerancing and fundamental skills in communicating product design data in accordance with industry standards. 2 lectures, 2 activities. Formerly IT 233.

**ITP 234. Packaging Design Fundamentals. 4 units**
Term Typically Offered: F
A comprehensive overview of fundamental structural and graphic concepts for package design. Focus on design thinking, two-dimensional and three-dimensional form creation, design elements, visual perception, photo rendering, and rapid prototyping. 3 lectures, 1 laboratory.

**ITP 260. Manufacturing Processes and Materials. 4 units**
Term Typically Offered: W, SP
Prerequisite: CHEM 111 or CHEM 124 or CHEM 127.
Introduction to a wide variety of manufacturing processes and materials with emphasis on metallic products. Analysis of relationships among manufacturing processes, materials and product design. Provides experiential learning on safe and efficient operations of manufacturing equipment. 3 lectures, 1 laboratory. Formerly IT 260.

**ITP 270. Selected Topics. 1-4 units**
Term Typically Offered: TBD
Prerequisite: Open to undergraduate students and consent of instructor.
Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Formerly IT 270.

**ITP 275. Industrial Facility Systems and Equipment. 4 units**
Term Typically Offered: SP
Prerequisite: ITP 150. Corequisite: ITP 211.
Develop an understanding of contemporary issues in modern industrial facilities. Emphasis on support systems and equipment such as heating and cooling; material handling; electrical, hydraulic, pneumatic power systems; and energy management. Includes facilities sustainability and lean practices. 3 lectures, 1 activity.

**ITP 302. Developing and Presenting New Enterprise Strategies. 4 units**
Term Typically Offered: W
Prerequisite: COMS 101 or COMS 102, BUS 346.
Taking new industrial enterprise concept to launch. Planning and management of product-based start-up including integration of: product development; manufacturability and costs; outsourcing; channel selection; supply chain; inventory and scheduling. Application to project case study. Emphasis on developing effective technical presentations. 2 lectures, 2 activities. Formerly IT 402.

**ITP 303. Lean Six Sigma Green Belt. 4 units**
Term Typically Offered: F,W,SP,SU
Prerequisite: STAT 217, STAT 218, STAT 251, or any 300 or 400 level statistics course.
Develop skills to function as lean six sigma leader. Discussion and problem sessions cover lean six sigma green belt body of knowledge: define, measure, analyze, improve, control. Team skills necessary to complete projects. Course offered in in-class and online formats. 4 lectures. Formerly IT 303.

**ITP 306. Product Design and Development. 4 units**
Term Typically Offered: F, SP
Prerequisite: ITP 233 or BUS 310.
Overview of user-centered design methods involving sketching and quick prototyping techniques for new product development. Topics include: design thinking, identification of user needs, concept generation/selection/testing, industrial design, visual perception, ergonomics, sustainable design, product architecture, and intellectual property. 3 lectures, 1 laboratory. Formerly IT 326.

**ITP 326. Product Design and Development. 4 units**
Term Typically Offered: F, SP
Prerequisite: ITP 233 or BUS 310.
Overview of user-centered design methods involving sketching and quick prototyping techniques for new product development. Topics include: design thinking, identification of user needs, concept generation/selection/testing, industrial design, visual perception, ergonomics, sustainable design, product architecture, and intellectual property. 3 lectures, 1 laboratory. Formerly IT 326.

**ITP 329. Industrial Materials. 4 units**
Term Typically Offered: TBD
Prerequisite: CHEM 110 or CHEM 111 or equivalent, and junior standing.
Structure, properties, applications and limitations of select industrial materials to include ferrous and nonferrous metals, ceramics, glasses, composites, and organic materials. Materials testing and material selection. 3 lectures, 1 activity. Formerly IT 329.
ITP 330. Packaging Fundamentals. 4 units
GE Area F
Term Typically Offered: F,W,SP,SU
Prerequisite: Junior standing; completion of GE Area B3 via a course in physics (PHYS), Honors Contract physics (HNRS), or physical science (PSC).

Overview of packaging development, functions, and materials. Processes and technology protecting goods through supply chain. Container types, package design, development, research and testing. Economic and international importance and perspective as industrial activity. Packaging and the environment, and laws affecting packaging. 3 lectures, 1 laboratory. Fulfills GE Area F. Formerly IT 330.

ITP 341. Packaging Polymers and Processing. 4 units
GE Area F
Term Typically Offered: F, W, SP
Prerequisite: Junior standing and completion of GE Area B3 via college level CHEM.

Physical and chemical properties of plastic materials, processing techniques, recycling, laws and regulations. Evaluation of materials and technologies to reduce waste, improve reuse and recycling. Laboratory with common industry processes emphasizes relationships among processing, structure, and properties, and consumer interaction to specifications. 3 lectures, 1 laboratory. Fulfills GE Area F. Formerly IT 341.

ITP 371. Supply Chain Management in Manufacturing and Services. 4 units
Term Typically Offered: F,W,SP, SU
Prerequisite: A grade of C- or better, or consent of instructor, in: MATH 141 or MATH 221, and STAT 217 or STAT 218 or STAT 251 or any 300 or 400 level statistics course.

Introduction to supply chain management and performance metrics. Supply or value chains dealing with hard goods and services from design to daily management. Project management techniques and technology for making and implementing decisions. 4 lectures. Formerly IT 371.

ITP 390. Industrial Automation. 4 units
Term Typically Offered: F, W
Prerequisite: ITP 233 and ITP 260.

Automated manufacturing systems, including computer numerical control (CNC), robotics, computer-integrated manufacturing, assembly and packaging. Hands-on activities in manual/automatic programming/operation of CNC machines, robots and programmable logic controllers. 2 lectures, 2 activities. Formerly IT 390.

ITP 400. Special Problems for Advanced Undergraduates. 1-4 units
Term Typically Offered: TBD
Prerequisite: Consent of instructor.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter. Formerly IT 400.

ITP 403. Lean and Quality Systems Management. 4 units
Term Typically Offered: F, W
Prerequisite: ITP 303; Business majors must have formally declared their concentration to enroll.

Process improvement and quality assurance viewed from systems perspective including cost, time, and process. Lean thinking and tools studied as problem solving approach achieving continuous improvement through waste elimination and variability reduction. Projects improve processes in manufacturing, supply chain or service. 4 lectures. Formerly IT 403.

ITP 406. Industrial Sales. 4 units
Term Typically Offered: F, SP
Prerequisite: BUS 346.

Technical competencies in industrial selling and purchasing through application of process management as it relates to sales, marketing and customer service. Includes guest speakers and team-based projects with local business organizations, individual and team product presentations with written proposals. 4 lectures. Formerly IT 406.

ITP 408. Paper and Paperboard Packaging. 4 units
Term Typically Offered: W, SP
Prerequisite: ITP 330.

Physical and chemical properties, manufacture, conversion and use of paper, paperboard, corrugated board and related components. Design, use and evaluation of packages made from these materials. Survey of tests and procedures for paper based packaging materials and packaging products following ASTM, TAPPI, and ISO standards. 3 lectures, 1 laboratory. Formerly IT 408.

ITP 409. Packaging Machinery and Processes. 4 units
Term Typically Offered: W
Prerequisite: ITP 330.

Integrated study of packaging machinery and processes from a practical and operational viewpoint. Understanding basic processes and interrelationship between packaging machinery and type of product, production layout and efficiency, material handling and distribution equipment, quality control and ancillary systems. 3 lectures, 1 activity. Formerly IT 409.

ITP 410. Operations Planning and Control. 4 units
Term Typically Offered: F, W
Prerequisite: BUS 391; and ITP 303 or ITP 371.

Linking supply chain operations to deliver value to the end customer. Contrasting of advanced manufacturing concepts, such as pull systems, sales and operations planning, mixed model manufacturing, level production, and theory of constraints to traditional materials requirements planning systems. 3 lectures, 1 activity. Formerly IT 410.

ITP 411. Packaging Sustainability. 4 units
Term Typically Offered: F, SP
Prerequisite: ITP 330.

A comprehensive overview of cradle-to-cradle sustainability concerns that apply to the packaging life cycle, tools for measuring & reporting sustainability and communicating sustainability initiatives. 3 lectures, 1 laboratory.
Overview of various analytical methods and tools used for the evaluation of polymers and other packaging materials including thermal characterization, spectroscopy, chromatography. Qualitative and quantitative analysis of the matter. Identification of polymeric materials and morphology. Mass transfer measurement. 3 lectures, 1 laboratory.

Overview of the role that packaging quality plays in consumer packaged goods. Techniques used for testing and evaluating the quality of consumer product packaging, including material quality assessment, product-package interaction and human-package interaction. 3 lectures, 1 laboratory.

Overview of packaging laws and regulations. Content ranges from FDA, USDA, FTC, and EPA concepts, to labeling and structural issues such as bioterror, product security and environmental packaging, to materials issues, litigation, international concepts and intellectual property issues. 4 lectures.

Key concepts, tools, and approaches for making effective supply chain and logistics decisions in support of business goals. Practical management issues and applications are the focus rather than theoretical, mathematical optimization. Business cases and simulations are used to illustrate and explore best practices. 4 lectures. Formerly IT 415.

An overview of Radio Frequency Identification (RFID) technology from the managerial standpoint. Developing simple RFID solutions using development kits. 2 lectures, 2 laboratories. Formerly IT 457.

Selection and completion of a project under faculty supervision. Projects typical of problems graduates must solve in their field of employment. Project results presented in a formal report, and must be completed in two quarters. Minimum 120 hours total time. Formerly IT 461.

Selection and completion of a project under faculty supervision. Projects typical of problems graduates must solve in their field of employment. Project results presented in a formal report, and must be completed in two quarters. Minimum 120 hours total time. Formerly IT 462.

Selection and analysis of industrial and technological problems and opportunities in directed individual or group-based projects. Problems typical to those which graduates could encounter in their fields of employment. Formal report required. Minimum 120 hours of total time. 4 seminars. Formerly IT 464.

An integrative experience replicating a manufacturer's business/production systems, including the design, fabrication, processing, quality control, resource management, cost-control, marketing, sales and packaging functions. Focus of instruction methodology on the development of the student's comfort with ambiguity and change inherent in business/production systems. Builds upon the foundational concepts developed throughout the Industrial Technology curriculum. 2 lectures, 2 laboratories. Formerly IT 407.
ITP 470. Selected Advanced Topics. 1-4 units
Term Typically Offered: TBD
Prerequisite: Consent of instructor.

Directed group study and seminars in selected topics in industrial technology. Open to undergraduate students. Class Schedule will list topic selected. Total credit limited to 12 units. 1 to 4 lectures. Formerly IT 470.

ITP 471. Selected Advanced Laboratory. 1-4 units
Term Typically Offered: TBD
Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 laboratories. Formerly IT 471.

ITP 475. Packaging Performance Testing. 4 units
Term Typically Offered: F, SP
Prerequisite: ITP 330.

Survey of tests and procedures for packaging materials and packaging products following ASTM and ISTA standards. The testing procedures include tests for shock, vibration, drop and impact as prescribed for shipment by truck, rail, sea, and air. Hands-on product-packaging testing for quality control. 3 lectures, 1 laboratory. Formerly IT 475.

ITP 485. Packaging Development. 4 units
Term Typically Offered: SP
Prerequisite: ITP 330, ITP 341, ITP 408, and ITP 475.

Development of industrial and consumer goods packaging concept to marketplace. Interplay of design for marketing, production and distribution. Development of package for market and consumer performance. Domestic and international case with examination of performance, economic and social factors. Class project. 3 lectures, 1 activity. Formerly IT 435.

ITP 500. Individual Study. 1-6 units
Term Typically Offered: TBD
Prerequisite: OCOB graduate standing and formal petition with approval from the Associate Dean.

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Maximum of 6 units may be applied to degree requirements. Formerly IT 500.

ITP 532. Technology Entrepreneurship. 4 units
Term Typically Offered: TBD
Prerequisite: OCOB graduate standing or approval from the Associate Dean.

An understanding of the technology entrepreneurship processes by which new and innovative technologies are developed, embodied in products and/or services, brought to market, financed, and yield significant company growth. Focus on the technology startup experience, which has become a critical ingredient in national competitiveness as well as the career path of many former IT students. 2 lectures, 2 laboratories. Formerly IT 532.

ITP 537. Distribution Packaging for Business Managers. 4 units
Term Typically Offered: SU
Prerequisite: OCOB graduate standing or approval from the Associate Dean of OCOB.

Physical properties of distribution packaging and equipment used in prototyping and testing of product-packaging systems for global supply chains. Application of packaging knowledge to solve distribution packaging problems in modern business, with a view towards costs and environmental sustainability. Course is offered online only. 4 lectures.

ITP 545. Advanced Product Design and Development. 4 units
Term Typically Offered: TBD
Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Product design and development using current CAD modeling systems and rapid prototyping technologies. Comprehensive simulation of the product development life cycle from initial concept to completed prototype. Applications of three-dimensional modeling and rapid prototyping techniques to support product development from concept to completion. 2 lectures, 2 laboratories. Formerly IT 545.

ITP 570. Selected Advanced Topics. 1-4 units
Term Typically Offered: TBD
Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Directed group study of selected topics for advanced students. Open to undergraduate students. The Schedule of Classes will list title selected. Total credit limited to 16 units. 1-4 seminars. Formerly IT 570.

ITP 571. Selected Advanced Topics Laboratory. 1-4 units
Term Typically Offered: TBD
Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Directed group laboratory study of selected topics for advanced students. The Schedule of Classes will list title selected. Total credit limited to 16 units. 1-4 laboratories. Formerly IT 571.

ITP 579. Applied Industry Project I. 5 units
Term Typically Offered: TBD
Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Initiation, completion and presentation of an individual project, involving research, allowing an opportunity to apply knowledge, skills, and competencies to address a significant issue in the field of packaging value chain, preferably in connection with the student’s employment. Formerly IT 591.

ITP 592. Applied Industry Project II. 3 units
Term Typically Offered: TBD
Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Initiation, completion and presentation of an individual project, involving research, allowing an opportunity to apply knowledge, skills, and competencies to address a significant business issue in the field of industrial technology, preferably in connection with the student’s employment. As part of ITP 591 a formal written project proposal must be accepted and approved by the Industrial Technology Area Chair before work begins. Formerly IT 592.
ITP 599. Industrial and Technical Studies Thesis. 3 units
Term Typically Offered: TBD
Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Completion of a thesis involving individual research that is significant to the field of industrial and technical systems. A formal written proposal must be accepted by the Associate Dean of OCOB Graduate Programs before work begins. Course satisfies culminating experience requirement through the completion of the comprehensive thesis. Total credit limited to 9 units. Formerly IT 599.