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## Industrial Technology and Operations

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The Master of Industrial Technology and Operations (MITO) is a professional degree designed for individuals who plan to make a career in industry. The purpose of the MITO program is to enhance the ability of the students to pursue their professional goals by providing up-to-date knowledge of the technologies and modern management approaches used in world-class industrial companies. The MITO curriculum prepares students to move into management, supervisory and staff positions in industry. The MITO is not an MBA or an engineering degree, therefore it is not recommended for those planning to pursue careers in academia or research.

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### Degree Offered

Master of Industrial Technology and Operations

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### Admission Requirements

Applicants must hold a four-year bachelor's degree from an accredited institution. Students with a GPA of 3.0/4.0 can be admitted unconditionally. Students with a GPA of 2.5/4.0 can be admitted contingent upon their earning "A"s or "B"s in the first two courses taken at IIT. The GRE is not required for applicants who have completed a degree at a U.S. institution.

Applicants who have completed an undergraduate degree outside the U.S. must complete the GRE and submit scores with the admission application. Minimum required GRE scores are 2.5 for analytical and a combined score of 900 for the verbal and quantitative portions of the exam. Applicants from countries where English is not the primary language also must complete the TOEFL

with a minimum score of 80 on the new Internet-based test (equivalent to 550 PBT or 213 CBT) with no individual section scored below 15.

All applicants must submit a completed application form, the application fee, official transcripts (or certified copies) for all academic work at the college level, two letters of recommendation and a professional statement.

Students accepted into the program must have access to a Windows-based computer, the Internet and software for word processing, spreadsheet and presentation applications. All students will be required to use an IIT-issued email account.

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### Master of Industrial Technology and Operations

30 credit hours

Each student's program of study is customized to best serve individual career objectives. Of the 30 semester hours of graduate credit required for the MITO, the student must complete at least 18 semester hours of MITO graduate courses. A student may choose to complete up to 12 semester hours of courses offered by other IIT departments, but must be suitably qualified and obtain permission to register from their adviser and the associated course instructor(s). Up to 12 semester hours of senior (400-level) courses can be taken as part of this master's program (see our specializations). A total of 9 semester hours taken at a different university (passed

with the grade of "B" or better) may be transferred to IIT and applied toward the MITO degree if those credits have not been applied toward any earned degree (subject to administrative approval).

MITO courses are presented live and via interactive video at IIT's Main Campus in Chicago and Rice Campus in Wheaton. Also, the MITO program can be completed over the Internet. Using a delayed Internet format (lecture videos are posted within 24 hours after the live session), students can log on and "attend" class at the time and location of their choice. A demonstration of IIT web-based courses is available at [www.iit-online.iit.edu](http://www.iit-online.iit.edu).

## The MITO Curriculum

The Master of Industrial Technology and Operations requires the completion of 30 credit hours (10 courses). The coursework must include a minimum of 18 hours of 500-level MITO courses. Students may choose to complete six (6) of the general MITO courses listed below and four (4) specialty courses listed at right to earn the MITO degree with an industrial specialization in MT, IF, or IL. Alternately, under the guidance of their adviser, students may choose ten (10) courses of most interest and benefit to their career objectives. Students who wish to pursue a specialization in subjects covered by other departments may do so with the permission of their adviser and the associated course instructor(s).

Each MITO student is expected, in cooperation with their faculty adviser, to structure a program of study that will best serve his or her career objectives. This educational program would take into consideration the student's undergraduate education as well as all professional work experience.

General MITO courses include:

INTM 501	The Industrial Enterprise
INTM 502	Fundamentals of Industrial Engineering
INTM 509	Inventory Control
INTM 511	Industrial Leadership
INTM 512	Quality Systems
INTM 522	Computers in Industry
INTM 534	Resource Management
INTM 545	Strategic International Business

## Course Descriptions

Numbers in parentheses indicate class, lab and total credit hours, respectively

### INTM 501

#### The Industrial Enterprise

Introduces students to the variety of industrial operations and organizations. Covers changes within industry over the past decades that have led to today's global competitiveness. The history of industrial development including changing technology and management approaches is reviewed. The interaction of technology, technical systems, and social systems is considered as well as concepts for planning and forecasting. (3-0-3)

### INTM 502

#### Fundamentals of Industrial Engineering

Industrial engineering concepts are introduced and the student prepared to perform basic engineering tasks, including design of workstations, cells and lines. Coverage includes time and motion studies, work measurement, ergonomics, route sheets, plant layout, site selection, equipment selection, MRP, JIT, etc. Scheduling techniques will be covered along with material control techniques. Management Information Systems (MIS) are introduced and options covered. (3-0-3)

### INTM 507

#### Construction Technology

Introduces the full range of technologies involved in construction of both new and modified facilities, including steel, concrete and timber construction as well as supporting specialties such as HVAC, electrical, plumbing, etc. The interactions between the various construction trades will be covered along with the role of the architects and engineers. (3-0-3)

### INTM 509

#### Inventory Control

Fundamentals of inventory control including inventory classifications, i.e. raw materials, work-in-process (WIP) and finished goods. Topics include inventory record keeping, inventory turnover, the 80/20 (or ABC) approach, external and internal lead times, excess/obsolete inventory, and inventory controls. Material Resource Planning (MRP) and Enterprise Resource Planning (ERP) are included. (3-0-3)

### INTM 511

#### Industrial Leadership

Supervision and management practices are key to all components and sectors of industry. People are the key resources and their effective use is critical to a successful operation. As companies move to become high performance organizations, traditional management tools and techniques have to be reviewed and reconsidered. Skills covered include motivation, developing consensus, conflict avoidance and negotiations. Group dynamics along with handling of individual workers is critical. (3-0-3)

### INTM 512

#### Quality Systems

Quality systems covers metrology as well as overall systems for industrial and service companies. Metrology coverage includes electrical, mechanical and chemical systems. SPC, ISO, QS, TQM, MilSpecs and GMP are covered. Emphasis is on selecting alternates and developing the methodology to support those options. Vendor qualification and certification are included as well as techniques for handling quality requirements specified by customers. (3-0-3)

### INTM 515

#### Advanced Project Management

This course covers project management in the PMP framework and provides a structured approach to managing projects using Microsoft Project and Excel. Coverage includes creation of key project management charts (Gantt, Pert, CPM, timelines and resource utilization), basic statistics used in estimating task times, critical path generation in Excel and Project, project cost justification in Excel, SPC and acceptance sampling for machine acceptance, project analysis via simulation, and management of personnel, teams, subcontractors and vendors. Case studies are utilized to demonstrate core concepts and dynamic scheduling. (3-0-3)

### INTM 522

#### Computers in Industry

Computers are ubiquitous in all industrial sectors. Management Information Systems (MIS) are available for even the most complex of industrial operations. The integration of MIS with operational specialties (such as order entry, production scheduling, quality control, shipping and invoicing) is discussed. A variety of Microsoft Excel tools are introduced and utilized to set up approaches for handling a variety of industrial situations. (3-0-3)

### INTM 531

#### Manufacturing Processes for Metals and Mechanical Systems

Material processing and manufacturing techniques are covered for solid materials, including metals, plastics, ceramics and glass. Making of parts from these materials is covered along with subsequent assembly of these parts into components, subassemblies and final products. Advanced Manufacturing Technologies (AMT) will be covered including robots, lasers, AGVs, etc. The industrial structure that makes up this sector of manufacturing will be covered. (3-0-3)

**INTM 532****Manufacturing Processes for Electronics and Electrical Systems**

The materials used in Electronic and Electrical (E&E) manufacturing will be reviewed including materials and components that are used to produce chips, PCBs and wiring systems. Focus will be on the processes for producing the range of parts and products included in this broad sector. Automation for producing parts and assemblies will be covered. Techniques covered will include surface mounted technology (SMT), wave soldering, automation insertion, automated inspection, etc. The industrial structure that makes up this sector of manufacturing will be covered. (3-0-3)

**INTM 533****Manufacturing Processes for Chemical and Process Systems**

This course will cover materials and manufacturing based on process systems. This would include painting, anodizing, plating, plastic preparation, plastics manufacturing, cleaning, etc. along with the processes for producing the chemicals involved. Environmental and hazardous material issues are of importance and "green systems" that minimize the use of resources are encouraged. OSHA, EPA and other regulatory systems will be covered. The industrial structure that makes up this sector of manufacturing will be covered. (3-0-3)

**INTM 534****Resource Management**

The key in operating a manufacturing facility is to make optimum use of all of the available resources including labor, capital, technology, materials and time. This course will integrate knowledge gained in prior courses into an overall understanding of optimum management of available resources. Financial analy-

sis, cost accounting, Activity Based Costing (ABC), program management, investment and scheduling will be covered. Decision-making and risk analysis are covered. Students will learn about tools for optimizing and prioritizing decisions involved in manufacturing management and workforce assignment. Ethical considerations involved in management and decision-making will be included. (3-0-3)

**INTM 540****Supply Chain Management**

This course covers the full range of activities involved in the supply chain. This includes management tools for optimizing of supply chains, relationships with other parts of the organization, in-house versus third party approaches, and suitable performance measurements. Topics covered include: Warehouse Management Systems (WMS), Transportation Management Systems (TMS), Advanced Planning and Scheduling Systems (APS), as well as cost benefit analysis to determine the most appropriate approach. (3-0-3)

**INTM 542****Warehousing and Distribution**

This course covers warehouse layout and usage based on product requirements such as refrigeration, hazardous material, staging area, and value added activities. Processes covered include receiving, put-away, replenishment, picking and packing. The requirement for multiple trailer/rail car loading and unloading is considered as well as equipment needed for loading, unloading, and storage. Computer systems for managing the operations are reviewed. Emphasis is on material handling from warehouse arrival through warehouse departure. (3-0-3)

**INTM 543****Purchasing**

Purchasing responsibilities, processes, and procedures are included. Topics covered include: supplier selection and administration, qualification of new suppliers, preparing purchase orders, negotiating price and delivery, strategic customer/vendor relationships, and resolution of problems. All aspects of Supplier Relation Management (SRM) are covered. (3-0-3)

**INTM 544****Export/Import Management**

Internationalization of industry requires special expertise and knowledge, which must be taken into consideration throughout all interactions with overseas companies either as customers or suppliers. Topics covered include custom clearance, bonded shipping, international shipping options, import financing and letters of credit, customer regulations, insurance, import duties and trade restrictions, exchange rates, and dealing with different cultures. (3-0-3)

**INTM 545****Strategic International Business**

Understanding international business strategies is fundamentally important to businesses of any size in today's competitive, worldwide marketplace. Course objectives include providing a background in international business fundamentals, economics, human resources, cultural issues and interrelationships, as well as understanding the business decision processes involved in product planning, marketing, and organizational planning, structure and performance. Includes development of managerial skills for international business related to strategic planning, marketing and sales policy, and implementation of organizational goals. (3-0-3)