

## Master of Industrial Technology and Operations

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Industrial Technology and Management  
Suite 4001 South  
3424 S. State Street  
Chicago, IL 60616  
312.567.3650  
312.567.3655 fax  
www.intm.iit.edu

**Director**

Keith McKee  
312.567.3650

**Associate Director**

Mazin Safar  
312.567.3624

**Program Coordinator**

Pamela Houser  
312.567.3584

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 achieving a 3.3 GPA or better in the first three 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 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.

Prospective students who have previously obtained a MS or even a PhD in highly technical subjects may be well served to pursue the MITO degree. These individuals are often technical experts who, once employed in industry, have found that they lack an understanding of industrial operations, applied technologies and management skills. As a hybrid program covering both technology and management, the MITO curriculum enables such specialists to move from technology into operations.

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.

## 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 INTM 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 advisor 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).

The flexibility of course options within the MITO program allows students to pursue an industrial specialization, if so desired. A specialization requires completion of 12 credit hours (4 courses) in any one of three concentrations offered as part of Industrial Technology and Management programs: Industrial Logistics (IL), Industrial Facilities (IF), or Manufacturing Technology (MT). Alternately, students may complete up to four (4) courses in another IIT department with appropriate qualifications and approvals. MITO students have taken courses from Stuart School of Business, the Institute of Design, and Armour College of Engineering.

INTM's industrial specializations require completion of four courses within a specific subject area:

### Industrial Logistics (IL)

INTM 509 Industrial Logistics  
 INTM 530 Transportation  
 INTM 540 Supply Chain Management  
 INTM 542 Warehousing and Distribution  
 INTM 543 Purchasing  
 INTM 544 Export/Import Management

### Industrial Facilities (IF)

INTM 413 Facilities and Construction Management  
 INTM 417 Construction Estimating  
 INTM 507 Construction Technology  
 INTM 515 Advanced Project Management

### Manufacturing Technology (MT)

INTM 406 Quality Control  
 INTM 531 Mfg Processes for Metals/Mechanical Systems  
 INTM 532 Mfg Processes for Electronics/Elect Systems  
 INTM 533 Mfg Processes for Chemical/Process Systems

A new specialization is now available to MITO students interested in the food industry. IIT's Food Safety and Technology (FST) Program, admission to which requires a bachelor's degree in food science and technology, agricultural engineering, chemical engineering or a related field, will allow MITO students to earn a Certificate in Food Safety and Technology (FST) as part of their MITO degree. This is an outstanding opportunity for those involved in food manufacturing, logistics or facilities, but who lack formal education in food science. The FST Certificate consists of the following four courses:

FST 511 Food Law and Regulation  
 FST 524 Fundamentals of Food Science and Technology  
 FST 531 HACCP Planning and Implementation  
 FST 541 Principles of Food Packaging

INTM 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. An online demonstration of IIT web-based courses is available at [www.iit-online.iit.edu](http://www.iit-online.iit.edu).

## Course Descriptions

All courses earn three credits.

### 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.

### 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.

### **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.

### **INTM 508 Cost Management**

Accounting basics are introduced with primary emphasis on the costing and estimating procedures as used in industry. The objective of this course is to provide a good understanding of financial activities and hands-on experiences in working with a variety of costing and accounting systems.

### **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.

### **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.

### **INTM 514 Topics in Industry**

Provides overview of multiple industrial sectors and the influences that are forcing change. All aspects of industry are considered: history of industry, inventory, supply chain, e-commerce, management, manufacturing, industrial facilities, resource management, electronics and chemical industries, alternate energies, marketing, entrepreneurship, computers as tools, and other specialty areas.

### **INTM 515 Advanced Project Management**

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 utilized to demonstrate core concepts and dynamic scheduling.

### **INTM 518 Industrial Risk Management**

Each year industrial companies are affected by critical incidents which cause disruptions in operations and significant monetary losses due to repairs and/or lost revenue. Whether it is a small fire, an extended electrical outage or an incident of a more serious magnitude, all company stakeholders – from the board of directors to the employees to the customers – are impacted. The key to understanding the complexities of industrial resiliency lies in focusing on the issues of preparedness: prevention, mitigation and control. This course is designed to prepare the student for managing a critical incident, including understanding risk and business impact, emergency preparedness, contingency planning and damage control.

### **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, shopping 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.

### **INTM 530 Transportation**

Course covers transportation practices and strategies for the 21st century. The role and importance of transportation in the economy and its relationship to the supply chain will be covered in detail. Transportation modes – truck, rail, air, and water – will be examined for both domestic and global transportation. Costing and pricing strategies and issues will be discussed. Security issues in domestic and international transportation will be part of the course. Lectures with years of practical transportation experience in the corporate world will provide students with their perspective on the role of transportation in today's economy.

### **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. Advance Manufacturing Technologies (AMT) will be covered including robots, lasers, AGVs, etc. The industrial structure that makes up this sector of manufacturing will be covered.

### **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.

### **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.

### **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.

### **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.

### **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.

### **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.

### **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.

### **INTM 546 Manufacturing and Logistics Information Systems**

This course provides an overview of manufacturing and supply chain information systems, tools, and techniques utilized for effective decision making. Current state-of-the-art and commercially available logistics software packages, such as MRP, WMS, TMS, APS, etc., will be used and their impact on management decision making analyzed.

### **INTM 561 Energy Options for Industry**

Carbon-based fuels are a limited resource and within decades will be in very short supply. Associated energy costs will increase and industry will be required to incorporate alternate fuels and/or power sources, such as uranium (for nuclear power), hydroelectric, geothermal, wind, wave, solar, etc. This course presents such energy options and explores the anticipated impact on industry.

***Please note:** This information is compiled from IIT's current Graduate Programs Bulletin and includes recent department updates. The Graduate Programs Bulletin is the official university publication consulted when delineating or assessing a program of study.*