The Master of Industrial Technology and Operations (M.I.T.O.) is a professional degree designed for individuals who plan to make a career in industry. The purpose of this degree is to enhance the ability of 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 M.I.T.O. curriculum prepares students to move into management, supervisory and staff positions in industry. The M.I.T.O. is considered to be a “hybrid” degree, blending practical application of current technologies with the management skills needed to oversee a wide range of industrial operations. Students build a program of study suited to their career interests and experience. The M.I.T.O. is not a MBA or an engineering degree, therefore it is not recommended for those planning to pursue careers in academia or research.

### Degree Offered

Master of Industrial Technology and Operations

### 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 GPA of 3.3 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 writing and a combined score of 900 for the verbal and quantitative portions of the exam taken prior to July 2011, or a combined score of 292 for exams taken August 2011 and after. Applicants from countries where English is not the primary language also must complete the TOEFL with a minimum score of 70 on the Internet-based test (equivalent to 523 PBT) with no individual section scored below 15. IELTS scores are also accepted, with a minimum score of 5.5. Students with a TOEFL score between 70 and 89 or an IELTS score between 5.5 and 6.0 will be required to complete an English assessment test upon arrival at IIT to identify need and placement in a remedial English course during the first term of study.

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. International students must also submit financial support documentation verifying sufficient funds to cover degree studies and living expenses.

Prospective students who have previously obtained a M.S. or even a Ph.D. in highly technical subjects may be well served to pursue the M.I.T.O. 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 M.I.T.O. curriculum enables such specialists to move from technology into operations.
Faculty

Maurer, William, Industry Professor and Coordinator of Outreach Activities. B.S., University of Illinois; M.S., Keller Graduate School of Management. Operations, lean manufacturing, corporate strategy.

Safar, Mazin, Industry Professor and Program Director. B.S., Al-Hikma University (Iraq); M.S., Illinois Institute of Technology; M.B.A., University of Chicago. Operations management, supply chain, inventory control, economics.

Adjunct Faculty

Arditi, David, Professor of Civil and Architectural Engineering. B.S., M.S., Middle East Technical University (Turkey); Ph.D., Loughborough University (United Kingdom). Construction engineering and management.

Ayman, Roya, Professor of Psychology and Director of Industrial/Organizational Training. B.A., M.A., Ph.D., University of Utah. Leadership, diversity, organizational climate, and work-family interface.

Bobco, William, Adjunct Professor. B.S., M.B.A., University of Chicago. Production management, supply chain management, materials handling.

Coates, James, Adjunct Professor. B.S. National Louis University. Facilities Maintenance, HVAC, stationary engineering, electrical systems.

Davis, Blake, Adjunct Professor. B.A., M.A., Illinois Institute of Technology. City and regional planning, sustainability, environmental issues.

Footlik, Robert B., PE, Adjunct Professor. B.S., Illinois Institute of Technology. Industrial engineering, warehousing operations, logistics and distribution technologies.


Gopal, Gurram, Adjunct Professor. B.Tech., Indian Institute of Technology (India); M.S., Ph.D., Northwestern University. Chemical Engineering, industrial engineering, operations research, economics, finance.

Hoffman, Robert, Adjunct Professor. Oxford and London School of Economics. Transportation, logistics, and economics.

Jain, Jagjit, Adjunct Professor. B. Tech. in Mechanical Engineering; M.S. in Operations Research; M.B.A. in Finance/Economics/Accounting.

Jabbari, Kamyar, Adjunct Professor. B.S., Towson State; M.B.A., University of Chicago; J.D., IIT Chicago-Kent College of Law. Corporate finance, international finance, economics, and banking law.

Kleiman, Lori, SPHR, Adjunct Professor. B.A., University of Illinois; M.A.S., California National University. Human resource management, employment law.

Kumiega, Andrew, Adjunct Professor. B.S., University of Illinois (Chicago); M.S., Illinois Institute of Technology; M.S., Ph.D., University of Illinois (Chicago). Engineering management, industrial engineering, finance.

Kleiman, Lori, SPHR, Adjunct Professor. B.A., University of Illinois; M.A.S., California National University. Human resource management, employment law.

Kumiega, Andrew, Adjunct Professor. B.S., University of Illinois (Chicago); M.S., Illinois Institute of Technology; M.S., Ph.D., University of Illinois (Chicago). Engineering management, industrial engineering, finance.

Lemming, Raymond, Adjunct Professor. B.S. in Civil Engineering. B.S. in Psychology. M.B.A. in Organizations and Management, Juris Doctor.

Lewis, Philip, Adjunct Professor. B.S., Milwaukee School of Engineering. Industrial management, manufacturing processes.

Prendergast, John, Adjunct Professor. B.A. in Occupational Education; M.A. in Education.

Rozansky, Irene, Adjunct Professor. B.A., Purdue University; M.B.A., University of Massachusetts. Industrial risk assessment and management.

Shankar, Rama, Adjunct Professor. B.S., Mechanical Engineering; M.S., Materials Management; M.S., Engineering Management. Quality control, industrial management and operations, six sigma.

Shields, Herb, Adjunct Professor. B.S., Clarkson University. Electrical engineering, logistics, purchasing and acquisitions.

Tijunelis, Donatas, PE, Adjunct Professor. B.S., M.S. in Chemical Engineering, D.B.A. Operations management, strategic project management, energy and sustainability.

Tomal, Daniel, Adjunct Professor. B.S., M.S., Ph.D., Bowling Green State University. Electrical technology, industrial technology, administration and supervision.

Twombly, John R., Clinical Professor of Accounting and Finance and Director of Undergraduate Programs in Stuart School of Business. B.S., University of Pennsylvania; M.B.A., Ph.D., University of Chicago; Certified Public Accountant. Financial and managerial accounting.
Master of Industrial Technology and Operations

Each student’s program of study is customized to best serve individual career objectives. Of the 30 credit hours required for the M.I.T.O. degree, the student must complete at least 18 credit hours of INTM graduate courses. Up to 12 credit hours of senior (400-level) courses may be completed as part of the degree. A maximum of 6 credit hours may be applied from special project courses (INTM 597 or an Interprofessional Project (IPRO 497)). A total of 9 credit hours taken at a different university (passed with the grade of “B” or better) may be transferred to IIT and applied towards the M.I.T.O. degree if those credits have not been applied toward any earned degree (subject to administrative approval). No thesis or comprehensive examination is required as part of this degree.

The flexibility of course options within the M.I.T.O. program allows students to complete an industrial specialization, or simply take the 10 courses of greatest interest. A specialization requires the completion of 12 credit hours (4 courses) in any one of four concentrations within the INTM curriculum: Industrial Facilities (IF), Industrial Sustainability (ST), Manufacturing Technology (MT), or Supply Chain Management (SCM). Alternatively, students may complete up to 4 courses in another IIT department with appropriate qualifications and approvals. For example, students have taken courses from Stuart School of Business, Armour College of Engineering, and the Food Safety and Technology Program.

INTM courses are presented live and via interactive video at IIT’s Main Campus in Chicago and Rice Campus in Wheaton IL. In addition, the M.I.T.O. program can be completed entirely online. Using a delayed Internet format (lecture videos are posted within 24 hours after the live session), students can log on and view lectures at the time and location of their choice. A demonstration of IIT web-based courses is available at http://iit.edu/iit_online/.
Specialization Courses

An industrial specialization requires completion of four (4) courses within an identified subject area.

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

Supply Chain Management
INTM 509 Inventory Control
INTM 530 Transportation
INTM 540 Supply Chain Management
INTM 542 Warehousing and Distribution
INTM 543 Purchasing
INTM 544 Export/Import
INTM 546 Manufacturing and Logistics Information Systems

Manufacturing Technology
INTM 406 Quality Control in Manufacturing
INTM 531 Manufacturing Processes for Metals and Mechanical Systems
INTM 532 Manufacturing Processes for Electronics and Electrical Systems
INTM 533 Manufacturing Processes in Chemical Industries
INTM 546 Manufacturing and Logistics Information Systems

Industrial Sustainability
INTM 559 Issues in Industrial Sustainability
INTM 560 Sustainability of Critical Materials
INTM 561 Energy Options for Industry
INTM 562 Special Topics in Sustainability
Course Descriptions

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

**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 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 experience in working with a variety of costing and accounting systems. (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) 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 514 Topics in Industry**
This course 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. (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, 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 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. (3-0-3)

**INTM 520 Applied Strategies for the Competitive Enterprise**
Course covers the application of proven management principles and operational practices. Learn how high performance companies create a competitive advantage despite economic challenges and a transitional customer base. Factors covered include strategy deployment, financial analysis, new product development, quality, customer service, and attaining market leadership. Case studies illustrate variable impacts on business situations. (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 530 Transportation**
This 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—trucks, rail, air, and water—will be examined for both domestic and global transportation. Costing and pricing strategies and issues will be discussed as well as security issues in domestic and international transportation. (3-0-3)
INTM 531
Manufacturing Processes for Metals & Mechanical Systems
A broad range of manufacturing processes are studied including casting, forging, rolling, sheet metal processing, machining, joining, and non-traditional methods such as powder, EDM, and additive processes. Particular attention on interrelationships between manufacturing processes and properties developed in the work piece, both intended and unintended. Economic considerations and tradeoffs, as well as computer-integrated manufacturing topics, are also explored. (3-0-3)

INTM 532
Manufacturing Processes for Electronics & 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
Chemical Manufacturing Processes in Industry
This course provides an overview of current and emerging chemical processes employed in the energy, food, drug, and plastics sectors. Current and future impacts of various manufacturing processes on society, environment, and sustainability are covered as are issues related to OSHA, EPA, FDA, USD, and other regulatory systems. The various implications of recovery and reuse are explored as well as new non-polluting, zero-emissions processes and technologies. Students will gain an appreciable understanding of “how it’s made” and the range of chemical processes and related technical challenges involved in manufacturing. A background in chemistry is not required. (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 & Distribution
This course covers warehouse layout and usage based on product requirement 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
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
Organizational involvement in international business activities – whether sourcing material and designs, expanding product sales and reach, or creating economies of scale and scope – requires an understanding of various factors in international finance, marketing, and strategy. This course brings together these disciplines to explore financial factors that may add or transform risks, the necessary adjustments in the creation of global marketing strategy, and the strategies for creating and preserving a competitive advantage in the international arena. (3-0-3)

INTM 546
Manufacturing & Logistics Information Systems
This course provides an overview of managing and supply chain information systems, tools, and techniques utilized for effective decision making. Current state-of-the-art and commercially available industrial software packages, such as MRP, WMS, TMS, APS, etc., will be used and their impact on management decision making analyzed. (3-0-3)

INTM 547
Supply Chain Strategies
The range of supply chain strategies to be considered when assessing a firm’s internal and external supply chain network. Strategies involved in the end-to-end supply chain including product life cycle management (PLM), inventory optimization, network design optimization, management tools for optimizing supply chains, relationships with other parts of the organization, in-house versus third-party approaches, and suitable performance measurements. Prerequisite(s): [(INTM 441 with min. grade of D) OR (INTM 540)] (3-0-3)
Industrial Technology and Management

INTM 559
Issues in Industrial Sustainability
Examines the concept of sustainability and its application in the industrial environment. Identifies underlying stresses on natural and human environments and the resultant problems for business and society including legal, ethical, and political issues related to sustainability. Global warming, peak oil, and commodity pricing are considered as indicators of the need for improvements in sustainability. Industrial ecology will be discussed as well as strategies for developing sustainable practices in manufacturing, power generation, construction, architecture, logistics, and environmental quality. Coverage includes case studies on businesses that have developed successful sustainability programs. (3-0-3)

INTM 560
Sustainability of Critical Materials
This course explores the limitations in supply and the need for sustainable use of carbon and non-carbon-based materials such as oil, minerals, food, water, and other natural resources used by industry. Limitations in the global availability of such resources pose challenges to industry which will require careful consideration and planning to ensure continued prosperity for current and future generations. Course will cover strategies and options to mitigate anticipated shortages and optimize the use of non-renewable natural resources, review of fuel and raw material pricing, and cost/benefit analysis of sustainable development proposals. Technical analyses will be presented during class discussions, but a technical background is not required. (3-0-3)

INTM 561
Energy Options in 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. (3-0-3)

INTM 562
Special Topics in Sustainability
This course allows the student to research and report on an industrial sustainability issue of interest and relevance to their career objectives. Topics may touch on industrial ecology, ethics, regulations, environment, resource use, alternative manufacturing methods, facilities, logistics, etc. This is the fourth course in a specialization in industrial sustainability. (0-0-3)

INTM 594
Special Projects
Special project. (Credit: Variable)

INTM 597
Special Projects
Independent study and project. Permission of instructor required. (Credit: Variable)