

Master of Industrial Technology and Operations

Department Web Site: www.intm.iit.edu

Industrial Technology and Management

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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 considered to be a “hybrid” degree, blending operational approaches and 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 building on their experience. 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.

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 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 writing and a combined score of 900 for the verbal and quantitative portions of the exam taken prior to August 2011, or 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 with no individual section scored below 15. IELTS 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 a remedial English course during their first term at IIT.

All applicants must submit a completed application form, the application fee, official transcripts (or certified copies) for all academic work at the college level, 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 MS or 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 technology and management, the MITO curriculum enables such specialists to move into operations or management.

Faculty

Gopal, Gurram, Industry Professor and Academic Advisor. B.Tech., Indian Institute of Technology (India); M.S., Ph.D., Northwestern University. Chemical engineering, industrial engineering, operations research, global sourcing, CRM, economics, finance.

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, project management.

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, work-family interface.

Batka, Shawn, Adjunct Professor. M.B.A, Finance, DePaul University; B.S., Southern Illinois University, Industrial Technology. Manufacturing and logistics information systems.

Calhoun, Mark, Adjunct Professor. B.S., Environmental Science & Natural Resources, Purdue University; M.B.A. (M.I.S.), Indiana State University. Supply chain management, procurement, energy management.

Cesarone, John, Senior Lecturer of Mechanical Engineering, B.S., M.S., University of Illinois; Ph.D., Northwestern University. Robotics, reliability engineering, manufacturing.

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

Davis, Blake, Adjunct Professor. B.S. National Louis University. City and regional planning, sustainability, environmental issues.

Dunn, Robert, Adjunct Professor. B.S. Pennsylvania State, M.S. Virginia Institute of Technology. Operations, supply chain, procurement, inventory, sourcing.

Hamill-Governale, Nancy, Adjunct Professor. Master of Architecture, Illinois Institute of Technology; B.A. Geography, Environmental Planning, Southern Illinois University. Facilities management, sustainability.

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

Jain, Jagit, Adjunct Professor. B. Tech in Mechanical Engineering, M.S., in Operations Research. M.B.A. in Finance/Economics/Accounting. Supply chain management, export/import, logistics.

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

Khalili, Nasrin, Associate Professor of Environmental Management, Stuart School of Business. B.S., M.S.P.H., Tehran University, Ph.D. Illinois Institute of Technology. Energy and environmental management, environmental economics, energy systems, sustainability.

Kumiega, Andrew, Adjunct Professor. B.S., University of Illinois (Chicago); M.S., Illinois Institute of Technology; M.S., Ph.D., University of Illinois (Chicago). Industrial engineering, operations management, risk management, quality, finance.

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

Lewis, Phillip, Adjunct Professor. B.A., Milwaukee School of Engineering. Industrial management, manufacturing processes, operations, marketing.

Olsen, Katherine, Adjunct Professor. M.S., Supply Chain Management, Elmhurst College. B.S., Industrial Engineering, University of Illinois at Urbana-Champaign. Supply Chain Design, Sales & Operations Planning, Warehouse Management, Six Sigma, Continuous Improvement.

Prendergast, John, Adjunct Professor. B.A. in Occupational Education; M.A. in Education. Construction practices & trades.

Rigopoulos, Theo, Adjunct Professor. B.A. Elmhurst College. Supply chain management, logistics, manufacturing.

Shankar, Rama, Adjunct Professor. B.S., Mechanical Engineering, M.S., Materials Management; M.S., Engineering Management. Quality control, industrial management and operations, quality, 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 Chicago; Certified Public Accountant. Financial and managerial accounting.

Waterloo, Daniel, Adjunct Professor. M.P.M and M.B.A., Keller Graduate School of Management, DeVry University. B.S.E.E., University of Illinois at Urbana-Champaign. Business development, sales, software, electronics technology

Master of Industrial Technology and Operations

30 credit hours

Required Credit Hours

Elective courses: 18-30 hours

Special project: 0-6 hours

Optional specialization courses: 12 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 four concentrations within the INTM curriculum. Alternately, students may complete up to four (4) courses in another IIT department with appropriate qualifications and approvals. For example, MITO students have taken courses from Stuart School of Business and Armour College of Engineering.

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 view class lectures at the time and location of their choice. An online demonstration of IIT web-based courses is available at www.iit-online.iit.edu.

General management courses offered by INTM within the MITO program include:

INTM 404 Marketing, Sales and Product Introduction
 INTM 410 Operations Management
 INTM 425 Human Resource Management
 INTM 477 Entrepreneurship in Industry
 INTM 502 Industrial Engineering Concepts and Applications
 INTM 508 Cost Management
 INTM 511 Industrial Leadership
 INTM 514 Topics in Industry
 INTM 518 Industrial Risk Management
 INTM 520 Applied Strategies for the Competitive Enterprise
 INTM 522 Modeling for Decision-Making
 INTM 545 Strategic International Business

INTM's industrial specializations require completion of four courses within one identified area:

Industrial Facilities (IF)

INTM 413 Construction Administration for Construction Projects
 INTM 417 Construction Estimating
 INTM 507 Construction Technology
 INTM 515 Advanced Project Management
 INTM 516 Integrated Facilities Management
 INTM 523 Sustainable Facilities Operations

Industrial Sustainability (ST)

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

Manufacturing Technology (MT)

INTM 406 Quality Control
 INTM 531 Mfg Processes: Metals/Mechanical Systems
 INTM 532 Mfg Processes: Electronics/Electrical Systems
 INTM 533 Chemical Manufacturing Processes in Industry
 INTM 535 Performance Management in Food Operations
 INTM 546 Manufacturing and Logistics Information Systems

Supply Chain Management (SCM)

INTM 427 E-Commerce in Marketing & Supply Chain Networks
 INTM 432 Sales and Operations Planning
 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
 INTM 547 Supply Chain Strategies

Course Descriptions

All courses earn three credits.

INTM 502 Industrial Engineering Concepts and Applications

Beginning with productivity and productivity improvement, students learn Industrial Engineering concepts and are trained to apply them to optimize engineering and operational tasks. Topics covered include time and motion studies, work measurement, ergonomics, value stream engineering, and value stream mapping. Data envelopment analysis and analytical hierarchy processes are implemented using Excel to optimize operations. Plant location and layout are covered. Students learn to optimize project selection using ROI and other metrics and execute projects using Microsoft Project. An open source ERP system is used to illustrate MRP and other planning functions. The application of statistical methods, including hypothesis testing to improve performance is also 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

This course introduces accounting information used for decision-making within a business enterprise. Financial reporting, financial terminology, and the three major financial statements are reviewed. Product costing, short-term and long-term decision-making, budgeting, control of operations, and performance evaluations are covered, as are cost-volume-profit relationships, relevant costs, flexible budgets and standard costs.

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, safety stock, forecasting, dependent and independent demand, 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.

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 516 Integrated Facilities Management

This course involves understanding processes and tools needed to successfully manage building systems, functions and personnel in any type of building, complex of buildings or physical environment. Course covers topics in facilities management ranging from routine maintenance to complex systems interactions and financial decisions. Students learn to assess issues of safety, human comfort, sustainable use of resources, building and infrastructure life cycles, and company objectives, and develop solutions based on studying real problems in facilities management organizations.

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. A small fire, an extended electrical outage or an incident of a more serious magnitude affects all company stakeholders – from the board of directors to the employees to the customers. Understanding the complexities of industrial resiliency requires a focus on 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 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.

INTM 522 Modeling for Decision-Making

Management Information Systems (MIS) are utilized in all industrial sectors to manage, analyze and optimize operational processes. This course examines the integration of MIS for a range of operational activities, including production scheduling, inventory control, purchasing, shipping and invoicing. Students will be exposed to the theory of MIS by reviewing case studies and successful applications. Students learn how to build spreadsheet models for multiple business problems using linear programming (LP) and integer programming (IP), and perform regression analysis and basic time series forecasting. A variety of Microsoft Excel tools are introduced.

INTM 523 Sustainable Facilities Operations

Maintaining and managing buildings and facilities is a challenging, multifaceted occupation. Facilities are becoming smarter and greener as the goals of energy conservation and occupant comfort have shifted to include environmental responsibility. This course examines facility operations and management (O&M) related to sustainability and green technology, with an emphasis on the U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) requirements, rating system, and the process for properties to apply for certification as a resource-efficient operation.

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, as well as security issues in domestic and international transportation.

INTM 531 Manufacturing Processes for Metals and 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.

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 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 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, USDA, 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.

INTM 535 Performance Management In Food Operations

Creating an organizational culture of quality and performance is critical to managing the unique demands of a food processing company. Students will learn how to develop, manage, and improve food production processes, implement lean principles to eliminate waste and improve yields, and measure operational performance. Coursework includes Total Quality Management (TQM), evaluation and management of supply chain activities, and strategic deployment techniques.

INTM 540 Supply Chain Management

This course covers the full range of activities involved in the supply chain, including management tools for optimizing 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.

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 degree requirements.

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

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

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 a global marketing strategy, and the strategies for creating and preserving a competitive advantage in the international arena.

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 industrial software packages, such as MRP, WMS, TMS, APS, etc., will be used and their impact on management decision making analyzed.

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: INTM 441 or INTM 540, or department permit.

INTM 559 Issues in Industrial Sustainability

This course examines the concept of sustainability and its application in the industrial environment. Underlying stresses on natural and human environments are identified as well as 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 sustainability improvements. Industrial Ecology is discussed as well as strategies for developing sustainable practices in manufacturing, power generation, construction, architecture, logistics, and environmental quality. Case studies on businesses employing successful sustainability programs are reviewed.

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.

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.

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.

INTM 597 Special Projects

Independent study and project. Permission of instructor required. Variable credit.