Bachelor of Industrial Technology and Management

Department Web Site: www.intm.iit.edu

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The Bachelor of Industrial Technology and Management (BINTM) program is designed to prepare skilled adults for managerial positions in industry. This is a completion program for working individuals who have technical training in manufacturing or industrial specialties. The program enables students to build upon existing skills, improve their managerial capabilities, and thereby expand their career opportunities.

Educational outcomes of the BINTM program include:

- Understand best practices in industry and methods of implementation.
- Identify and evaluate significant factors and issues affecting managerial decision-making.
- Ability to assume a leadership role and a higher level of professional responsibility.
- Understand how to address a wide range of operational and situational challenges.
- Understand the importance of ethical and sustainable industrial operations.
- Understand the dynamics of the global industrial landscape.
- Communicate effectively at all levels, in an objective and professional manner.
- Ability to function on multidisciplinary teams.

The program offers five specializations: Industrial Facilities (IF), Industrial Sustainability (ST), Manufacturing Technology (MT), Supply Chain Management (SCM) and Telecommunication Technology (TT). Students have the option to complete a specialization or take courses from more than one area as electives. The core curriculum covers material applicable to all industrial sectors. This approach allows students to optimize course selection to suit career objectives.

The ideal candidate for this program is a person who is already working within, or has a strong interest in, these industries or related fields. This curriculum provides a broad knowledge base which gives students the flexibility to advance within a chosen technical specialty, or move into a related career at a professional or management level.

Admission to the program is based on a review of college transcripts plus consideration of work experience and career goals. In general, 60 credit hours from an accredited college are required for admission (only courses graded “C” or better are accepted for transfer). Those who have accrued at least 45 hours towards admission requirements may be admitted with the condition that outstanding requirements be completed within two years. Candidates with more than 60 hours of transferable credit may qualify to have excess credit applied towards INTM coursework.

To suit full-time work schedules, courses are offered nights and Saturdays at IIT’s Main Campus in Chicago, IIT’s Rice Campus in Wheaton, IL, and via the Internet for students who are unable to attend live classes.

A three-course INTM certificate program is available for individuals interested in improving management and decision-making skills. The courses are part of the regular curriculum and can be applied toward the BINTM degree.

A co-terminal degree program is now available, allowing completion of both the BINTM degree and the Master of Industrial Technology and Operations (MITO) in an expedient manner. The co-terminal reduces overall time and credits required to earn both degrees by nine (9) hours.

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Admission Requirements

Mathematics
Five to six credit hours at the level of Trigonometry or above. Technical Mathematics also accepted.

Computer Science
Three credit hours of computer science/programming or microcomputer applications.

Natural Science
Ten to eleven credit hours of science or engineering courses. Relevant courses include physics, chemistry or biology (physics highly recommended). Up to six credit hours may be in engineering graphics/drafting. It is preferred that two sequential courses be completed in a single field, and the third course be in a different field. In certain cases, technology courses may satisfy this requirement.

Humanities and Social Sciences
Nine credit hours. Humanities courses include literature, philosophy (except logic) and history. Social sciences include anthropology, geography, political science, psychology, sociology and economics. A minimum of three credit hours in each category is required. A maximum of six credit hours in lower-level Humanities (at 100- or 200-level) can be accepted.

Technical Coursework
Thirty-one credit hours. (Candidates with adequate college credit but lacking the technical coursework may qualify for admission based on a strong interest and/or experience in industrial technology.)

Industrial Technology and Management Curriculum

A total of 126 credit hours are required for the bachelor’s degree, consisting of 66 credits (22 courses) of junior- and senior-level courses completed at IIT and the 60 transfer credits required for admission. Students may attend on a part-time or full-time basis, understanding that INTM courses are generally offered evenings to accommodate full-time work schedules of students.

The core curriculum (15 courses) emphasizes proficiency in the essential functions of industrial enterprises with a focus on management-related topics. The core coursework includes upper-level humanities and social science electives and two (2) Interprofessional Projects. In addition, students complete seven (7) electives, generally consisting of three (3) technical electives and four (4) specialization electives. Electives provide more in-depth coverage of specific aspects of industrial organizations and their related sectors. Students choose elective courses based on career goals and personal interests, and have the option to complete a formal specialization by taking four courses within one specialty area.

Five industrial specializations are available:

- Industrial Facilities (IF)
  Covers construction, project management, and renovation and maintenance of buildings, facilities and equipment.

- Industrial Sustainability (ST)
  Covers a range of issues in sustainability, non-renewable material resources, and alternative energies.

- Manufacturing Technology (MT)
  Covers manufacturing processes, mechanical technology, quality control, and management information systems.

- Supply Chain Management (SCM)
  Covers supply chain management, warehousing and distribution, purchasing, and export/import activities.

- Telecommunication Technology (TT)
  Covers management and maintenance of data networks, network configurations, network security, new technologies.
Bachelor of Industrial Technology and Management

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<th>Required courses</th>
<th>Credit Hours</th>
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<td>INTM 301, 315, 322, 404, 408, 409, 410, 425, 432</td>
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<td>Electives (Technical and/or Specialization)</td>
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<td>300/400-level course</td>
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<td>Interprofessional Projects</td>
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<td>Total Hours</td>
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Bachelor of Industrial Technology and Management Curriculum

A suggested program based on part-time attendance. Students may complete coursework at their own pace.

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Total Credit Hours 66
The Core Curriculum includes the following 15 courses:

- INTM 301 Communications for the Workplace
- INTM 315 Industrial Enterprises
- INTM 322 Industrial Project Management
- INTM 404 Marketing, Sales and Product Introduction
- INTM 408 Cost Management
- INTM 409 Inventory Control
- INTM 410 Operations Management
- INTM 425 Human Resource Management
- INTM 432 Sales and Operations Planning
- INTM 430 Two (2) Interprofessional Project (IPRO) Courses
- INTM 441 Supply Chain Management
- INTM 477 Entrepreneurship in Industry

INTM Electives (7 courses) may be chosen from both Technical and Specialization Elective options

**Technical Electives:**

- INTM 314 Maintenance Technology and Management
- INTM 319 Electronics in Industry
- INTM 414 Topics in Industry
- INTM 418 Industrial Risk Management
- INTM 420 Applied Strategies for the Competitive Enterprise
- INTM 427 E-Commerce
- INTM 447 Supply Chain Management
- INTM 477 Entrepreneurship in Industry

**Specialization Electives** include the following; complete 4 courses in one focus area to obtain a Specialization.

**Industrial Facilities (IF):**

- INTM 407 Construction Technology
- INTM 413 Facilities and Construction Administration
- INTM 415 Advanced Project Management
- INTM 416 Integrated Facilities Management
- INTM 417 Construction Estimating
- INTM 407 Transportation
- INTM 441 Supply Chain Management
- INTM 442 Warehousing and Distribution
- INTM 443 Purchasing
- INTM 444 Export/Import
- INTM 446 Manufacturing and Logistics Info Systems

**Industrial Sustainability (ST):**

- INTM 459 Issues in Industrial Sustainability
- INTM 460 Sustainability of Critical Materials
- INTM 461 Energy Options in Industry
- INTM 462 Special Topics in Sustainability

**Manufacturing Technology (MT):**

- INTM 406 Quality Control
- INTM 412 Mfg. Processes for Metals/Mechanical Systems
- INTM 431 Mfg. Processes: Electronics/Electrical Systems
- INTM 433 Manufacturing Processes in Chemical Industries
- INTM 446 Manufacturing and Logistics Information Systems
- INTM 449 Telecommunications over Data Networks

**Supply Chain Management (SCM):**

- ITMO 440 Introduction to Data Networks and the Internet
- ITMO 441 Network Administration and Operations
- ITMS 448 CyberSecurity Technologies
- INTM 449 Telecommunications over Data Networks

**Telecommunication Technology (TT):**

- ITMO 440 Introduction to Data Networks and the Internet
- ITMO 441 Network Administration and Operations
- ITMS 448 CyberSecurity Technologies
- INTM 449 Telecommunications over Data Networks

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**Co-Terminal Bachelor of Industrial Technology and Management/Master of Industrial Technology and Operations (BINTM/MITO)**

The BINTM/MITO co-terminal degree program provides an attractive opportunity for BINTM students who intend to pursue a graduate degree. The seamless format of the curriculum, the reduction of total credit hours and overall time required, and the ability to apply undergraduate financial aid scholarships towards the BINTM/MITO co-terminal program are most positive attributes.

An application for the BINTM/MITO co-terminal program should be submitted by current BINTM students during their first term in their senior year (U4). Applicants must have an undergraduate GPA of 3.0 in order to be admitted to the co-terminal program. Once admitted, students must maintain a GPA of 3.0/4.0 to remain in the program. If a student fails to meet GPA requirements, they will be dismissed from the co-terminal program.

The BINTM/MITO co-terminal program reduces the total credit hours ordinarily required to complete both degrees from 156 to 147 (a reduction of 9 hours). The graduate curriculum remains flexible to suit students' professional and career interests. Students will work with an academic advisor to ensure program requirements for both degrees are satisfactorily achieved.
Certificate in Industrial Technology and Management

The three-course INTM Certificate provides an introduction to industrial organizations and how they operate. Certificate students should have at least two years of work experience and some college credit in industrial subjects. The INTM Certificate program does not qualify for federal financial aid. Students must complete the following three courses:

INTM 315  Industrial Enterprises
INTM 322  Industrial Project Management
INTM 410  Operations Management

Course Descriptions

All courses earn three credits. (C) indicates course fulfills communications general education requirements.

INTM 301  Communications for the Workplace
Review, analyze and practice verbal and written communication formats found in the workplace. Emphasis is on developing skills in technical writing, oral presentations, business correspondence and interpersonal communications using electronic and traditional media. Credit not granted for both INTM 301 and COM 421. (C)

INTM 314  Maintenance Technology and Management
Maintenance of facilities is a major concern for all industrial operations. Course covers technologies involved as well as the management aspects for maintaining buildings, construction, and equipment installation and maintenance for all types of operations.

INTM 315  Industrial Enterprises
An introduction to the world of industrial enterprises and the organizational priorities required to achieve efficiency and competitiveness. Students learn to assess the present state of a company, address performance issues, foster functional communication and cooperation between departments, identify sources and impacts of waste, identify value-added activities, and transform outdated business practices into flexible, customer-driven processes.

INTM 319  Electronics in Industry
Basic overview of electrical and electronic technology in industry. Emphasis on electrical and electronic components, industrial devices, electrical theory, application, and basic troubleshooting. Students select and complete an electrical/electronic class project.

INTM 322  Industrial Project Management
Projects are the driving force behind innovation and improvement in any organization. This course identifies the tools and techniques needed to lead any project to its intended conclusion. Topics include project plans, managing expectations and contingencies, building a winning team, gaining commitments, managing project risks, and development of personal skills critical to the successful project manager. (C)

INTM 404  Marketing, Sales and Product Introduction
This course examines marketing and sales, and the differences and details of these activities as applied within industry. The range of marketing types is covered, to include business-to-business, industrial, commercial, retail, internet, social media, and entrepreneurial/professional. Sales fundamentals include understanding the customer and the competition, sales strategy, sales management, product positioning, product life cycle, sales structures, margins, and prospecting for new customers. Product development is addressed throughout the course, inclusive of market feedback, product evaluation, opportunity assessment, prototyping, field trials and marketing testing, and product launch. (C)

INTM 406  Quality Control
This course focuses on how organizations manage quality in a competitive marketplace regardless of the nature of the industry. Topics include principles of quality, cost of quality, inspection and receiving, audits, corrective and preventive action systems, Supply Performance Management (SPM), FMEA and control plans, process capability studies and Statistical Process Control (SPC), measurement system analysis, Quality Management Systems (QMS), process improvement methodologies (Lean, Six Sigma and Kaizen), and creation of a performance dashboard.

INTM 407  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 408  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.
INTM 409
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. (C)

INTM 410
Operations Management
Focuses on core processes within an organization – the activities that add value. An operations strategy depends on the industrial sector as well as the organization. This course introduces a variety of qualitative and quantitative tools for such activities as project management, process analysis, job design, forecasting, resource planning, productivity, quality, inventory and scheduling. The objective of this course is to provide the framework for integrating approaches covered in other INTM courses. (C)

INTM 412
Mfg Processes: 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 413
Facilities and Construction Administration
Covers fundamentals of project administration and characteristics of the construction industry. Pre-construction discussion includes technical and economic feasibility, project delivery systems, documents, bonding and bidding. Duties and liability of parties at pre-contract stage and during contract administration, to include scheduling and time extensions, payment, retainage, substantial and final completion, change orders, suspension of work, contract termination and dispute resolution. Labor law, labor relations, safety, and general management of a construction company.

INTM 414
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. (C)

INTM 415
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.

INTM 416
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 417
Construction Estimating
General approaches for estimating construction costs are covered. Several commercially available software packages are introduced. Emphasis is on acquiring the knowledge required to develop cost estimates for construction, renovation and maintenance projects for buildings, facilities and equipment.

INTM 418
Industrial Risk Management
Industrial companies can be affected by critical incidents which cause disruptions in operations and significant monetary losses due to repairs and/or lost revenue. Be it a small fire, an extended electrical outage or a more serious incident, 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 420
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 425  
**Human Resource Management**  
This course will introduce students to key aspects of HR management, including legal requirements for all normal HR activities as well as techniques for dealing with employees when hiring, evaluating, promoting and terminating. (C)

INTM 427  
**E-Commerce**  
This course reviews electronic commerce and its role in industrial organizations. Topics include a history of e-commerce, business-to-business (B2B) models, and business-to-consumer (B2C) models. The impact of this paradigm shift on all aspects of business is also covered. (C)

INTM 430  
**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 – 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 431  
**Mfg. Processes: 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 432  
**Sales and Operations Planning**  
This course covers Sales and Operations Planning (S&OP) processes, objectives and procedures utilized by leading global supply chain companies. Key elements of the S&OP process are explained, including demand plans, forecasts and capacity plans. Students also learn how to develop, maintain and manage supplier relationships (SRM) and how companies use Customer Relationship Management (CRM) tools to enhance business relationships. (C)

INTM 433  
**Manufacturing Processes in Chemical Industries**  
This course provides a survey overview of the many chemical manufacturing processes found in the energy, food, drug and synthetic polymer sectors. Related societal, environmental and regulatory impacts are discussed, such as sustainability, OSHA and EPA. Implications for recovery and reuse as well as new non-polluting processes are explored. The overall industrial structure that makes up this sector of manufacturing will be covered. (C)

INTM 441  
**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. (C)

INTM 442  
**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/railcar 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. (C)

INTM 443  
**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 Relationship Management (SRM) are covered. (C)

INTM 444  
**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. (C)

INTM 446  
**Manufacturing and Logistics Information Systems**  
Provides an overview of manufacturing and supply chain information systems, tools and techniques utilized for effective decision making. Current state-of-the-art tools 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 449  
**Telecommunications over Data Networks**  
This course covers a suite of application protocols known as Voice over IP (VoIP). It describes important protocols within that suite including RTP, SDP, MGCP and SIP and the architecture of various VoIP installations including on-net to on-net, on-net to PSTN and Inter-domain scenarios. The functions of the Network Elements that play significant roles in this architecture will be defined. Examples of network elements currently available as products will be examined. Prerequisite: ITM 440 or ITM 540.
**INTM 459**  
**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 460**  
**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. (C)

**INTM 461**  
**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. (C)

**INTM 462**  
**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 477**  
**Entrepreneurship in Industry**  
Introduces various forms of entrepreneurship with emphasis towards industrial organizations. Provides helpful tools for developing and implementing significant “game-changing” actions to effect change within an existing organization or develop a new business venture. Students complete an Opportunity Assessment (OPASS) Project wherein they identify, evaluate and develop an approach for a “real-life” business and produce a formal report and presentation. (C)

**IPRO Interprofessional Project**  
IPRO projects develop communication, teamwork and leadership skills, as well as an awareness of economic, marketing, ethical and social issues within the framework of a multidisciplinary team project. Project teams are integrated across academic programs and at different levels within programs.

**INTM 500-level Course Options**  
Detailed in IIT’s Graduate Programs Bulletin and on the INTM website at www.intm.iit.edu.

Please note: This information is compiled from IIT’s current Undergraduate Programs Bulletin and includes recent department updates. The Undergraduate Programs Bulletin is the official university publication consulted when delineating or assessing degree requirements.