

INDUSTRIAL TECH AND MGMT (INTM)

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 communication using electronic and traditional media. Credit not granted for both INTM 301 and COM 421.

Lecture: 3 **Lab:** 0 **Credits:** 3

Satisfies: Communications (C)

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cooperation between departments, identify sources and impacts of waste, identify value-added activities, and transform outdated business practices into flexible, customer-driven processes.

Lecture: 3 **Lab:** 0 **Credits:** 3

Satisfies: Communications (C)

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 or electronic class project.

Lecture: 3 **Lab:** 0 **Credits:** 3

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.

Lecture: 3 **Lab:** 0 **Credits:** 3

Satisfies: Communications (C)

INTM 403

Management and Leadership

Effective management of employees, teams, and organizations at large requires understanding the principles of organizational behavior and how leaders engage and motivate others to help them achieve organizational goals. Course topics focus on interpersonal skills, emotional intelligence, decision-making and problem-solving strategies, team and organizational communications, team dynamics, conflict and negotiation, power and influence in the workplace, leadership theories and attributes, organizational structures, organizational culture, and change management.

Lecture: 3 **Lab:** 0 **Credits:** 3

Satisfies: Communications (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 market testing, and product launch.

Lecture: 3 **Lab:** 0 **Credits:** 3

Satisfies: Communications (C)

INTM 405

Maintenance Technology and Management

Maintenance of facilities and building systems is a major concern for all industrial operations. Facility managers must maintain heating, ventilation, air conditioning, plumbing, fire-life safety, electrical and other building systems, many of which are interrelated. Dysfunction in one system can cause problems in another, leading to occupant discomfort, poor energy efficiency and premature equipment failure. Equipment maintenance techniques have evolved to include more scientific diagnosis for increased uptime reliability. Preventive, predictive and prescriptive maintenance command a high percentage of modern behaviors to keep facilities running at peak efficiency. This course blends both the technical and managerial sides of maintenance with a focus on procedural analysis.

Lecture: 3 **Lab:** 0 **Credits:** 3

INTM 406

Quality Management Systems

This course focuses on how organizations manage quality in a competitive marketplace regardless of the nature of the industry. Students learn how quality is determined, measured, controlled and improved in an organization. Core quality concepts and associated tools are covered, inclusive of quality management principles, various process improvement methodologies, and the role of statistics in decision-making. Quality function deployment, value stream mapping, process capability, measurement system analysis, risk assessment using Failure Mode and Effects Analysis (FMEA), hypothesis testing, analysis of variance (ANOVA), design of experiments, and statistical process control (SPC). Students utilize Minitab to explore quality tools and perform data analysis to support decision-making.

Lecture: 3 **Lab:** 0 **Credits:** 3

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 interaction between the various construction trades will be covered along with the role of the architects and engineers.

Lecture: 3 Lab: 0 Credits: 3

INTM 408

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.

Lecture: 3 Lab: 0 Credits: 3

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.

Lecture: 3 Lab: 0 Credits: 3

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.

Lecture: 3 Lab: 0 Credits: 3

INTM 411

Functional Facilities Management

Covers key activities in facilities management, the role and responsibilities of the facilities manager, and the functional aspects of management and maintenance activities by building type (commercial, high rise, hotels, hospital, data center). Budgeting, strategic planning, and coordination of capital and operating projects; inspection, repair, and renovation of equipment and buildings in accordance with health and safety standards; managing internal staffing, external contractors, insurance and control activities (parking, waste disposal, building security, etc.). Information systems, real estate management, sustainability issues and emergency preparedness also covered.

Lecture: 3 Lab: 0 Credits: 3

INTM 413

Contract Administration for Construction Projects

This course 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 liabilities of parties at pre-contract stage and during contract administration to include scheduling and time extensions, payments, 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.

Lecture: 3 Lab: 0 Credits: 3

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.

Lecture: 3 Lab: 0 Credits: 3

INTM 416

Integrated Facilities Management

Integrated Facilities Management involves understanding the processes and tools needed to successfully manage new construction and renovation projects, building systems improvements, ongoing facilities management functions, and integration of new technologies within buildings and infrastructure. Students learn to assess facilities projects, develop project scope, plan for implementation, and create a project team. Explores real world successes and failures in buildings, equipment and technologies. Coursework focuses on completion of a comprehensive project, from conceptualization to development and implementation, inclusive of costing, team building and creating a pitch for project funding to upper management.

Lecture: 3 Lab: 0 Credits: 3

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.

Lecture: 3 Lab: 0 Credits: 3

INTM 418**Industrial Risk Management**

Each year, industrial companies are affected by critical incidents which cause disruption 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.

Lecture: 3 Lab: 0 Credits: 3

INTM 419**Budgeting and Finance for Facility Managers**

Budgeting for facility operations is a critical business activity which can have profound impacts for an organization due to operational subsystems and interdependencies. Overlooking system maintenance in one area by not including it in the budgeting process can affect other systems, leading to overall functional deterioration. Financial decision-making requires detailed analyses of up-front costs, life cycle costs, cost containment measures, lease vs. purchase opportunities, anticipated income and expenses, and benchmarking. This course covers generally accepted accounting principles (GAAP) and financial concepts, business planning, annual and capital budgets, costs and cost controls, project accounting, financial aspects of property development, leasing and letting, and current trends impacting/applicable to facility management.

Lecture: 3 Lab: 0 Credits: 3

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.

Lecture: 3 Lab: 0 Credits: 3

INTM 423**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.

Lecture: 3 Lab: 0 Credits: 3

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.

Lecture: 3 Lab: 0 Credits: 3

Satisfies: Communications (C)

INTM 427**E-Commerce in Marketing and Supply Chain Networks**

This course covers electronic commerce and its applications in industrial organizations. Topics covered include the role of e-commerce in a firm's business operations and competitiveness, e-commerce infrastructure technologies, e-commerce applications in product development and marketing, and effective use of e-commerce in supply chain management and collaboration. Innovations in business models, marketing strategies and supply chain processes driven by web-enabled applications are included. Social and ethical challenges posed by the widespread adoption of e-commerce will also be studied.

Lecture: 3 Lab: 0 Credits: 3

INTM 430**Global Logistics Management**

Introduces students to the various aspects of the logistics function within a firm's operations. Covers planning, implementation and control of all activities governing the effective and efficient transportation and storage of products from the point of origin to the point of consumption, while conforming to all requirements. Topics covered include logistics as a competitive advantage, supply chain network design, making decisions involving inventory management, transportation and storage, logistics performance measurement, logistics IT, logistics security and risk management, and issues related to global trade including international contracts.

Lecture: 3 Lab: 0 Credits: 3

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.

Lecture: 3 Lab: 0 Credits: 3

Satisfies: Communications (C)

INTM 434**Digital Transformation**

Explores current and emerging trends in the adoption of various digital technologies to help transform business operations. Key elements include IoT, Artificial Intelligence, Machine Learning, Data Analytics, RPA, Virtual Reality, Augmented Reality (and more) and how those are applied in various industries like Construction, Manufacturing, Transportation, Facility Management, etc. Students learn to identify and evaluate digital solutions to improve processes and/or products for any business. Emphasis on implementation and change management.

Lecture: 3 Lab: 0 Credits: 3

INTM 435**Performance Management in Food Operations**

Creating an organization-wide culture of quality and performance is critical to managing the unique demands of a food processing company. Learn how to develop, manage, and improve food production processes, implement lean principles to eliminate waste and improve yields, and measure operational performance. Topics covered include budgeting and financial tools, introducing new food products and processes, Total Quality Management (TQM), evaluation and management of supply chain activities, and strategy deployment techniques.

Lecture: 3 Lab: 0 Credits: 3

INTM 436**Lean Manufacturing**

Lean principles are the primary continuous improvement tool utilized in the manufacturing industry. In this course, students learn how to evaluate process performance, starting with lean thinking to determine exactly what is needed to achieve the desired outcome of a process and the value it creates. With lean thinking comes the identification of waste, which can take many forms including organizational policies and practices which may not provide any value to the customer. The next step is to map the process as it is in its current state so that potential future state improvements are more easily identified and serve as a catalyst toward achieving process perfection. Diagnostic tools are introduced, both qualitative and quantitative in nature, to help reveal the potential of the process.

Lecture: 3 Lab: 0 Credits: 3

INTM 437**Smart Factory Automation**

Technology changes how companies operate, impacting internal processes and how comprehensive manufacturing solutions are established to serve customer needs. The challenge lies in connecting independent processes into systems that are reliable, self-adjusting, and communicate in real time. Internal systems must successfully blend hardware, software, sensors and codes, and integrate new technologies to automate, assess and control manufacturing operations. The goal is to achieve a transparent system with faster processing times, fewer interruptions and a more continuous flow, resulting in competitive advantage throughout the entire value stream. This course covers interconnection, optimization and automation of processes to achieve competitive advantage in manufacturing operations.

Lecture: 3 Lab: 0 Credits: 3

INTM 438**Advanced Machining for Manufacturing 1**

Today's leading edge manufacturing environment has advanced technology and systems embedded throughout its framework. This course exposes students to the functional aspects and capabilities of a 5-axis CNC machining center, and the processes involved in taking a machined part from prototype to production. This state-of-the-art technology is used by high-production companies around the world to create complex, precision-machined parts and products with tight tolerances and extreme repeatability. Students gain experience using SinuTrain simulators and hands-on learning on a 5-axis CNC machine. Coverage includes CNC programming and use of IIoT system technologies embedded in the machine to obtain internal diagnostics with real time data and connect with internal departments, suppliers and customers. Prior completion of a course in manufacturing processes highly recommended. First course in a two-course sequence.

Lecture: 2 Lab: 2 Credits: 3

INTM 439**Advanced Machining for Manufacturing 2**

Continues exploration of the functional aspects, capabilities and limitations of a 5-axis CNC machining center, building upon skills and knowledge obtained in AMM I. Students increase proficiency in metrology, geometric dimensioning and tolerancing per ASME standards, material sciences, and use of computer integrated technology (CAD, CAM and CIM). This course provides a top-to-bottom, hands-on experience for the manufacturing process and the technologies that surround it, with consideration of managerial perspectives and concerns.

Prerequisite(s): INTM 438

Lecture: 2 Lab: 2 Credits: 3

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.

Lecture: 3 Lab: 0 Credits: 3

Satisfies: Communications (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/rail cars 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.

Lecture: 3 Lab: 0 Credits: 3

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 Relation Management (SRM) are covered.

Lecture: 3 Lab: 0 Credits: 3

Satisfies: Communications (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.

Lecture: 3 Lab: 0 Credits: 3

Satisfies: Communications (C)

INTM 446**Manufacturing and Logistics Information Systems**

Provides an overview of manufacturing, logistics and supply chain management (SCM) information systems and software packages, as well as practical tools and techniques for effective decision making. Emphasis on the importance of accurate and timely data, efficient business processes, and utilizing state-of-the-art information tools and technologies. Students gain hands-on experience using a modern ERP system to understand the features, functionality, and end-to-end dependencies of the core ERP modules used in an enterprise.

Prerequisite(s): INTM 441

Lecture: 3 Lab: 0 Credits: 3

INTM 448**Agile Methodologies for New Product/Process Development**

The development of new products and operational processes in a manufacturing setting requires collaboration and teamwork across multiple departments and flexible (agile) methods to expediently assess product/process viability and implement production without interrupting current operations. This course explores agile methodologies and management strategies involved in developing a new product or process, to include innovation and design, environmental concerns, market analysis, timing, budgets, collaborative strategies, patents and trade secrets, licensing and distribution, and marketing/pricing.

Lecture: 3 Lab: 0 Credits: 3

INTM 452**Pharmaceutical Manufacturing Technologies, Regulation and Practice**

Pharmaceutical manufacturing is a highly regulated and collaborative industry. This course presents the multiple interactions of engineering technology, manufacturing, process, formulation and analytical chemistries, and regulatory disciplines that are involved in the development and manufacture of pharmaceutical drug products and devices, as well as the regulatory approval process. Key practical aspects of manufacturing are addressed, to include 1) the process of drug product development from discovery to manufacturing, 2) drug products in Phase 1 to Phase 3 clinical trials, and 3) the regulatory approval of a new drug product application. Issues related to medical devices, supply chain and packaging are also presented. Understanding industry practices enables proactive interactions with various internal departments to get a final approved product manufactured, packaged and delivered to the customer (patient or pharmacy).

Lecture: 3 Lab: 0 Credits: 3

INTM 459**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.

Lecture: 3 Lab: 0 Credits: 3

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.

Lecture: 3 Lab: 0 Credits: 3

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.

Lecture: 3 Lab: 0 Credits: 3

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 focus on industrial ecology, energy sources/systems, sustainable operations, integrated technologies, regulations, environmental issues, resource use, alternative manufacturing methods, facilities, logistics, etc. Special topics of current interest may be taught as group lecture.

Credit: Variable

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.

Lecture: 3 **Lab:** 0 **Credits:** 3

INTM 491**Undergraduate Research**

Undergraduate research.

Credit: Variable

INTM 497**Special Projects INTM**

Special projects.

Credit: Variable

INTM 498**Undergraduate Research Experience**

Team research experience; topic determined by supervising faculty.

Lecture: 0 **Lab:** 6 **Credits:** 3

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 process are implemented, using Excel to optimize operations. Plant location selection 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.

Lecture: 3 **Lab:** 0 **Credits:** 3

INTM 505**Maintenance Technology and Management**

Maintenance of facilities and building systems is a major concern for all industrial operations. Facility managers must maintain heating, ventilation, air conditioning, plumbing, fire-life safety, electrical and other building systems, many of which are interrelated. Dysfunction in one system can cause problems in another, leading to occupant discomfort, poor energy efficiency and premature equipment failure. Equipment maintenance techniques have evolved to include more scientific diagnosis for increased uptime reliability. Preventive, predictive and prescriptive maintenance command a high percentage of modern behaviors to keep facilities running at peak efficiency. This course blends both the technical and managerial sides of maintenance with a focus on procedural analysis.

Lecture: 3 **Lab:** 0 **Credits:** 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.

Lecture: 3 **Lab:** 0 **Credits:** 3

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.

Lecture: 3 **Lab:** 0 **Credits:** 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.

Lecture: 3 **Lab:** 0 **Credits:** 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.

Lecture: 3 **Lab:** 0 **Credits:** 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.

Lecture: 3 Lab: 0 Credits: 3

INTM 516**Integrated Facilities Management**

Integrated Facilities Management involves understanding the processes and tools needed to successfully manage new construction and renovation projects, building systems improvements, ongoing facilities management functions, and integration of new technologies within buildings and infrastructure. Students learn to assess facilities projects, develop project scope, plan for implementation, and create a project team. Explores real world successes and failures in buildings, equipment and technologies. Coursework focuses on completion of a comprehensive project, from conceptualization to development and implementation, inclusive of costing, team building and creating a pitch for project funding to upper management.

Lecture: 3 Lab: 0 Credits: 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.

Lecture: 3 Lab: 0 Credits: 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.

Lecture: 3 Lab: 0 Credits: 3

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.

Lecture: 3 Lab: 0 Credits: 3

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.

Lecture: 3 Lab: 0 Credits: 3

INTM 530**Global Logistics Management**

Introduces students to the various aspects of the logistics function within a firm's operations. Covers planning, implementation and control of all activities governing the effective and efficient transportation and storage of products from the point of origin to the point of consumption, while conforming to all requirements. Topics covered include logistics as a competitive advantage, supply chain network design, making decisions involving inventory management, transportation and storage, logistics performance measurement, logistics IT, logistics security and risk management, and issues related to global trade including international contracts.

Lecture: 3 Lab: 0 Credits: 3

INTM 534**Digital Transformation**

Explores current and emerging trends in the adoption of various digital technologies to help transform business operations. Key elements include IoT, Artificial Intelligence, Machine Learning, Data Analytics, RPA, Virtual Reality, Augmented Reality (and more) and how those are applied in various industries like Construction, Manufacturing, Transportation, Facility Management, etc. Students learn to identify and evaluate digital solutions to improve processes and/or products for any business. Emphasis on implementation and change management.

Lecture: 3 Lab: 0 Credits: 3

INTM 535**Performance Management in Food Operations**

Creating an organization-wide culture of quality and performance is critical to managing the unique demands of a food processing company. Learn how to develop, manage, and improve food production processes, implement lean principles to eliminate waste and improve yields, and measure operational performance. Topics covered include budgeting and financial tools, introducing new food products and processes, Total Quality Management (TQM), evaluation and management of supply chain activities, and strategy deployment techniques.

Lecture: 3 Lab: 0 Credits: 3

INTM 537**Smart Factory Automation**

Technology changes how companies operate, impacting internal processes and how comprehensive manufacturing solutions are established to serve customer needs. The challenge lies in connecting independent processes into systems that are reliable, self-adjusting, and communicate in real time. Internal systems must successfully blend hardware, software, sensors and codes, and integrate new technologies to automate, assess and control manufacturing operations. The goal is to achieve a transparent system with faster processing times, fewer interruptions and a more continuous flow, resulting in competitive advantage throughout the entire value stream. This course covers interconnection, optimization and automation of processes to achieve competitive advantage in manufacturing operations.

Lecture: 3 Lab: 0 Credits: 3

INTM 538**Advanced Machining for Manufacturing 1**

Today's leading edge manufacturing environment has advanced technology and systems embedded throughout its framework. This course exposes students to the functional aspects and capabilities of a 5-axis CNC machining center, and the processes involved in taking a machined part from prototype to production. This state-of-the-art technology is used by high-production companies around the world to create complex, precision-machined parts and products with tight tolerances and extreme repeatability. Students gain experience using SinuTrain simulators and hands-on learning on a 5-axis CNC machine. Coverage includes CNC programming and use of IIoT system technologies embedded in the machine to obtain internal diagnostics with real time data and connect with internal departments, suppliers and customers. Prior completion of a course in manufacturing processes highly recommended. First course in a two-course sequence.

Lecture: 2 Lab: 2 Credits: 3

INTM 539**Advanced Machining for Manufacturing 2**

Continues exploration of the functional aspects, capabilities and limitations of a 5-axis CNC machining center, building upon skills and knowledge obtained in AMM I. Students increase proficiency in metrology, geometric dimensioning and tolerancing per ASME standards, material sciences, and use of computer integrated technology (CAD, CAM and CIM). This course provides a top-to-bottom, hands-on experience for the manufacturing process and the technologies that surround it, with consideration of managerial perspectives and concerns.

Prerequisite(s): INTM 438 or INTM 538

Lecture: 2 Lab: 2 Credits: 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.

Lecture: 3 Lab: 0 Credits: 3

INTM 542**Warehousing and 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.

Lecture: 3 Lab: 0 Credits: 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.

Lecture: 3 Lab: 0 Credits: 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.

Lecture: 3 Lab: 0 Credits: 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.

Lecture: 3 Lab: 0 Credits: 3

INTM 546**Manufacturing and Logistics Information Systems**

Provides an overview of manufacturing, logistics and supply chain management (SCM) information systems and software packages, as well as practical tools and techniques for effective decision making. Emphasis on the importance of accurate and timely data, efficient business processes, and utilizing state-of-the-art information tools and technologies. Students gain hands-on experience using a modern ERP system to understand the features, functionality, and end-to-end dependencies of the core ERP modules used in an enterprise.

Prerequisite(s): INTM 441 with min. grade of C or INTM 540 with min. grade of C

Lecture: 3 Lab: 0 Credits: 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 C or INTM 540 with min. grade of C

Lecture: 3 Lab: 0 Credits: 3

INTM 548**Agile Methodologies for New Product/Process Development**

The development of new products and operational processes in a manufacturing setting requires collaboration and teamwork across multiple departments and flexible (agile) methods to expediently assess product/process viability and implement production without interrupting current operations. This course explores agile methodologies and management strategies involved in developing a new product or process, to include innovation and design, environmental concerns, market analysis, timing, budgets, collaborative strategies, patents and trade secrets, licensing and distribution, and marketing/pricing.

Lecture: 3 Lab: 0 Credits: 3

INTM 550**Demand Planning and Forecasting**

Foundations, methodologies and strategies of demand management, planning and forecasting. Course covers the range of factors that influence, shape and control demand, digitization of the supply chain, use of technology and big data, forecasting techniques and performance metrics.

Lecture: 3 Lab: 0 Credits: 3

INTM 551**Data Analytics for Industry**

Organizations of all types employ rigorous analysis of vast amounts of internal and external data to improve the quality of decision making. This course prepares students to define and organize data, perform exploratory analysis, and select and implement analytical models, with a focus on applications in the areas of operations and marketing. Excel plugins, statistical packages (R, SAS or SPSS), and business intelligence products like Tableau will be used extensively for modeling. The course covers descriptive and inferential statistics, principles of design of experiments and analysis of variance (ANOVA), and supervised and unsupervised learning methods including regression, classification, clustering and neural networks. Students will also learn social network data analysis and text mining methods. Prior completion of a course in elementary probability and statistics highly recommended.

Lecture: 3 Lab: 0 Credits: 3

INTM 552**Pharmaceutical Manufacturing Technologies, Regulation and Practice**

Pharmaceutical manufacturing is a highly regulated and collaborative industry. This course presents the multiple interactions of engineering technology, manufacturing, process, formulation and analytical chemistries, and regulatory disciplines that are involved in the development and manufacture of pharmaceutical drug products and devices, as well as the regulatory approval process. Key practical aspects of manufacturing are addressed, to include 1) the process of drug product development from discovery to manufacturing, 2) drug products in Phase 1 to Phase 3 clinical trials, and 3) the regulatory approval of a new drug product application. Issues related to medical devices, supply chain and packaging are also presented. Understanding industry practices enables proactive interactions with various internal departments to get a final approved product manufactured, packaged and delivered to the customer (patient or pharmacy).

Lecture: 3 Lab: 0 Credits: 3

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.

Lecture: 3 Lab: 0 Credits: 3

INTM 560**Sustainability Critical MatrIs**

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.

Lecture: 3 Lab: 0 Credits: 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.

Lecture: 3 Lab: 0 Credits: 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 focus on industrial ecology, energy sources/systems, sustainable operations, integrated technologies, regulations, environmental issues, resource use, alternative manufacturing methods, facilities, logistics, etc. Special topics of current interest may be taught as group lecture.

Credit: Variable

INTM 594**Special Projects**

Special project.

Credit: Variable

INTM 597**Special Projects**

Independent study and project. Permission of instructor required.

Credit: Variable