INDUSTRIAL TECHNOLOGY (INDT)

INDT 310 Introduction to Industrial Technology (3 credits)
This course presents an overview of the careers that comprise the field of industrial technology and the courses and curriculum for the degree. Topical areas include the concept of technology, overview of materials and manufacturing, safety science, network technology, electricity and electronics, automation and robotics, energy technologies, and nuclear technology. Recommended preparation: completed general education requirements.
Prereqs: MATH 160 or MATH 170

INDT 332 Introduction to Analog and Digital Electronics (3 credits)
Introduction to the fundamental laws of electrical engineering, circuit analysis – D. C. and A. C. circuits-R-L and C elements – series and parallel circuits; D. C. and A. C. machines, Transformers, and Electrical measurements. Digital electronics: number system and codes; logic gates; Boolean algebra; ALU; introduction to CMOS. Typically Offered: Fall.
Prereqs: INDT 310 or Permission

INDT 333 Industrial Electronics and Control Systems (3 credits)
Introduction to Control Systems: Fundamentals of programmable logic controllers. Logic concepts, Processing unit, input/output systems, peripheral devices, programming techniques, applications and interfacing. Recommended preparation: completed general education requirements.
Prereqs: INDT 332 or Permission

INDT 350 Introduction to Materials Science (3 credits)
Introduction to the fundamentals and applications of materials engineering. Atomic, molecular, and crystalline structures and properties of materials with their relevance to engineering. Topics will include: diffusion, defects, phase diagrams, heat treatment, mechanical behavior, and will cover the different materials classes, i. e. , metals, ceramics, polymers, composites, and semiconductors.
Prereqs: INDT 310 or Permission

INDT 353 Manufacturing Systems (3 credits)
Introduction to manufacturing processes, mechanical and physical properties of materials, and solidification processes. Metal forming, materials removal processes, property enhancing, Joining and Assembly processes, and surface processing operations. Manufacturing systems, automation, and integrated manufacturing systems. Recommended preparation: completed general education requirements.
Prereqs: INDT 350 or Permission

INDT 362 Behavior Based Safety (3 credits)
Principles of paradigm shifts required for total safety, human barriers to safety, the basic principles of behavior-based psychology and behavioral safety analysis and behavior-based interventions.
Prereqs: PSYC 101

INDT 364 Hazardous Materials (3 credits)
Handling, transportation, and storage of hazardous materials; how to protect and suppress fires that occur in hazardous materials. Recommended preparation: completed general education requirements and INDT 310.
Prereqs: CHEM 112/CHEM 112L; and MATH 160 or MATH 170

INDT 400 (s) Seminar (1-16 credits)
Credit arranged

INDT 404 (s) Special Topics (1-16 credits)
Credit arranged

INDT 405 (s) Professional Development (1-16 credits)
Credit arranged

INDT 408 Fire Safety Hazard Analysis (3 credits)
Collect and apply fire incident data and analysis. Conduct fire analysis. Conduct fire loss investigation. Identify the components that, alone or in combination, form emergency and standby power systems. Understand the dynamics of heating systems. Identify basic components and hazards associated with 'hot work' and manufacturing processes dealing with proper storage and handling procedures. Identify the fire hazards of grinding processes. Understand proper design, installation, and maintenance of electrical systems and appliances. Identify common types of refrigeration and associated hazards and their corrective actions. Identify the unique hazard of semiconductor manufacturing.
Prereqs: Permission

INDT 409 Fire Suppression Design and Detection (3 credits)
Identify the operational characteristics of modern fire alarm systems. Identify the proper applications of automatic fire detectors. Evaluate fire alarm systems, testing and maintenance. Identify the requirements and the benefits of fire alarm systems relating to other systems. Identify and understand the properties, proper use and limitations of non-water systems, halogen and carbon dioxide agents. Identify and understand the water supply system requirements as well as the design criteria for hydraulics for fire protection. Identify the properties and limitations of both dry and wet chemical extinguishing agents. Identify the properties and limitations of various foam extinguishing agents. Identify the properties and proper agents and application techniques for combustible metal fires.
Prereqs: Permission

INDT 410 Loss Control (3 credits)
Initiate and coordinate hazard abatement solutions with building managers, plant personnel in providing the corrective actions for life safety and fire protection deficiencies. Use calculations to identify friction loss. Use calculations in determining fire resistive coatings used in buildings. Identify the hazards of explosion prevention and protection. Understand the precautionary need for various types of air-moving equipment. Identify building construction elements for fire protection. Understand the elements of confinement of fire in buildings. Identify and describe the structural damage factors to be evaluated after a fire. Identify fire hazards of construction, alteration and demolition of buildings.
Prereqs: Permission

INDT 411 Fire and Life Safety Management (3 credits)
Conduct complex inspection surveys of commercial and residential properties to evaluate physical characteristics of a property and business. Oversee acquisition, installation, operation, maintenance and disposition of building systems. Understand public protection class and municipal and private water systems. Possess knowledge of property fire insurance, building construction and/or field experience in performing fire/property surveys involving detailed analysis. Observe, examine, inspect, gather data and describe all aspects of a property/building and business. Possess knowledge of fire services, environmental hazards, and building construction.

INDT 412 Engineering for Fire and Life Safety (3 credits)
Identify fire protection in special occupancies. Identify fire protection in warehouse and storage operations. Identify fire protection of electronic equipment. Understand and apply related NFPA standards and company requirements and standards. Evaluate code, law, and regulation compliance of a facility's operations. Identify safety control systems (PLC controllers, hardwired interlock systems) as it applies to: NFPA 70E, 79, 85 and 86 ANSI/ISA 84. 00. 01-2003 (IEC 61511) Safety Integrity Levels 1, 2 or 3. Identify principles of human behavior and fire. Identify the chemistry and physics of fire. Identify dynamics of fire growth. Identify challenges to safety in the built environment. Apply fundamentals of safe building design. Identify the local and regional codes and standards for the built environment.

INDT 413 Community Planning and Design for Fire Protection and Management (3 credits)
Perform pre-incident planning for industrial and commercial facilities. Identify and understand the operations of fire loss prevention and emergency organizations. Evaluate operations of public emergency operations, fire training and communication systems. Identify the use and function of fire emergency services protective clothing and protective equipment. Identify concepts of egress design. Use calculation methods for egress prediction. Develop and manage emergency preparedness procedures and assure all emergency systems and procedures are tested as planned. Identify the elements of the National Incident Management System (NIMS) in relation to emergencies.
Prereqs: Permission

INDT 415 Impact of Technology on Society (3 credits)
In-depth examination of the impact technology has had and will continue to have on society. Recommended preparation: completed general education requirements.
Prereqs: INDT 310 or Permission

INDT 419 Industrial Sustainability Analysis (3 credits)
Cross-listed with TM 419
Joint-listed with TM 519
This course covers two practical topics, which are Sustainability Assessment (Topic 1) and Advanced Manufacturing (Topic 2). Topic 1 establishes the concept of sustainability, and sustainable design and manufacturing. Under this section, we introduce the intersection of sustainability and manufacturing through sustainable development, sustainability principles, and sustainable engineering. Topic 2 provides an overview of what Advanced Manufacturing (AM) is, what approaches are used, what the possible applications are, and what the limitations of the technology are. We focus on AM processes, principles, sustainability performance of AM, and sustainability assessment of AM at the macro and micro level. Students will complete one project including techno-economic and socio-environmental studies in the broad area of food-energy-water processes and systems.

INDT 434 Power Generation and Distribution (3 credits)
Conventional & Non-Conventional methods – comparison of sources of energy. Growth & future trends in power systems; Hydroelectric, Nuclear, and Gas Turbine power plants – merits & demerits; selection of site. Effect of system voltage on transmission efficiency, circuit breakers, kelvin's Law; radial, ring main systems – different types of DC & AC distributors with concentrated loads. Recommended preparation: completed general education requirements.
Prereqs: INDT 332 or Permission

INDT 435 Network Administration (3 credits)
This course provides students with the instruction necessary to install, configure, and troubleshoot a computer network. This course introduces current networking standards, the OSI Model, various protocols and topologies, the interconnections between various hardware components, network operating systems, DNS, DHCP, TCP/ IP, Ethernet, wired and wireless transmission, and security.
Prereqs: MATH 160 or MATH 170; and INDT 310

INDT 442 Systems Integration (3 credits)
This course is designed to provide students with an understanding of Systems Integration (SI) processes, approaches, drivers, tools and techniques required for successful SI, critical success factors, and best practices. The objective of the course is to provide the students an understanding of the technical and business process issues involved in systems integration. Systems integration process is illustrated over the life cycle concept of projects – during design, development, implementation, testing and production. Recommended preparation: completed general education requirements.
Prereqs: INDT 310

INDT 443 Government Contract Law (3 credits)
Contract formation, and contract administration pertaining to government contracts. Recommended preparation: completed general education requirements and INDT 310.

INDT 444 Quality Assurance Organization and Management (3 credits)
Industrial management principles applied to effective economic control of quality assurance activities. Recommended preparation: completed general education requirements.
Prereqs: INDT 310; and STAT 251 or STAT 301

INDT 446 Labor Law (3 credits)
Practical legal considerations in employer/employee relationships, including union contracts. Recommended preparation: completed general education requirements and INDT 310.

INDT 448 Project and Program Management (3 credits)
This course addresses the project/program life-cycle. It defines projects and programs, and the roles and responsibilities of project and program managers. Students are introduced to the related, but differing, techniques for project/program planning (work structuring, budgeting, scheduling, resource allocation), and execution (monitoring, control, auditing, closure). Typically Offered: Summer and Spring.

INDT 450 Comprehensive Exam Preparation (1 credit)
The course prepares students for a comprehensive exam in Industrial Technology. Certified Technology Manager (CTM) exam is required to be taken by all students graduating in Industrial Technology. Typically Offered: Spring.

INDT 453 Computer Integrated and Robotics Manufacturing Technology (3 credits)
The course provides an overview of computer integrated manufacturing technology with a focus on robotic automation. Covered topics include: computer aided design, computer aided manufacturing, automated production lines and assembly systems, cellular and flexible manufacturing. The integration of hardware and software components for manufacturing automation is studied, with an emphasis on sensors, actuators, controllers, computer numerical control, and kinematic modeling of industrial robots. Enrollment per section limited to lab stations available.
Prereqs: INDT 353 or Permission

INDT 457 Lean to Green Sustainable Technology (3 credits)
Lean production and lean manufacturing refer to the use of systematic methods to reduce costs by eliminating wastes and nonvalue-added activities, while delivering what the customer wants, on time. Even without explicitly targeting environmental outcomes, lean efforts can yield substantial environmental benefits. Recommended preparation: completed general education requirements.
Prereqs: INDT 353 or Permission

INDT 462 Industrial Safety (3 credits)
Overview of industrial safety and health in business and industry. Includes Program Organization, Hazard Information, and Program Implementation. Recommended preparation: completed general education requirements.
Prereqs: INDT 362

INDT 464 Human Performance Fundamentals (3 credits)
Introduction to the factors that control and influence human performance. Explore the basis of individual and leader behaviors as well as organizational processes and values that either lead to or prevent error. Fundamental knowledge of human and organizational behavior is emphasized so that the manager, supervisor, and worker can better handle error-provoking work situations to prevent human error and work-place events. Recommended preparation: completed general education requirements.
Prereqs: INDT 362

INDT 466 Human Performance Field Investigation (3 credits)
Provides education in the area of participating in an investigation of an incident that has a significant human contribution. Principles of the old view of human error – the problems it holds, the traps it represents, and the temptations that can make one fall into them. The new view of human error in which human error is the starting point for an investigation. Reconstruct the human contribution to system failure and "reverse engineer" the evolving mindset of personnel who were caught up in an event. Investigate the biases and difficulties in understanding past behavior associated with system failure. Recommended preparation: completed general education requirements.
Prereqs: INDT 464

INDT 470 Homeland Security (3 credits)
This course will provide students with a basic understanding of terrorism involving Weapons of Mass Destruction (WMD) (e. g. biological, nuclear, incendiary, chemical, radiological, and explosive devices). The history of WMD/Terrorism and how it relates to modern day devices and concepts will be discussed. The students will gain an understanding of international terrorism and homegrown terrorists. Recommended preparation: completed general education requirements.

INDT 472 National Incident Management Systems (3 credits)
This course is designed to increase the participants' knowledge and understanding of the inherent flexibility of the Incident Command System to manage major or complex incidents. Utilizing lectures and small group activities, participants will acquire an in-depth knowledge of the National Incident Management System (NIMS), terminology, players, and management philosophy. Participants will also acquire the ability to organize and manage major or complex incidents. The material covered during the course includes command and general staff duties and responsibilities, unified command, major incident management and area command structures. Recommended preparation: completed general education requirements.

INDT 473 Fundamentals of Unmanned Aerial Systems (3 credits)
The course introduces students to unmanned aerial systems (UAS) and provides an overview of UAS types, applications, and operation considerations. The general principles of aerodynamics, propulsion, navigation and stability control applied to UAS are studied. The course provides an in-depth coverage of the main components integrated in both civilian and military UAS, such as payloads, ground control systems, communication data links, and launch/recovery systems.
Prereqs: General Technical Background

INDT 475 Introduction to Non-Destructive Testing (3 credits)
The course introduces students to methods, techniques, and equipment for non-destructive testing. The basic concepts and principles of visual, liquid penetrant, magnetic particles, ultrasonic, radiographic, eddy current, and thermal testing are covered.
Prereqs: INDT 350 or Permission

INDT 484 Industrial Technology Capstone I (3 credits)
Gen Ed: Senior Experience This course is the first of two capstone courses. The students will select and develop a project that applies technology to a problem. Students are encouraged to incorporate service learning into the project and work in teams. One hour of lecture and two 3-hour labs per week. Recommended preparation: Senior standing.
Prereqs: INDT 442 and INDT 444

INDT 485 Industrial Technology Capstone II (3 credits)
This course is second of the two capstone courses. The students will develop their project that applies technology to a problem. Students are encouraged to incorporate service learning into the project and to work in teams. One hour of lecture and two 3-hour labs per week. Recommended preparation: Senior standing.
Prereqs: INDT 442 and INDT 444

INDT 499 (s) Directed Study (1-16 credits)
Credit arranged