INDUSTRIAL TECHNOLOGY (INDT)

INDT 310 Introduction to Industrial Technology
IndT 310 Introduction to Industrial Technology (3 cr)
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.

**Prereq:** Math 160 or Math 170 .

INDT 311 Problems in Industrial Technology
IndT 311 Problems in Industrial Technology (1 cr)
Students will develop a project applying technology to a National Academy of Engineering Challenge Problem. Recommended preparation: completed general education requirements.

**Prereq:** IndT 310 .

INDT 332 Introduction to Analog and Digital Electronics
IndT 332 Introduction to Analog and Digital Electronics (4 cr)
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.

**Prereq:** IndT 310 or Permission .

INDT 333 Industrial Electronics and Control Systems
IndT 333 Industrial Electronics and Control Systems (3 cr)
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.

**Prereq:** IndT 310 or Permission .

INDT 350 Introduction to Materials Science
IndT 350 Introduction to Materials Science (3 cr)
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.

**Prereq:** IndT 310 or Permission .

INDT 353 Manufacturing Systems
IndT 353 Manufacturing Systems (3 cr)
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.

**Prereq:** IndT 350 or Permission .

INDT 362 Behavior Based Safety
IndT 362 Behavior Based Safety (3 cr)
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.

**Prereq:** Psyc 101 .

INDT 364 Hazardous Materials
IndT 364 Hazardous Materials (3 cr)
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.

**Prereq:** Chem 112; and Math 160 or Math 170 .

INDT 400 (s) Seminar
IndT 400 (s) Seminar (cr arr).

INDT 404 (s) Special Topics
INDT 405 (s) Professional Development
INDT 408 Fire Safety Hazard Analysis
INDT 408 Fire Safety Hazard Analysis (3 cr)
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.

**Prereq:** Permission .

INDT 409 Fire Suppression Design and Detection
INDT 409 Fire Suppression Design and Detection (3 cr)
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.

**Prereq:** Permission .

INDT 410 Loss Control
INDT 410 Loss Control (3 cr)
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.

**Prereq:** Permission .
INDT 411 Fire and Life Safety Management
INDT 411 Fire and Life Safety Management (3 cr)
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
INDT 412 Engineering for Fire and Life Safety (3 cr)
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
INDT 413 Community Planning and Design for Fire Protection and Management (3 cr)
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.

Prereq: Permission .

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

Prereq: IndT 310 or Permission .

INDT 434 Power Generation and Distribution
INDT 434 Power Generation and Distribution (3 cr)

Prereq: IndT 332 or Permission .

INDT 453 Computer Integrated and Robotics Manufacturing Technology
INDT 453 Computer Integrated and Robotics Manufacturing Technology (3 cr)
In-depth examination and implementation of advanced computer aided drafting, 3D solids modeling, computer numerical control, basic and advanced toolpath generation, virtual machining environments, and robotics applications. Enrollment per section limited to lab stations available. Recommended preparation: completed general education requirements.

Prereq: IndT 353 or Permission .
INDT 457 Lean to Green Sustainable Technology

This course introduces students to the principles of Lean manufacturing and sustainability. It focuses on reducing costs, eliminating waste, and improving efficiency. Prerequisites: completed general education requirements. Recommended preparation: completed general education requirements.

Prereq: IndT 353 or Permission.

INDT 462 Industrial Safety

Students will learn about the principles of industrial safety and health in the workplace. Includes program organization, hazard information, and program implementation. Recommended preparation: completed general education requirements.

Prereq: IndT 362.

INDT 463 Industrial Transportation Safety

An overview of safety in all aspects of industrial transportation, including roads, railroads, air, water, and pipeline. Prerequisites: completed general education requirements.

Prereq: IndT 462.

INDT 464 Human Performance Fundamentals

Provides education in the area of investigating human error and failure. Recommended preparation: completed general education requirements.

Prereq: IndT 462.

INDT 465 Construction Safety

The course covers the major components of construction health and safety, including hazards, law, written programs, implementation, control, and behavior. Prerequisites: completed general education requirements.

Prereq: IndT 364.

INDT 466 Human Performance Field Investigation

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. Recommended preparation: completed general education requirements.

Prereq: IndT 464.

INDT 470 Homeland Security

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. Recommended preparation: completed general education requirements.

Prereq: IndT 442 and IndT 444.

INDT 471 National Incident Management Systems

This course is designed to increase the participants' knowledge and understanding of the Incident Command System and its role in managing complex incidents. Participants will gain an understanding of the Incident Management System (NIMS), terminology, players, and management philosophy. Recommended preparation: completed general education requirements.

Prereq: IndT 442 and IndT 444.

INDT 472 National Incident Management Systems

This course focuses on the general principles of aerodynamics, propulsion, navigation, and stability control applied to UAS. 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. Recommended preparation: completed general education requirements.

Prereq: General Technical Background.

INDT 473 Fundamentals of Unmanned Aerial Systems

This course introduces students to unmanned aerial systems (UAS) and provides an overview of UAS types, applications, and operation considerations. The emphasis is on a balanced approach to: (1) theoretical and analytical understanding of the fundamentals of mechatronics system design, and (2) practical implementation of learned concepts. Recommended preparation: completed general education requirements.

Prereq: IndT 464 and IndT 444.

INDT 474 Mechatronics Systems

This 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. Recommended preparation: completed general education requirements.

Prereq: IndT 353 or permission.

INDT 484 Industrial Technology Capstone I

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. Course will have 1 lecture hours and 2, 3 hour labs each week. Recommended preparation: senior standing.

Prereq: IndT 442 and IndT 444.

INDT 485 Industrial Technology Capstone II

This course is the second of 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 work in teams. Course will have 1 lecture hours and 2, 3 hour labs each week. Recommended preparation: senior standing.

Prereq: IndT 442 and IndT 444.

INDT 499 (s) Directed Study

This course allows students to conduct research under the guidance of a faculty member. Recommended preparation: completed general education requirements.