COURSES

PDF APPLIED INDUSTRIAL TECHNOLOGY

AIT101   Fundamentals Of Applied Industrial Technology   4 Credits

Explains the fundamental concepts of electricity used in many applications, especially control systems. Ohm's Law and Kirchhoff's voltage and current laws will be applied both in theory and through lab experiments. Mechanical concepts of basic levers and forces, friction and pulleys and gears are introduced, as well as their effects on a system. Covers fundamental operation of electric relay controls and explains basic logic circuits which are used to provide automated control of many types of machines. Simulated tools and test equipment are utilized.

AIT102   Measurement Tools and Methods   1 Credit

Explains the fundamental concepts of dimensional measurement. Accuracy and tolerance will be described and applied in theory and through lab experiments. U.S. Customary Units and S.I. Metric Units are utilized both in measurement and conversion. Covers fundamental operation of dial and digital calipers.

AIT103   Intro to Machine Tool Technologies   1 Credit

Introduction to the fundamental concepts of using a drill press and band saw, including their parts and controls. These tools will be utilized in the manufacturing process to cut materials and countersink, counterbore, ream and tap holes. Lab experiments will be accomplished through simulated tools and test equipment.

AIT121   Electrical Control Systems   1 Credit

Prerequisite: AIT 101 Covers the function and operation of logic control circuits used in industrial, commercial and residential applications. Relays, limit switches and time-delays are introduced for a variety of uses. Automation with electrical control is common in many settings, using components wired together in specific configurations that form the logic needed to determine the sequences of machine operations.

AIT125   Industrial Robotics in the Manufacturing Industry   0 Credits

Prerequisites: AIT 101 Covers the fundamentals of industrial robotics found in modern manufacturing, logistics and distribution environments. Covers servo robot system components, prepares students to perform robotic movement using articular and/or Cartesian coordinates, ensures exposure to the design of programs for point-to-point and task activities, includes analysis of industrial robotic integration to standardize production line systems, and integrates basic troubleshooting techniques into robot theory and operation.

AIT131   Basic Industry 4.0 Certification   2 Credits

Prerequisites: None Smart Automation Certification Alliance Industry 4.0 Associate - Basic Operations Certification prepares individuals to succeed in operations and assembly positions in modern production environments that use Industry 4.0 automation technologies. Class provides the knowledge and skills necessary to earn this nationally recognized certification and it is also ideal for individuals in related occupations who want to learn more about automated equipment and processes. Topics include: concepts & terminology of smart manufacturing, basic setup, adjustment & operation of automated machines, safety, hand tools, blueprint & schematic reading, precision measurement, basic electrical control, pneumatic & sensor systems operation, basic robot operation & terminology and production monitoring via HMI.

AIT155   Applied Industrial Technology Hands On Lab   1 Credit

Allows students of Applied Industrial Technology to use hands-on trainers and equipment as they become available for the study of various topics.

AIT198   Special Topics in Applied Industrial Technology   1 Credit

Explores various topics of current interest/demand in Applied Industrial Technology areas of study. Applies to a variety of current topics in the field of industrial technology, covering subjects such as new approaches and techniques, equipment configuration, upgrades, preventive maintenance, etc.

AIT200   Applied Industrial Technology Projects   1 Credit

Prerequisites: None Explores various project-based topics in the Applied Industrial Technology field. Applies to a range of subjects including short courses and workshops covering a variety of themes relevant to industry.

AIT201   Pneumatic Power Technologies   1 Credit

Introduces the concepts of how to connect and operate basic pneumatic components and systems, read circuit diagrams, monitor system operation, and design circuits. Different types of actuators and values will be explained, and skills working with pneumatic schematics will be strengthened by using simulated tools and test equipment.

AIT250   Mechatronics: Electrical Components   3 Credits

3 units Prerequisite or Corequisite: AIT 101 Covers the basics of electrical components in a complex mechatronic system. Students will learn the basic functions and physical properties of electrical components, and the roles they play within the system. Technical documentation such as data sheets, schematics, and timing diagrams will be covered while exploring troubleshooting strategies and preventive maintenance.

AIT251   Mechatronics: Mechanical Components   3 Credits

3 units Prerequisite or Corequisite: AIT 250 Covers the basics of pneumatic, electropneumatic and hydraulic control circuits in a complex mechatronic system. Teaches the functions and properties of control elements based upon physical principles, and the roles they play within the system. Covers technical documentation such as data sheets, circuit diagrams, displacement step diagrams and function charts while exploring troubleshooting strategies and preventive maintenance. Covers the basics of mechanical components in a complex mechatronic system. Students will learn the basic functions and physical properties of mechanical components, and the roles they play within the system. Technical documentation such as data sheets, schematics, and timing diagrams will be covered while exploring troubleshooting strategies and preventive maintenance.

AIT252   Mechatronics: Pneumatic & Hydraulic   3 Credits

3 units Prerequisite or Corequisite: AIT 251 Covers the basics of pneumatic, electropneumatic and hydraulic control circuits in a complex mechatronic system. Students will learn the functions and properties of control elements based upon physical principles, and the roles they play within the system. Technical documentation such as data sheets, circuit diagrams, displacement step diagrams and function charts will be covered while exploring troubleshooting strategies and preventive maintenance.

AIT253   Mechatronics: Programmable Logic Controllers   3 Credits

3 units Prerequisite or Corequisite: AIT 252 Covers the fundamentals of digital logic and an introduction to programmable logic controllers (PLCs) in a complex mechatronic system. Students will learn the role PLCs play within a mechatronic system or subsystem; students will explore basic elements of PLC functions by writing and testing programs to control them. Course teaches students how to identify malfunctioning PLCs, as well as to apply troubleshooting strategies to identify and localize problems caused by PLC hardware.

AIT270   Mechatronics 2: Process Control Technologies   3 Credits

Prerequisites: AIT 253 Covers content specifically outlined by the Siemens Mechatronic Systems Certification Program (SMSCP) exam objectives and is part of a six-course series to prepare students for the SMSCP Level 2 industry credential exam. Topics include closed loop and other technologies used in process control in the context of a complex mechatronic system are included. Students will understand and establish operating parameters as PID controllers are introduced and explored, along with strategies for optimizing them. Troubleshooting strategies for a variety of industry controllers and their applications are embedded throughout the course.

AIT271   Mechatronics 2: Intro to Totally Integrated Automation   3 Credits

Prerequisites: AIT 253 Covers content specifically outlined by the Siemens Mechatronic Systems Certification Program (SMSCP) exam objectives and is part of a six-course series to prepare students for the SMSCP Level 2 industry credential exam. Introduces the Siemens concept of Totally Integrated Automation by looking at field level analogue sensors and actuators and up to the control level with programming and networking Programmable Logic Controllers (PLCs). Hands-on lab work includes connecting devices and controls, evaluating and writing a PLC program

with analogue values and STEP 7 software functions like comparison, memory, arithmetic, conversion, and jump. Including the basics of MPI-Bus and PROFIBUS system, and wire modules to a PLC. Maintenance and troubleshooting of these PLC programs and bus systems are essential components of the course.

AIT272   Mechatronics   2: Automation Systems   3 Credits

Prerequisites: AIT 253 Covers content specifically outlined by the Siemens Mechatronic Systems Certification Program (SMSCP) exam objectives and is part of a six-course series to prepare students for the SMSCP Level 2 industry credential exam. Course is divided into two main sections: Manufacturing Technologies, including CNC, CAD and CAM, and Microcontrollers and Programming, which constitute essential tools in modern manufacturing, particularly in mechatronic systems. Introduces through the microcontroller section the theory behind microcontroller and microprocessor architecture, and its ways of interaction with other electronic elements to explore applications. This theory is complemented with practical exercises that reflect the importance of microcontrollers in a mechatronic system. Covers an exploration of manufacturing automation and the concepts of Metal Cutting, Modal analysis, CNC, CAM and CAD. Provides students with part of the skill set necessary to maintain and improve mechatronic systems.

AIT273   Mechatronics   2:   Motor Control   3 Credits

Prerequisites: AIT 253 Covers general machine operation, different types of braking and loads on a motor, and motor efficiency and power. Different control techniques are introduced, including different methods of starting a motor, controlling voltage and frequency, and the role of different sensors in relation to motor operation. Troubleshooting techniques and an examination of the various causes of motor failure are explored; preventive measures to protect motors are also introduced.

AIT274   Mechatronics   2: Mechanics and Machine Elements   3 Credits

Prerequisites: AIT 253 Covers content specifically outlined by the Siemens Mechatronic Systems Certification Program (SMSCP) exam objectives and is part of a six-course series to prepare students for the SMSCP Level 2 industry credential exam. Focuses on the study of the mechanical components that are included in a complex mechatronic system. Includes overview of statics and kinetics, which include; force system analysis, study of equilibrium, frames and machines, friction and effects of forces on the motion of objects among other basic topics. Covers machine elements, fundamentals of a variety of components expanding the material into calculations involving force, stress and wear analysis and investigation of the appropriate component required in given a system. Included are the deployment of these techniques for supporting mechatronic systems and to ensure its proper function, correct possible defects that may interrupt the process, and to plan preventive maintenance operations on them while observing and incorporating safety standards.

AIT275   Mechatronics   2: Manufacturing Processes 3 Credits

Prerequisites: AIT 253 Covers content specifically outlined by the Siemens Mechatronic Systems Certification Program (SMSCP) exam objectives and is part of a six-course series to prepare students for the SMSCP Level 2 industry credential exam. Course is divided into two main sections: process management, and function and importance of a hands-on design project. Lessons and labs explore engineering technology in ways that ensure students have an awareness of what it is like to work with customers, timelines, budgetary restrictions, and in general to include some basic business sense in the spirit of their work. The simulations and exercises in this course emphasize business-related factors that further develop well-rounded mechatronics technicians.

AIT285   AIT   Certification/ Examination Prep 1 Credit

Reviews industrial technology theory and practice including devices and circuits, wiring techniques, controls, operation of test instruments, measurement methods, and troubleshooting of industrial systems. Manufacturing, distribution, and logistics practices and tasks will be covered as applicable. Prepares students for current industrial certification and employment tests through practice questions, example scenarios, and review.

AIT290   Applied   Industrial Technology Internship   1 Credit

Prerequisite: Consent of Instructor. Allows students to apply knowledge to real on-the-job situations in a program designed by a company official and faculty advisor to maximize learning experiences.