

INDUSTRIAL TECHNOLOGY



Industrial Maintenance

The Industrial Maintenance Program is an academic discipline concerned with the study of technologies used in the repair of modern automated machinery. Topics include basic electricity, mechanics, hydraulics and pneumatics, machining, motor control repair and design, programmable logic controllers, refrigeration, and welding. The skills developed within this discipline include troubleshooting machine malfunctions, electrical troubleshooting, electrical circuit design, programming of motor drives, programming and program design of programmable logic controllers, MIG TIG and stick welding, and other required skills for employment as an Industrial Maintenance Technician.

Transfer requirements for the Industrial Maintenance Program are available in the Counseling Center. In all cases, students should consult with a counselor for specific transfer requirements. College of the Sequoias Counseling Office may be reached at (559) 730-3715.

Career options include positions in industrial maintenance, industrial electrician, and commercial maintenance technician. A higher degree may be required to meet minimum job requirements depending on the position.

Industrial Automation

This degree prepares students for advanced-level employment in the fields of industrial automation and industrial maintenance. Students are required to complete the industrial maintenance program or have equivalent experience before advancing to the industrial automation program. Students completing this program will acquire employment skills in the areas of instrumentation, process control, electrical wiring and troubleshooting, motor controls, variable frequency drives, programmable logic controllers, human-machine interfaces, industrial networks, and industrial robots.

Upon successful completion of this degree, students will be prepared for employment in the following occupations: Maintenance technician, automation technician, controls technician, instrumentation technician, electrical technician, field service technician, and technical sales representative.

Videos

- Industrial Technology (<https://vimeo.com/461521696/>)
- Industrial Automation 1 (<https://vimeo.com/508052612/>)
- Industrial Automation 2 (<https://vimeo.com/461521264/>)

Contact Information

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Associate Degree

- Associate of Science in Industrial Automation (AS) (<https://catalog.cos.edu/areas-study/industrial-maintenance/associate-science-industrial-automation/>)
- Associate of Science in Industrial Maintenance Technology (AS) (<https://catalog.cos.edu/areas-study/industrial-maintenance/associate-science-industrial-maintenance-technology-not-for-transfer-as/>)

Certificate

- Certificate of Achievement in Industrial Automation (<https://catalog.cos.edu/areas-study/industrial-maintenance/certificate-achievement-industrial-automation/>)
- Certificate of Achievement in Industrial Maintenance Technology (<https://catalog.cos.edu/areas-study/industrial-maintenance/certificate-achievement-industrial-maintenance-technology/>)
- Skill Certificate in Programmable Logic Controllers (<https://catalog.cos.edu/areas-study/industrial-maintenance/skill-certificate-programmable-logic-controllers/>)
- Skill Certificate in Water and Wastewater Treatment (<https://catalog.cos.edu/areas-study/industrial-maintenance/skill-certificate-water-wastewater-treatment/>)

For a complete list of courses and descriptions visit: COURSES (<https://catalog.cos.edu/course-descriptions/>)

ITEC 110 Electricity and Electronics

Hours: 2 Lecture/Discussion Hours:
3 Lab

This course is an entry-level course in the Industrial Maintenance Program. Topics will include alternating and direct currents, including circuit basics, construction, and testing of industrial electrical circuits and applications for relays, transformers, and relay ladder logic. Fundamentals of industrial electronics and solid state devices will be studied, in addition to magnetism, dc and ac motors, and their applications. Other topics will be digital electronics, standards and codes.

ITEC 111 Manufacturing Processes

Hours: 2 Lecture/Discussion Hours:
3 Lab

This course is an entry level course in the Industrial Maintenance Program. Topics to be studied will be industrial machining to include the lathe and milling machines. Other topics will be GMAW, SMAW, and GTAW welding (mig, stick, and tig). Industrial safety and preventative maintenance are studied.

ITEC 112 Welding Principles 1

Hours: 3 Lecture/Discussion Hours:
4 Lab

Topics will be GMAW, STAW, and GTAW welding (mig, stick, and tig). Industrial safety and preventative maintenance are studied. Practical applications will be in creating projects in steel and stainless steel using all three modes of welding. Students will become competent in all three modes.

ITEC 120 Programmable Logic Controllers

Hours: 2 Lecture/Discussion Hours:
3 Lab

This is a course in industrial computers and Programmable Logic Controllers. The student will be able to use a personal computer to identify parts of a PLC, program and troubleshoot the PLC upon completion of this course.

Prerequisites: ITEC 110 or equivalent college course with a minimum grade of C.

ITEC 174 Programmable Logic Controllers for Industrial Automation

Hours: 3 Lecture/Discussion Hours:
3 Lab

Equivalent Course: ITEC 274

The function and application of programmable logic controllers. Topics covered include bit-level instructions, timers, counters, compare instructions, PID control, data manipulation, sequencers, I/O configuration, electrical wiring of PLC hardware, memory organization, documentation, and troubleshooting. Lab exercises will provide hands-on activities with hardware and software used in the industry.

Prerequisites: ITEC 120 with a minimum grade of C or ITEC 270 with a minimum grade of C and faculty approval or equivalent college course with a minimum grade of C.

Corequisites: ITEC 182, ITEC 184, and ITEC 283 must be taken concurrently.

3unit(s)

ITEC 176 Advanced Programmable Logic Controllers for Industrial Automation

Hours: 3 Lecture/Discussion Hours:
3 Lab

Equivalent Course: ITEC 276

Advanced course in the function and application of programmable logic controllers. Topics covered include arrays, analog and digital I/O configuration, memory organization, data manipulation, sequencer functions, math instructions, array instructions, subroutines, programs, tasks, produce/consume tags, load cells and weigh scales, remote I/O, and networked applications.

Prerequisites: ITEC 174, ITEC 182, ITEC 184 and ITEC 283 or equivalent college courses with a minimum grade of C.

Corequisites: ITEC 285, ITEC 279, and ITEC 287 must be taken concurrently.

ITEC 182 Methods of Automatic Control

Hours: 3 Lecture/Discussion Hours:
3 Lab

Equivalent Course: ITEC 282

Methods of automatic measurement and control used in industrial applications. Study of open and closed loop control systems. Loop controllers and programmable logic controllers. Closed loop control block diagrams. Sensing elements, transmitters, transducers, controllers, and final control elements. PID control theory, system response curves, and basic tuning principles. Wiring, programming, operating, and troubleshooting closed loop control systems and the devices they consist of.

Prerequisites: ITEC 120 with a minimum grade of C or ITEC 270 with a minimum grade of C and faculty approval or equivalent college course with a minimum grade of C.

Corequisites: ITEC 174, ITEC 184, ITEC 283 must be taken concurrently.

ITEC 184 Instrumentation

Hours: 3 Lecture/Discussion Hours:
3 Lab

Equivalent Course: ITEC 284

The theory and application of instrumentation in the manufacturing industry. Interpreting process documentation such as P&IDs and loop diagrams. Measurement and transmission of process variables such as temperature, pressure, level, and flow. Analog signal transmission, engineering units, scaling, programmable logic controllers, instrument calibration, diagnostic strategies, control valves, and process safety.

Prerequisites: ITEC 120 with a minimum grade of C or ITEC 270 with a minimum grade of C and faculty approval or equivalent college course with a minimum grade of C.

Corequisites: ITEC 174, ITEC 182, and ITEC 283 must be taken concurrently.

ITEC 213 Industrial Mechanics

Hours: 4 Lecture/Discussion Hours:
4 Lab

This course is designed to instruct the student in the design, repair, and specification of the industrial mechanical equipment. Topics to be studied will be mechanical power transmission equipment, gear reducers, chains and belts, pumps, compressors, and motors. The student will learn to repair equipment according to new equipment manufacturers standards.

4unit(s)

4unit(s)

4unit(s)

3unit(s)

4unit(s)

4unit(s)

5unit(s)

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| ITEC 220 Water Treatment Fundamentals Hours: 3 Lecture/Discussion The course provides an introduction to the basic methods used to treat water supplies for domestic drinking water purposes. The course introduces and works with the supporting water treatment principles, operations and maintenance considerations and water-related mathematics. The course fulfills the specialized education/training requirement that is necessary for water treatment plant or distribution system operator certification by State Water Resources Control Board. The course prepares students for the Grade T1 and T2 water treatment plant operator certification exams. | 3unit(s) | ITEC 270 Programmable Logic Controllers for Technicians Hours: 1 Lecture/Discussion Hours: 3 Lab This course in PLC is for technicians and will involve wiring, installation, and programming at an intermediate level. | 2unit(s) |
| ITEC 221 Fundamentals of Wastewater Treatment Hours: 3 Lecture/Discussion The course provides an introduction to the basic methods used to treat domestic and industrial wastewater prior to disposal and/or reuse. The course introduces and works with the supporting wastewater treatment principles, operations and maintenance considerations and wastewater related mathematics. The course fulfills the educational point requirement that is necessary prior to State Water Resources Control Board operator certification. The course prepares students for the Grade 1 and 2 operator certification exams. | 3unit(s) | ITEC 279 Industrial Robots Hours: 3 Lecture/Discussion Hours: 3 Lab Operation and programming of industrial robots used in manufacturing processes. Study of automated robot work cells, servo motors, servo drives, closed-loop control, PLC control of servo systems, and safety devices. Prerequisites: ITEC 174, ITEC 182, ITEC 283, and ITEC 184 or equivalent college course with a minimum grade C. Corequisites: ITEC 176, ITEC 285, and ITEC 287. | 4unit(s) |
| ITEC 222 Automated Controls Hours: 4 Lecture/Discussion Hours: 4 Lab This course offers theory and application of solid state devices used to control industrial machinery. The devices include power supplies, smart relays, variable frequency drive motor controllers, DC motor controllers, sensors, and discrete and analog input and output modules. Programming of the common proprietary languages will be covered as well as troubleshooting and repair of the devices. Prerequisites: ITEC 112 or equivalent college course with a minimum grade of C. | 5unit(s) | ITEC 283 Variable Speed Drives Hours: 3 Lecture/Discussion Hours: 3 Lab This course covers methods of electric motor control using variable speed drives. Students will install, wire, program, and troubleshoot variable speed drive applications. Lab activities will be provided with equipment and software used in the industry. Prerequisites: ITEC 120 with a minimum grade of C or ITEC 270 with a minimum grade of C and faculty approval or equivalent college course with a minimum grade of C. Corequisites: ITEC 174, ITEC 182, and ITEC 184 must be taken concurrently. | 4unit(s) |
| ITEC 223 Welding Principles 2 Hours: 3 Lecture/Discussion Hours: 4 Lab This course offers instruction in the practice and theory of SMAW (stick) welding. This course also offers practice and theory in gas and plasma arc cutting. The student will be able to make welds in mild steel and stainless steel. Prerequisites: ITEC 213 or equivalent college course with a minimum grade of C. | 4unit(s) | ITEC 285 Industrial Networks Hours: 3 Lecture/Discussion Hours: 3 Lab The theory and implementation of industrial automation networks, including digital data, industrial control networks, instrumentation and process control bus and network standards. Prerequisites: ITEC 174, ITEC 182, ITEC 184 and ITEC 283 or equivalent college courses with a minimum grade of C. Corequisites: ITEC 176, ITEC 279, and ITEC 287 must be taken concurrently. | 4unit(s) |
| ITEC 224 Hydraulics and Pneumatics Hours: 2 Lecture/Discussion Hours: 3 Lab This course offers instruction in fluid power as used in an industrial environment. The course covers theory of fluid power, system design, troubleshooting, and repair of both hydraulic and pneumatic systems. A hands-on lab provides job-ready experience and skills for students. Prerequisites: ITEC 111 or equivalent college course with a minimum grade of C. | 3unit(s) | ITEC 287 Industrial Automation Capstone Project Hours: 3 Lecture/Discussion Hours: 3 Lab This is a capstone course which utilizes the knowledge and skills gained from all of the courses of the Industrial Automation program. The student will design and implement an automated process that incorporates the program curriculum to produce a functional industrial automation system using hardware and software used in industry. Prerequisites: ITEC 174, ITEC 182, ITEC 184, and ITEC 283 or equivalent college courses with a minimum grade of C. Corequisites: ITEC 176, ITEC 285, and ITEC 279 must be taken concurrently. | 4unit(s) |

ITEC 290 Advanced PLC for Technicians

4unit(s)

Hours: 3 Lecture/Discussion Hours:
3 Lab

Advanced course in the function and application of programmable logic controllers and peripheral devices. Topics covered include digital I/O configuration, memory organization, arrays, data manipulation, subroutines, programs, tasks, produce/consume tags, networked applications, HMI programming, safety/control relays.

Advisory on Recommended Preparation: Completion of ITEC 270 or equivalent course or equivalent work experience.

ITEC 295 Industrial Robots for Technicians

4unit(s)

Hours: 3 Lecture/Discussion Hours:
3 Lab

Operation and programming of industrial robots used in manufacturing processes. Study of automated robot work cells, material handling applications, and safety considerations.

Industrial Maintenance

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