

Department of

Industrial Technology and Education

College of Engineering

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Degrees offered: Bachelor of Science (BS) in Technology and Industrial Education, BS in Aviation Technology—Maintenance Management, BS in Aviation Technology—Professional Pilot, BS in Computer Electronics Technology, BS in Welding Engineering Technology, Associate of Applied Science (AAS) in Aircraft Maintenance Technician—Airframe, AAS in Aircraft Maintenance Technician—Powerplant, AAS in Computer Aided Drafting and Design, Master of Science (MS) in Industrial Technology

Undergraduate emphases: *BS in Technology and Industrial Education*—Technology Education and Trade and Technical Education

Undergraduate Programs

Objectives

The Department of Industrial Technology and Education offers professional programs to prepare students to function as technologists in a variety of technical specialties. The department values the integration of academic knowledge with hands-on technical skills. This is achieved by emphasizing the application of scientific and technological principles in extensive laboratory activities. The department strives to ensure that all graduates will obtain employment to match their interests and preparation.

The **Technology and Industrial Education** programs prepare graduates to teach in public schools, applied technology colleges, and community colleges. **Aviation Technology—Maintenance Management** graduates fill aviation maintenance management positions in government and industry. The **Aviation Technology—Professional Pilot** curriculum prepares graduates to be professional pilots. **Computer Electronics Technology** graduates fill technical positions in the electronic and computer industries. **Welding Engineering Technology** graduates fill technical/management positions in the construction and fabrication industries. The **Aviation Maintenance Technician—Airframe** and **Aviation Maintenance Technician—Powerplant** programs provide training and FAA licensing for graduates to perform maintenance and repairs on aircraft. The **Computer Aided Drafting and Design** program teaches design and computer skills for graduates to work successfully in a variety of drafting fields.

Admission Requirements

Admission requirements are commensurate with those outlined for the University. See pages 48-51 in this catalog.

Professional Technology Program (PTP)

The Professional Technology Program (PTP) applies to Aviation Technology—Maintenance Management, Aviation Technology—Professional Pilot, Computer Electronics Technology, and Welding Engineering Technology students. The purpose of the program is to provide a quality education for students by requiring that they be fully prepared for upper-division coursework by having satisfactorily completed all required pre-professional courses.

Enrollment in upper-division ITE courses (3000-level and above) is available only to students who have been accepted into the PTP or into an appropriate graduate program or to students with a non-ITE major requiring a specific class. (Non-ITE majors may take a *maximum of two* upper-division ITE classes.)

To be eligible to apply for admission to a professional program, a student must be in good academic standing in the University and college, must achieve a grade of C- or better in every required preprofessional course, and must have an overall grade point average of 2.0 in required preprofessional coursework completed at USU.

A student can repeat no more than three of the required preprofessional courses in order to satisfy the PTP application and eligibility requirements. Multiple repeats of the same course are included in the total of three repeats. Audits count as a time taking a class unless prior written approval is obtained from the college academic advisor.

Although transfer credit accepted by the department and the college may be applied toward PTP admission requirements, the grades received will not be used in the USU GPA calculation. A final decision on admission of a transfer student into the PTP will

not be made until after the applicant has completed at least 15 credits of acceptable coursework at USU.

Eligible students must apply for admission to the PTP during the semester in which they are completing the required preprofessional courses.

For all technology majors in the Professional Program, the following academic regulations apply in addition to University regulations:

1. A minimum GPA of 2.0 must be maintained in technology/math/science/business courses required for, or used as technical electives in, the chosen major. Courses which were part of the preprofessional program requirements and University Studies courses are not included in this GPA calculation.

2. No more than 6 hours of *D* or *D+* credit may be applied toward meeting graduation requirements in technology/math/science/business classes.

3. College of Engineering courses may be repeated only once. Audits count as a time taking a class unless prior written approval is obtained from the department head. A maximum of three required or elective courses completed as part of a Professional Program can be repeated in order to meet graduation requirements. (Courses completed as part of a preprofessional program are not included in this total of three repeats.)

4. The *P-D-F* grading option may not be used in required or elective courses completed as part of a Professional Program. (The *P-D-F* grading option is approved for University Studies courses.)

5. The academic regulations listed above (1-4) apply to required coursework and any technology/math/science/business course which could be used to satisfy graduation requirements for the chosen degree. That is, once a student completes a particular technical elective, it becomes a required course for that student.

6. Students in violation of departmental or college academic regulations, no longer eligible for graduation, or not making satisfactory progress toward a degree, will be placed on probation.

a. Students will be placed on probation if they (i) earn an *F* in a technology/math/science/business course which could be used to satisfy graduation requirements for the chosen degree (see item 5 above); (ii) have more than 6 hours of *D* credit (see item 2 above); or (iii) have a GPA of less than 2.0 (see item 1 above).

b. Students remain on probation until they improve their standing by repeating and passing all failed classes, repeating classes to reduce the number of *D* credits to 6 or less, and/or by raising their GPA above 2.0.

c. While on probation, a student must earn a semester GPA of 2.0 or higher in technology/math/science/business classes and must not earn any grades of *D* or *F*.

While on probation, a student may not preregister. The student's major code will be changed to a preprofessional code. The student must meet at least once per semester with the college academic advisor to work out a schedule having the primary goal of correcting the existing academic problems.

Requirements

Bachelor of Science in Technology and Industrial Education

Technology Education. This emphasis prepares the student to teach in junior and senior high schools. The curriculum requirements include the following: ITE 1000, 1010, 1020, 1030, 1040,

1200, 2030, 2300, 3030, 3050, 3200, 3220, 3300, 3440, 4300, 4400, 5220, 5500, 5600; Math 1050, 1060; BIS 1400; Phyx 1800; InsT 5200; ScEd 3100, 3210, 4200, 4210, 5300; SpEd 4000; Engl 1010, 2010. Students are also required to complete a technical option (either ITE 1640 or ITE 4200). Students in this emphasis also take University Studies courses and electives. See major requirement sheet, available from the department, for further information.

Trade and Technical Education. This emphasis prepares the student to teach applied technology education courses at the high school or post-high school level. The curriculum requirements include the following: technical courses/work experience, 51 credits; professional courses, 27 credits, including InsT 5200, ITE 3200, 3300, 3900, 3930, 4300, 4400, 4700, 5220, 5910, SpEd 4000; University Studies, 24 credits; general electives, 9 credits; Engl 1010, 2010; BIS 1400; and Math 1050.

State licensure requires a minimum of two years of approved vocational experience. Successful completion of a trade competency examination is accepted in lieu of vocational experience.

Bachelor of Science in Aviation Technology— Maintenance Management

Aviation Technology—Maintenance Management graduates are qualified to enter the work force in many rewarding career fields in aviation. Employment opportunities exist in target industries such as major airline carrier maintenance management, commuter airline maintenance management, fixed-base operator (FBO) maintenance, and Federal Aviation Administration (FAA) aircraft inspection after some field experience. This major has a great deal of depth in general maintenance, which applies to most industrial maintenance operations. Although the major's focus is aviation, the knowledge and skills gained can be used in other fields.

The courses for **Aviation Technology—Maintenance Management** are as follows: ITE 1030, 1100, 1130, 1140, 1170, 1200, 1240, 2100, 2110, 2140, 2150, 2170, 2180, 2190, 2200, 2300, 2420, 2430, 2440, 3010, 3120, 3280, 3610, 4200, 4490, 4610, 4620; Math 1050, 1060, 1100; Phyx 1800; Stat 2300; Engl 1010, 2010; MHR 3110, 3710; and BIS 1400.

Students in Maintenance Management must also complete 11 credits of technical electives. At least 10 credits must be in upper-division courses. Technical electives include: ITE 2310, 2360, 2370, 2400, 3030, 3230, 3400, 3410, 3820, 4250, 4310; BA 3700, 4720. Completion of the optional FCC Avionics license will require more than the 126 credits for graduation. Students in this degree also take University Studies courses and electives. See major requirement sheet, available from the department, for further information.

Bachelor of Science in Aviation Technology— Professional Pilot

Aviation Technology—Professional Pilot graduates are trained to be commercial pilots. The degree requirements include completion of the following FAA licenses: private, instrument, commercial, CFI, CFII, and Multi-Engine. The courses for this specialization are as follows: ITE 1100, 1130, 2170, 2180, 2300, 2330, 2350, 2430, 2510, 2520, 2540, 2620, 2660, 2720, 2740,

2860, 2880, 3010, 3120, 3140, 4280, 4490, 4660, 5300, 5400; Math 1050, 1060, 1100; Bmet 2000, 3250; Engl 1010, 2010; BIS 1400, 1550; Phyx 1800; and MHR 3110. Nine credits of upper-division electives are required, chosen from the following list: MHR 3710, 3720; InsT 5230, 5400; Soc 3320, 3500; Psy 4240; BIS 4350, 4550; Phil 3520; and ITE 4250. Also 21 credits of University Studies classes and 8 credits of other electives (including upper-division courses) need to be taken to fulfill requirements for graduation. Prior to taking some of the courses required for this major, students must attain a 2.5 cumulative GPA.

Bachelor of Science in Computer Electronics Technology

Students choosing Computer Electronics Technology are trained for positions in industry as liaison technologists between the design engineer and production personnel. These positions are available in field engineering, test engineering, quality control engineering, and design engineering, to mention a few. Networks and LAN management are also emphasized.

The courses for **Computer Electronics Technology** are as follows: ITE 2240, 2300, 2310, 2320, 2360, 2370, 2400, 3380, 3390, 3400, 3510, 3710, 4710; ASTE 3050; BIS 1400, 2450, 3330, 3500, 5400; CS 1700, 1710, 1720; Chem 1110; Math 1050, 1060, 1100; Phyx 1800; Stat 2300; and Engl 1010, 2010. Students must choose 12 credits of technical electives specified in one of the following areas of emphasis: Computer Science, Electrical Engineering, Internet/E-Commerce, or Business Information Systems. For details, contact advisor. Students in this program also take University Studies courses and electives. See major requirement sheet, available from the department, for further information.

Bachelor of Science in Welding Engineering Technology

Utah State University offers one of the few BS degree programs in the nation in welding engineering technology. Students choosing this major are trained for entry-level positions in the industrial setting as welding engineers, welding engineering technologists, welding technologists, quality assurance technologists, or manufacturing technologists. They are prepared to work in field construction, light and heavy shop fabrication, and in manufacturing/production. They are trained in new process development, code and noncode high-quality applications, problem solving, technical sales, inspection, and estimating.

The courses for **Welding Engineering Technology** are as follows: ITE 1030, 1200, 1640, 2300, 2310, 2670, 2850, 3030, 3060, 3090, 3230, 3630, 3670, 3810, 3820, 4200, 4310, 4810, 4820, 5750, 5760, 5890; BIS 1400; Math 1050, 1060, 1100; Chem 1110, 1130; Engl 1010, 2010; BA 3700; MHR 3110, 3710; Stat 2300; and Phyx 1800. In addition, students in this major must also take University Studies courses and electives. See major requirement sheet, available from the department, for further information.

Associate of Applied Science Vocational-technical Programs

The two-year curricula develop strong technical skills in one of two areas of specialization—aircraft maintenance technician or computer aided drafting and design. Most of the credits earned in these programs may be applied toward a related BS degree should the student decide to continue his or her education.

Aircraft Maintenance Technician (Airframe or Powerplant) Two-year Associate of Applied Science Degree.

This two-year technical program, leading to an Associate of Applied Science (AAS) degree, emphasizes aircraft repair and maintenance. Required courses are: ITE 1030, 1130, 1140, 1170, 1200, 1240, 2100, 2110, 2140, 2150, 2170, 2180, 2190, 2200, 2300, 2420, 2430, 2440, 3280, 4200; Math 1050, 1060; Phyx 1800; and Engl 1010. FAA regulations require students to earn a 70 percent or higher score to pass each course.

In addition, students must complete University Studies requirements for the AAS degree, as described in the general University requirements. Federal Aviation Administration airframe and powerplant certification is available without University Studies requirements. See requirement sheet, available from the department, for further details.

Computer Aided Drafting and Design Two-year Associate of Applied Science Degree Program.

A two-year technical drafting and design program leading to an AAS degree is available to those desiring to directly enter the drafting and design occupation. Curriculum requirements include the following: ITE 1010, 1030, 1040, 1200, 2300, 2320, 3220, 3230, 3240, 3270, 4930; BIS 1400; Math 1050; and Engl 1010. Students in this program also fulfill University Studies requirements and complete technical electives and other electives. See requirement sheet, available from the department, for further details.

Graduate Programs

The Master of Science (MS) degree in Industrial Technology is available to individuals interested in graduate study. Candidates may choose either the Plan A thesis option or the Plan B nonthesis program.

Admission Requirements

See the general admission requirements for graduate study in this catalog (pages 72-73). Students applying for admission to the MS program must complete the GRE with a minimum quantitative and verbal score of 1,000 and a 40th percentile minimum score on the verbal and quantitative tests or must complete the MAT with a minimum score of 43. Admission committees also consider experience, undergraduate record, and formal recommendations.

MS Degree

The MS program offers a general technology degree. A Plan A or Plan B option is available. The Plan A and Plan B options are described on page 77 of this catalog. The degree is designed for industrial educators who want to strengthen their background in current educational theory and practice. Students are required to complete a professional core of courses relating to technology education or applied technology education and to select additional courses from a list of related courses. Plan A requires a minimum of 30 semester credits, including a thesis. Plan B is a nonthesis option that requires 33 semester credits, including a creative project. The core courses for this specialization are as follows: ITE 6090, 6100, 6150, 6450, and 6750.

Financial Assistance

The department offers a limited number of graduate research and teaching assistantships. For further information, contact the Industrial Technology and Education Department.

Industrial Technology and Education Courses (ITE)

ITE 1000. Orientation to Technology Education. Introduction to the technology education teaching profession, including programs, facilities, goals, and opportunities. (1 cr) (F)

ITE 1010. Communications Technology. Introduction to tools, materials, equipment, and processes used to transmit and receive messages. Major emphasis on hardware, software, communications, and the digital age. (3 cr) (F)

ITE 1020. Energy/Power/Transportation. Exploration of the concepts and processes relating to the source, conversion, transmission, and control of energy relating to use in industry, domestic, and transportation. (3 cr) (Sp)

ITE 1030. Material Processing and Tooling Systems. Introduction to properties of industrial materials (metallic, polymeric, ceramic, and composite), processes used to produce standard stock and finished products, design and construction of simple jigs and fixtures, and the use of precision measuring instruments in manufacturing. (3 cr) (F,Sp)

ITE 1040. Construction and Estimating. Overview of construction industry and its practices. Reviews four major parts of construction industry, including: (1) Inputs: materials; (2) Process: design and building of structures; (3) Outputs: sites, buildings, etc.; and (4) Feedback: effects of building systems. Provides prospective technology education teachers with opportunity to study and perform activities related to the field of construction and estimating. At completion of course, students should be able to demonstrate knowledge and skills required to implement a construction technology program. (3 cr) (Sp)

ITE 1100. The Aviation Profession. Covers attributes of aviation professional, career planning, and certification process. (1 cr) (F,Sp)

ITE 1130. Flight Principles. Basic flight theory and physics of flight. Aircraft control systems related to flight. Ground handling and servicing of aircraft. Special lab fee. (2 cr) (F)

ITE 1140. Aircraft Components and Principles. Materials and hardware, as well as nondestructive inspection applicable to aircraft. Plumbing methods, maintenance publications, and aircraft weight and balance control. (2 cr) (F)

ITE 1170. Aircraft Structures. Accepted methods and repair for metal structures. Organic finishes and application techniques with laboratory applications and practical experience. (3 cr) (F)

ITE 1200. Computer-Aided Drafting and Design. Provides students with ability to accurately produce basic engineering, 2-D, and pictorial drawings using traditional and computer-aided drafting techniques. Introduction to drafting fundamentals and equipment associated with the drafting industry, including drawings, reproductions, and computer-aided techniques. (3 cr) (F,Sp,Su)

ITE 1240. Aircraft Maintenance. Maintenance, repair, alteration, and inspection of aircraft. Assembly and rigging of control systems with laboratory application of maintenance assembly and rigging procedures. Prerequisites: ITE 1130, 1140. (3 cr) (Sp)

ITE 1640. Introduction to Welding. Theory of Oxy-Acetylene Welding, Shielded-Metal Arc Welding, and Gas Metal Arc Welding. (3 cr) (F)

ITE 2030. Manufacturing Technology and Enterprise. Focuses on management technology used to establish and finance a manufacturing firm, engineer a product and production system, and market a product. Emphasizes operation of basic ma-

chine woodworking equipment and a study of its uses. Prerequisite: ITE 1030. (3 cr) (F)

ITE 2100. Aircraft Reciprocating Powerplants and Accessories. Theory of operation, maintenance, and repair of reciprocating engines, propellers, exhaust systems, ignition systems, and fuel systems with laboratory applications of principles and components studied. Prerequisite: ITE 2110 (must be taken concurrently). (3 cr) (F)

ITE 2110. Aircraft Reciprocating Powerplants and Accessories Lab. Laboratory application of principles studied in ITE 2100. Prerequisite: ITE 2100 (must be taken concurrently). (3 cr) (F)

ITE 2140. Aircraft Turbine Powerplants and Maintenance Operations. Theory of turbine powerplants, including turbine engine and components operation, hot section inspection, and servicing. Aircraft engine 100-hour inspections and maintenance, with laboratory applications of principles and components studied. Prerequisite: ITE 2150 (must be taken concurrently). (3 cr) (Sp)

ITE 2150. Aircraft Turbine Powerplant Maintenance Operations Lab. Theory of turbine powerplants, including turbine engine and components operation, hot section inspection, and servicing. Aircraft engine 100-hour inspections and maintenance, with laboratory applications of principles and components studied. Prerequisite: ITE 2140 (must be taken concurrently). (3 cr) (Sp)

ITE 2170. Aircraft Systems. Theory and operation of aerospace environmental systems, communication, navigation and guidance systems, fuel and propellant systems, fire detection, and warning. (2 cr) (Sp)

ITE 2180. Aircraft Hydraulic and Pneumatic Systems. Theory and operation of aircraft hydraulic, landing gear, and brake systems. (2 cr) (F)

ITE 2190. Aircraft Systems Lab. Laboratory application of principles and components studied in ITE 2170. Prerequisite: ITE 2170 (must be taken concurrently). (1 cr) (Sp)

ITE 2200. Aircraft Hydraulics and Pneumatics Systems Lab. Laboratory application of principles and components studied in ITE 2180. Prerequisite: ITE 2180 (must be taken concurrently). (1 cr) (F)

ITE 2240. Analog Devices and Circuits. Study of differential amplifiers; operational amplifiers; regulators; and generator instrumentation amplifier, multiplier, and active filters. Prerequisites: ITE 2310; ITE 2400 (must be taken concurrently). (3 cr) (F)

ITE 2250. Internship. Planned supervised work experience in industry. Must have departmental approval. (1-4 cr) (F,Sp,Su) ®

ITE 2270. Computer Engineering Drafting. Provides students with ability to accurately produce computer-aided drafting software. Since there are no drafting prerequisites for this course, drafting fundamentals are also introduced. (2 cr) (F,Sp,Su)

ITE 2300 (QD). Electronic Fundamentals. Study and application of DC and AC concepts, semiconductors, digital electronics, and microcomputers. Prerequisite: Math 1050. (4 cr) (F,Su)

ITE 2310. AC/DC Circuits. Study of AC/DC principles beyond those taught in ITE 2300. Includes network theorems, capacitance, inductance, impedance, reactance, resonance, and transformers. Prerequisite: ITE 2300. (2 cr) (Sp)

ITE 2320. Electronic Drafting. Study of electronic drafting practices. Students exposed to various areas of electronic drafting and fabrication. Prerequisite: ITE 2300. (2 cr) (F)

ITE 2330. Private Pilot Ground School. Instructions in principles of flight, aircraft and engine operation, weather, navigation, radio aids to navigation, radio communi-

cations, and federal air regulations. Preparation for FAA Private Pilot written exam. (4 cr) (F,Sp)

ITE 2350. Private Pilot Certification. FAA approved flight training program meeting all requirements for, and in the issuance of, the Private Pilot Airplane License. Prerequisite: ITE 2330 (may be taken concurrently). (1 cr) (F,Sp,Su)

ITE 2360. Digital Circuits. Logic circuits, combinational and repeated circuits, counters, shifts registers, state tables, PLD's, and digital computer simulations. Prerequisite: ITE 2300 or equivalent. (3 cr) (Sp)

ITE 2370. Computer and Microprocessor Programming. Introduction to microprocessors and computers. Study of machine language programming, assemblies and cross assemblies, emulators, and input and output devices. Prerequisite: ITE 2300. (3 cr) (Sp)

ITE 2400. Active Devices and Circuits. Study of diodes; transistor principles, including semiconductor theory, bipolar, and field effect device characteristics; and modern thyristor devices. Prerequisite: ITE 2310. (3 cr) (F)

ITE 2420. FAA Regulations, Records, and Certification. Maintenance forms, records, and regulations releasing aircraft to airworthy status. Certification of maintenance technicians is also included. (2 cr) (Sp)

ITE 2430. Aircraft Electrical Systems and Components. Aircraft electrical power generating systems. Theory of generation, alternators, regulation, and control systems with laboratory application of principles and systems studied. Prerequisite: ITE 2300. (2 cr) (Sp)

ITE 2440. Aircraft Electrical Systems Laboratory. Laboratory application of principles and systems studied in ITE 2430. Prerequisites: ITE 2300; ITE 2430 (must be taken concurrently). (2 cr) (Sp)

ITE 2510. Intermediate Flight. FAA approved flight training program that fulfills the cross country requirements for commercial and instrument ratings. Prerequisite: ITE 2350. (1 cr) (F,Sp,Su)

ITE 2520. Instrument Pilot Ground School. Ground school approved by FAA under Part 141 of the Federal Aviation Regulations. Designed to prepare students to pass the FAA oral and written examinations required for becoming instrument rated pilots. Prerequisite: ITE 2350. (4 cr) (F,Sp)

ITE 2540. Instrument Pilot Certification. FAA approved flight training program meeting all the requirements for, and the issuance of, the Instrument Pilot Airplane Rating. Prerequisites: ITE 2350; ITE 2520 (may be taken concurrently). (1 cr) (F,Sp,Su)

ITE 2620. Commercial Pilot Ground School. Commercial flight operations including performance, cross country planning, advanced systems operations, complex airplanes, and flight maneuvers. Prerequisites: ITE 2350 and 2520. (2 cr) (F,Sp)

ITE 2660. Commercial Pilot Certification. Flight instruction to meet FAA requirements and completion of tests for certification. Prerequisites: ITE 2540; ITE 2620 (may be taken concurrently). (1 cr) (F,Sp,Su)

ITE 2670. GMA, FCA, and GTA Welding. Theory and skills course covering Gas Metal Arc Welding, Flux Core Arc Welding, and Gas Tungsten Arc Welding. Enrollment limited to Welding Engineering Technology majors or by permission. Prerequisite: ITE 1640. (3 cr) (Sp)

ITE 2720. CFI and CFII Ground School. Designed to prepare students to pass the FAA oral and written examinations required for becoming certified flight and instrument instructors. Combines Certified Flight Instructor and Certified Flight Instructor-Instrument into one course. Prerequisite: ITE 2660. (3 cr) (F,Sp)

ITE 2740. CFI Certification. FAA-approved flight training program meeting all requirements for the issuance of the Certified Flight Instructor Airplane Rating. Prerequisite: ITE 2720 (may be taken concurrently). (1 cr) (F,Sp,Su)

ITE 2850. Statics and Strength of Materials. Engineering technology course covering resultants and equilibrium of force systems; moments of inertia; method of work; stress, strain, and deflection due to tension, compression, and torsion; and Mohr's circle for stress and strain. Prerequisites: Math 1050, 1060. (3 cr) (F)

ITE 2860. CFII Certification. FAA approved flight training program meeting all the requirements for, and issuance of, the Certified Flight Instructor, Airplane Instrument Rating. Prerequisites: ITE 2720 and 2740 (may be taken concurrently). (1 cr) (F,Sp,Su)

ITE 2880. Multi-Engine Certification. FAA approved flight training program meeting all the requirements for, and the issuance of, the Multi-Engine Airplane Rating and the Certified Flight Instructor Multi-Engine Airplane Rating. Prerequisite: ITE 2660. (1 cr) (F,Sp,Su)

ITE 3010. National Airspace, Air Traffic Control, and Airport Administration. Study of air traffic control system, airspace usage, and facilities. Airport planning, development, and management and their importance to the achievement of a successful airport operation. Management of publicly owned and operated airports, ranging in size from general aviation to the large air carrier hubs. (3 cr) (F)

ITE 3030. Computer-Integrated Manufacturing and Robotic Systems. Introduction to principles, operations, and applications of computer-controlled manufacturing systems, including: CNC, CAD/CAM, robotics, programmable logic controllers, bar code readers, etc. Prerequisite: ITE 1030. (3 cr) (Sp)

ITE 3050. Graphic and Electronic Communication Technology. Introduction to modern graphic and electronic communication systems. Emphasizes design, development, production, and dissemination of both electronic and graphic messages. Covers major concepts, including desktop publishing, and audio and video production techniques. (3 cr) (Sp)

ITE 3060. Codes, Weld Inspection, and Quality Assurance. Study of ASME and AWS codes as relating to procedure qualification and welder qualification for fabrication of pressure vessels and structures, and how codes relate to quality assurance and ISO 9000. Prerequisite: ITE 2670. (3 cr) (F)

ITE 3070. Technology Education for Elementary Schools. Introduction to technology education and to science, technology, and society (STS) curricula for elementary schools, emphasizing teaching, developing, and managing technology-based activities. (3 cr)

ITE 3090. Welding Power Sources. Study of power sources used to generate and control voltage and amperage for welding. Prerequisites: ITE 2300, 2310, 2670. (2 cr) (Sp)

ITE 3120. Aviation Law. Law as it affects aviation industry. Rights and responsibilities of individual organizations and the aviation community. Regulation and liability pertaining to design, manufacturing, operation, and maintenance of aircraft. Prerequisite: ITE 1100. (3 cr) (F)

ITE 3140. Advanced Avionics Systems and Flight Simulation. In-depth study of state-of-the-art aircraft instrumentation systems and advanced flight training utilizing a flight simulator. Prerequisite: ITE 2540. (3 cr) (F,Sp,Su)

ITE 3200. Methods in Industrial Education I. Classroom laboratory practicum for design, practice, and performance of industrial education demonstrations and lab activities. Prerequisites: ITE 1000; ITE 3300 (must be taken concurrently). (3 cr) (F)

ITE 3220. Architecture and Construction Systems. Basics of architectural computer-aided drafting. Includes introduction to principles of construction. Explores residential and commercial systems, emphasizing construction codes. Prerequisites: ITE 1200, Math 1010. (3 cr) (F)

ITE 3230. Machine and Production Drafting. Teaches students to accurately produce both design drawings and working drawings. Explores techniques, symbols, and

conventions used to represent gears, cams, jigs, and fixtures. Also includes advanced techniques of production drawing, emphasizing Geometric Dimensioning and Tolerancing. Prerequisites: ITE 1200, Math 1050, or equivalent. (3 cr) (F)

ITE 3240. Technical Illustration. In-depth study of technical illustration. Includes preparation of pictorial drawings with rendering added. Explores industrial and architectural environments. Introduces rendering and animation software, emphasizing three-dimensional modeling. Prerequisite: ITE 1200. (3 cr) (Sp)

ITE 3270. Advanced Computer-Aided Drafting. Designed to enhance CADD productivity, encourage customization, and introduce students to advanced CADD techniques, including programming and introduction to parametric design. Prerequisite: ITE 1200. (3 cr) (Sp)

ITE 3280. Advanced Turbine Engines. Advanced study of turbo-jet propulsion. Comparative examination of jet, fan, turbo-prop, and turbo-shaft engines. Prerequisite: ITE 2150. (2 cr) (F)

ITE 3300. Clinical Experience I. Field-based experiences in secondary schools. Students complete 30 hours of tutoring students and assist teachers with managerial, clerical, and other professional tasks. Prerequisites: ITE 1000; ITE 3200 (must be taken concurrently). (1 cr) (F)

ITE 3380. Microprocessor and Computer Interfacing. Microcomputer interface applications, including digital system interface, serial and parallel interfacing, and D/A and A/D converters. Prerequisites: ITE 2240, 2370. (3 cr) (Sp)

ITE 3390. Microcontrollers. Study of microcontrollers and applications. Includes programming and building circuits. Prerequisite: ITE 3380. (3 cr) (F)

ITE 3400. Communication Circuits. Introduction to radio frequency communication circuits. Includes oscillators, modulation, transmitters, receivers, transmission lines, antennas, RF propagation, digital signal processing, GPS, and spread spectrum. Prerequisites: ITE 2300 and 2400. (3 cr) (Sp)

ITE 3410. FCC License. Prepares students to obtain the FCC General Radio Telephone Operator's License. Covers electronic fundamentals through microwave radar and FCC rules and regulations. Prerequisite: ITE 3400. (1 cr) (Sp)

ITE 3440 (DSC). Science, Technology, and Modern Society. Designed to challenge students from all academic majors to develop an understanding of the dynamic interaction between science, technology, and society. Explores responsibility of humans for directing the utilization of technology as a creative enterprise. (3 cr) (F,Sp)

ITE 3510. Introduction to Networking. Study of hardware and software required to build, install, maintain, and support a local area network. Emphasizes laboratory applications. Prerequisite: BIS 5400 (may be taken concurrently). (3 cr) (F)

ITE 3610. AeroTechnology Design I. Students select and plan a senior project. Requires written proposal, including technical description of the project and management plans. (1 cr) (Sp)

ITE 3630. Fusion Joining and Brazing Processes. Study of SAW, ESW, GMAW-EG, RW, PAW, PAC, Electron Beam, Laser, Friction, Brazing, and other welding processes. Prerequisites: Professional status and ITE 2670. (3 cr) (F)

ITE 3670. Design for Welding. Design of weldments and welded connections. Prerequisite: ITE 2850. (3 cr) (Sp)

ITE 3710. Electronics/Computer Design I. Students select and plan a senior project. Requires written proposal, including technical description of the project and management plans. Prerequisite: ITE 2320 (may be taken concurrently). (1 cr) (F)

ITE 3740. Facility and Equipment Maintenance. Systems approach to facility, equipment, and tool maintenance, including principles of woodworking, machine construction, adjustment, and sharpening. (3 cr)

ITE 3810. Welding Design I. Students select and plan a senior project. Requires written proposal, including technical description of the project and management plans. (1 cr) (Sp)

ITE 3820. Nondestructive Testing. Fundamental concepts relating to liquid penetrant, magnetic particle, ultrasonic, radiography, and other NDT processes. Prerequisites: Math 1100 and Phyx 1800. (3 cr) (Sp)

ITE 3900. Principles and Objectives of Industrial Education. Comprehensive study of philosophy and purposes of industrial education programs and their place in the total program of modern education. (3 cr)

ITE 3930. Evaluation of Industrial Subjects. Factors for evaluation of attitudes, skills, work habits, technical information, and instrument construction. (2 cr)

ITE 4200 (d6200).¹ Composite Manufacturing Processes and Repair. Composite manufacturing processes, composite materials survey, tooling design and fabrication, autoclave processes, vacuum bag techniques, filament winding processes, equipment requirements, materials cutting and storage, and composite materials testing. (3 cr) (Sp)

ITE 4250. Internship. Planned supervised work experience in industry. Prerequisite: Departmental approval. (1-6 cr) (F,Sp,Su) ®

ITE 4280. Airline Operations. Study of airline operations and their organizational structure. Examines functions of airline dispatcher, operations specialists, managers, and cockpit flight crew. Discussion of advanced flight planning, aircraft performance and loading considerations, and impact of weather on flight operations and routing priorities. Prerequisite: ITE 1100. (3 cr) (F)

ITE 4300. Clinical Experience II. Field-based experience, in which students complete 30 hours of teaching-related experiences in the classroom. Prerequisites: ITE 3200, 3300; ITE 4400 (must be taken concurrently). (1 cr) (Sp)

ITE 4310 (d6310). Corrosion and Corrosion Control. Analysis of corrosion mechanisms for ferrous metals, nonferrous metals, and nonmetallic materials, as well as the control of corrosion. Prerequisites: Chem 1110 and Math 1060. (2 cr) (Sp)

ITE 4400. Methods in Industrial Education II. Techniques of teaching as applied to individual and group instruction. Students apply various methods in presenting lessons. Prerequisites: ITE 3200, 3300; ITE 4300 (must be taken concurrently). (3 cr) (Sp)

ITE 4480. Certified Flight Instructor Practicum. Under supervision of ground school instructor, students gain practical experience teaching ground school subjects. Prerequisite: ITE 2740. (2 cr)

ITE 4490. Human Factors in Aviation Safety. Examines major causative agent in aircraft accidents: the human being. Emphasizes psychological and physiological factors enhancing accident probability. Includes detailed analysis of ergonomics (human engineering) and its influence on safety. Prerequisite: ITE 1100. (3 cr) (Sp)

ITE 4580. Occupational Safety and Health Management. Management practices and principles as applied to safety and health ethics, laws, organizations, programs, and varied functions of the safety and health professional. (2 cr)

ITE 4610 (CI). AeroTechnology Design II. Execution and completion of a team or individual project. Requires design reviews and written reports. Prerequisite: ITE 3610. (3 cr) (F)

ITE 4620 (CI). AeroTechnology Design III. Preparation and presentation of a team or individual project. Writing and speaking skills emphasized through technical reports and presentations. Prerequisite: ITE 4610. (3 cr) (Sp)

ITE 4660 (CI). Flight Senior Project. Students select, plan, and execute an approved senior project. Writing and speaking skills emphasized through technical reports and presentations. (3 cr) (F,Sp)

ITE 4700. Student Teaching in Postsecondary Schools. Planning, presenting, and evaluating instruction for students in postsecondary industrial and technical programs under the supervision of an experienced teacher. Enrollment by permission only. (4 cr)

ITE 4710 (CI). Electronics/Computer Design II. Execution and completion of a team or individual project. Requires design reviews and written reports. Prerequisite: ITE 3710. (3 cr) (Sp)

ITE 4810 (CI). Welding Design II. Execution and completion of a team or individual project. Requires design reviews and written reports. Prerequisite: ITE 3810. (3 cr) (F)

ITE 4820 (CI). Welding Design III. Preparation and presentation of a team or individual project. Writing and speaking skills emphasized through technical reports and presentations. Prerequisite: ITE 4810. (3 cr) (Sp)

ITE 4930. Independent Study. Upon application, students may propose and complete work above and beyond regular coursework to support or supplement their major. (1-4 cr) (F,Sp,Su) ®

ITE 4940. Related Industrial Experience. Provision for enrollment in industry schools conducted on university level. Approved by department upon application for trade competency examination and work experience in industry. (1-12 cr) (F,Sp,Su) ®

ITE 5040. Manufacturing Enterprise. Focuses on management technology used to establish a manufacturing enterprise, engineer a product and production system, finance the operation, and market the product. Prerequisite: ITE 1030. (3 cr)

ITE 5220 (CI). Program and Course Development. Review of basic principles and practices of curriculum and course development used in applied technology and technology education. Emphasizes components needed to develop a curriculum guide. Prerequisites: ITE 3200, 3300. (4 cr) (Sp)

ITE 5230. Technical Training Innovative Program. Prepares prospective and incumbent teachers to implement and conduct contemporary programs. Includes skill development and the philosophy needed for curriculum innovation. (1-4 cr) ®

ITE 5240. Principles of Technology. Introduction to applied technology principles forming the basis for today's society. (2-3 cr)

ITE 5300. Turbo Prop Aircraft Ground School. Introduction to Turbo Prop Commercial aircraft in use by Regional Airlines. Course includes the following: Systems Flight Management, Standard Operating Procedures, and Flight Planning. Prerequisite: ITE 2660. (3 cr) (F,Sp)

ITE 5400. Regional Jet Ground School. Introduction to typical commercial jet aircraft in use by Regional Airlines. Course includes the following: Aircraft Systems, Normal and Abnormal Operations, Performance, and Flight Planning. Prerequisite: ITE 2660. (3 cr) (F,Sp)

ITE 5500. Student Teaching Seminar. Focuses on observations and problems arising during student teaching. Includes review of teaching plans, procedures, adaptive classroom practices, and evaluation. Prerequisite: ITE 5600 (must be taken concurrently). (2 cr) (F)

ITE 5600. Student Teaching in Secondary Schools. Candidates assigned to cooperating teachers in public secondary schools within their major and minor subjects. Students have professional responsibilities with teaching. Prerequisite: ITE 5500 (must be taken concurrently). (8 cr) (F)

ITE 5750. Welding Metallurgy I. Metallurgical principles applied to welding and weldability of ferrous metals. Prerequisites: Chem 1110 and ITE 2670. (3 cr) (F)

ITE 5760. Welding Metallurgy II. Metallurgical principles applied to welding and weldability of nonferrous metals. Prerequisite: ITE 5750. (3 cr) (Sp)

ITE 5800. Seminar—Technology Education. Provides opportunity for students to participate in variety of enriching experiences, such as guest speakers, field trips, demonstrations, and conferences. (1-3 cr) ®

ITE 5890. Seminar—Welding Engineering Technology. Professional seminar specifically designed to introduce students to industry experts. Limited to welding students. (1 cr) (F,Sp) ®

ITE 5900. Workshop in Industrial Technology and Education. Special workshops for education or industry. May be repeated providing content varies. (1-4 cr) ®

ITE 5910. Special Problems in Industrial Technology and Education. (1-4 cr) ®

ITE 5920. Related Technical Training. (1-12 cr) ®

ITE 6090. Program Design in Technology and Industrial Education. Study of contemporary program design and development in technology and industrial education. Reviews complete curriculum developmental process. (3 cr) (F,Sp,Su)

ITE 6100. Contemporary Issues in Technology and Industrial Education. Study of present and future foundational professional developments in technology and industrial education. Students identify and investigate contemporary trends and issues affecting and facing technology and industrial education. (3 cr) (F,Sp,Su)

ITE 6150. Evaluation and Assessment in Technology and Industrial Education. Study of various methods used to measure and evaluate student achievement, including cognitive, affective, and psychomatic. Reviews principles of learning and teaching, and of evaluation of instruction. (3 cr) (F,Sp,Su)

ITE 6200 (d4200). Composite Manufacturing Processes and Repair. Composite manufacturing processes, composite materials survey, tooling design and fabrication, autoclave processes, vacuum bag techniques, filament winding processes, equipment requirements, materials cutting and storage, and composite materials testing. (3 cr) (Sp)

ITE 6250. Internship. Advanced instruction through supervised work experience in teaching, supervising, or administering educational or industrial program. (1-6 cr) (F,Sp,Su)

ITE 6310 (d4310). Corrosion and Corrosion Control. Analysis of corrosion mechanisms for ferrous metals, nonferrous metals, and nonmetallic materials, as well as the control of corrosion. Prerequisites: Chem 1110 and Math 1060. (2 cr) (Sp)

ITE 6440. Technology and Society. Study of dynamic interaction between technology and society. Examines human responsibility for directing changes in our future. (3 cr) (F,Sp,Su)

ITE 6450. Administration and Organization of Technology and Industrial Education. Administrative and supervisory techniques for successful operation of technology education and applied technology education programs. (3 cr) (F,Sp,Su)

ITE 6520. Explorations of Industry. Study of contemporary industry, business, and service through a series of site visits. Includes various management and finance methods and techniques. (3 cr) (F,Sp,Su)

ITE 6610. Computer Delivery Systems in Technology and Industrial Education. Introduces current computer technologies used in education. Explains how these technologies aid in development, preparation, and delivery of materials in a professional environment. Explores educational research and development of these technologies, with results being disseminated to others in the discipline. (3 cr) (F,Sp,Su)

ITE 6750. Research in Technology and Industrial Education. Introduction to practical research planning and design. Guides students from proposal selection to completed proposal to final research report. (3 cr) (F,Sp,Su)

ITE 6800. Seminar. (1-2 cr) (F,Sp,Su)

ITE 6900. Readings and Conference. Advanced individualized study on selected topics in technology and industrial education. Scheduled consultation with faculty member. (1-3 cr) (F,Sp,Su)

ITE 6910. Experimental Laboratory in Technology and Industrial Education. Introduction to elements of a research report through selection and development of experimental study utilizing tools, equipment, materials, and processes for improving programs and teaching techniques. (3 cr) (F,Sp,Su)

ITE 6930. Independent Study. Advanced educational experience through individual investigation. (1-6 cr) (F,Sp,Su)

ITE 6960. Master's Project. Development of creative project emphasizing a thoroughly developed plan of action. Includes proposal, project paper, and final presentation. (3-6 cr) (F,Sp,Su) ®

ITE 6970. Thesis Research. (1-9 cr) (F,Sp,Su)

ITE 6990. Continuing Graduate Advisement. (1-3 cr) (F,Sp,Su) ®

ITE 7230. Foundations of Technology and Industrial Education. Study of the objectives, legislative foundations, principles, philosophy, impact, and organization of technology and industrial education. (3 cr) (F,Sp,Su)

***ITE 7400. Occupational Analysis and Curriculum Development.** Students learn techniques for conducting an occupational analysis (both job and task analysis) and for developing performance-based or competency-based curriculum. Explores industrial and educational applications for this style of curriculum development. (3 cr)

ITE 7460. Finance and Grant Writing in Technology and Industrial Education. Procedures in financial administration of industrial education monies. Budget preparation, budget operation and control, and school accounting. In-depth review of steps and techniques needed for grant writing. (3 cr) (F,Sp,Su)

ITE 7810. Research Seminar. Identification of research problems, consideration of research strategies and methods, application of research and statistical concepts in departmental focus, and interaction with faculty. (1-6 cr) (F,Sp,Su)

ITE 7970. Dissertation Research. (1-15 cr) (F,Sp,Su) ®

ITE 7990. Continuing Graduate Advisement. (1-3 cr) ®

*This course is taught alternating years. Check with department for information about when course will be taught.

¹Parenthetical numbers preceded by *d* indicate a *dual* listing.

® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.