California State University, Fresno
**Bachelor of Science in Industrial Technology**
2014 – 2015

**Mission**

*To prepare individuals for technical and management careers in business, industry, agriculture and government for the improvement of regional and global economy.*

**Employment opportunities**

Typically, a graduate finds employment as manufacturing engineer, process engineer, and quality systems engineer, computer networking systems administrator, technical specialist, and plant manager. Positions in industrial and technical sales, product design and testing offer the graduate abundant opportunities.

**Graduate salary**

Industrial technology graduates get technically-oriented jobs with an average starting salary of $43,000 - $49,000 in the San Joaquin Valley, and $50,000 - $59,000 in the Bay Area and Los Angeles area. A survey of alumni indicates that after eight years on the job, the typical graduate is making $65,000 - $89,000 and is in a technical management position.

**Transfer Admission Requirements**

*To transfer to Fresno state, students who have 60 or more transferable units (90 quarter units) of community college work must:*

**H**ave at least a 2.0 cumulative grade point average (non-residents 2.4 GPA)
**C**omplete a minimum of 30 semester units (45 quarter units) of General Education coursework with a “C” or better grade in each General Education course;
**W**ithin the 30 units of General Education courses, complete 12 semester units of (G.E. Area A) Oral & Written Communication, Critical Thinking and a college level Math course (G.E. Area B).

*To transfer with fewer than 56 transferable units (84 quarter units) the student must:*

**S**ubmit high school transcripts;
**S**ubmit SAT or ACT scores, unless the high school GPA was 3.0 or above;
**H**ave met the high school GPA/test score eligibility index and the required high school course pattern;
**H**ave at least a 2.0 grade point average (nonresidents 2.4 GPA) in all college work and be in good standing at the last institution attended.

***The CSU allows a maximum of 70 transferable units taken at a community college to be applied toward the 120 units required for the B.S. in Industrial Technology degree.***

Contact: Department of Industrial Technology

 2255 E. Barstow Ave., Fresno, CA 93740-8002
 Phone: (559) 278-2145

 www.fresnostate.edu/jcast/indtech

**To Apply for Admission On-line go to:** www.fresnostate.edu/studentaffairs/are/undergrad/

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Student: |  |  | Adviser: |   |  |
|  | ID #:  |  |  | Catalog Yr: |   |  |
|  | Phone:  |  |  | Date: |  |  |
|  |  |  |   |  |  |  |  |  |
|  | **GENERAL EDUCATION**  |  |   |  |  | **MAJOR REQUIREMENTS** | **(2014–2015)** |
|  | G.E. Requirement: 51 semester units minimum toinclude 12 upper-division semester units. |  |   |  |  |  | *Req* | *Comp* |
|  |  | *Comp* |   |  |  | ***Technical Core (32)*** |  |  |
|  | ***Area A*** |  |   |  | IT 52 | Electricity and Electronics | 3 | ( ) |
| A1 | Oral Communication | ( ) |   |  | IT 74 | Manufacturing Processes | 3 | ( ) |
| A2 | Written Communication | ( ) |   |  | IT 102 | Ind Computer Concepts+Apps | 3 | ( ) |
| A3 | Critical Thinking:  | ( ) |   |  | IT 104 | Product Design (S) | 3 | ( ) |
|  |  |  |   |  | IT 106 | Energy Conversion and Utilization (F) | 3 | ( ) |
|  | ***Area B*** |  |   |  | IT 114 | Industrial Materials | 3 | ( ) |
|  | 12 semester units minimum including 3 upper division. One course is required in each sub area. |  |   |  | IT 115 | Design & Documentation Systems | 3 | ( ) |
|  |  |  |   |  | IT 196 | Senior Seminar | 1 | ( ) |
| B1 | Physical Science: **Phys 2A required** | ( ) |   |  | IT 199 | Senior Problems | 3 | ( ) |
| B2 | Life Science | ( ) |   |  | DS 73 | Statistics | 3 | ( ) |
| B4 | Quantitative Reasoning | ( ) |   |  | Chem 3A | Intro to General Chemistry | 4 | ( ) |
|  |  |  |   |  |  |  |  |  |
|  | ***Area C***  |  |   |  |  | ***Management Core (21)*** |  |  |
|  | 12 semester units minimum including 3 units upper division.  |   |  | IT 92 | Industrial Safety Management | 3 | ( ) |
|  | Select one course from C1, C2, and IC plus one additional course from either C1 or C2. |  |   |  | IT 107 | Facility Planning (F) | 3 | ( ) |
|  |  |  |   |  | IT 117 | Quality Assurance | 3 | ( ) |
| C1 | Arts | ( ) |   |  | IT 118 | Production Operations (F) | 3 | ( ) |
| C2 | Humanities | ( ) |   |  | IT 137 | International Quality Standards (S) | 3 | ( ) |
| C1/C2 | One Additional Course from C1 or C2 | ( ) |   |  | IT 148 | Proj Mgt and Control | 3 | ( ) |
|  |  |  |   |  | IT 184 | Advanced Manufacturing Technology (S) | 3 | ( ) |
|  | ***Area D*** |  |   |  |  |  |  |  |
|  | 15 semester units minimum including 6 units upper |  |   |  |  | ***MAJOR TOTAL*** | ***(53)*** |  |
|  | Division. One course is required in each sub-area. |  |   |  |  |  |  |  |
| D1 | American History | ( ) |   |  |  | ***Electives*** |  |  |
| D2 | American Government | ( ) |   |  |  | Consult department advisors to develop |  | ( ) |
| D3 | Social Science: **IT 20 required** | ( ) |   |  |  |   |  | ( ) |
|  |  |  |   |  |  |   |  | ( ) |
|  | ***Area E*** |  |   |  |  |   |  | ( ) |
|  | 3 semester units minimum. |  |   |  |  |   |  | ( ) |
| E1 | Lifelong Understanding and Self-Development | ( ) |   |  |  | ***ELECTIVES TOTAL*** | ***(15)*** |  |
|  |  |  |   |  |  |  |  |  |
|  | ***UPPER DIVISION G.E.*** |  |   |  |  |  |  |  |
| IB | Integration, Area B | ( ) |   |  |  | ***Additional Requirement*** | ***(1)*** |  |
| IC | Integration, Area C | ( ) |   |  | IT 198W | Technical Writing |  | ( ) |
| ID | Integration, Area D | ( ) |   |  |  |  |  |
| MI | Multicultural/International | ( ) |   |  |  |  |  |
|  | ***GE TOTAL*** | ***(51)*** |   |  |  |  |
|  |  |  |   |  |  | Students must pass the upper-division writing exam or complete IT 198W with a grade of “C” or higher (to be taken no sooner than the term in which 60 units are completed). |  |
|  | **Area A2 (Engl 1) must be completed before enrolling in area C or D Breadth courses.** |   |  |  |
|  | **Area B4 (Quantitative Methods) must be completed before enrolling in a Breadth B1 course** |   |  | **GE (51); Major (53); Electives (15)** |
|  | **All of Foundation (A1, A2, A3 and B4) must be completed before enrolling in any upper division GE course.** |  |  | **Total Units for BSIT = 120** |

|  |  |  |
| --- | --- | --- |
| ***SpecialityArea Electives*** | ***Select 21 units with advisor approval*** | ***Recommended Courses for the Specialty*** |
| **Course** | **Title** | **CAD/CAM** | **Industrial Controls** | **Quality** | **Transportation** | **Computer Networking** | **Course Completed** |
| IT 12 | Basic Vehicle |  |  |  | X |  |  |
| IT 30 | Exploring Technology Systems | X | X | X | X | X |  |
| IT 41 | Industrial Design Graphics | X | X | X | X | X |  |
| IT 45 | I T Competitions | X | X | X | X | X |  |
| IT103 | Network Operating Systems( Linux)  | X | X |  |  | X |  |
| IT 110 | Fluid Power | X | X | X | X |  |  |
| IT 112 | Industrial Process Control Systems I-Sensor & Instrumentation  | X | X | X |  | X |  |
| IT 116 | Applied Visual Programming (Cisco Java Programming) | X | X |  |  | X |  |
| IT 119 | Computer Integrated Manufacturing | X | X | X |  |  |  |
| IT 120 | Vehicle Engine Systems |  |  |  | X |  |  |
| IT 121 | Auto Engine Machining |  |  |  | X |  |  |
| IT 122 | Vehicle Chassis Analysis |  |  |  | X |  |  |
| IT 127 | Vehicle Design |  |  |  | X |  |  |
| IT 129 | Vehicle Diagnostics |  |  |  | X |  |  |
| IT130 | Network Operating Systems -Linux(Cisco IT Essentials II) |  |  |  |  | X |  |
| IT 131 | Automated Systems IDigital Systems & PLC | X | X | X | X | X |  |
| IT 133 | Industrial Process Control Systems II-Human Machine Interface |  | X |  |  | X |  |
| IT 134 | Computer-aided Manufacturing Systems I-Robotics | X | X | X |  | X |  |
| IT 144 | Tool Design Graphics | X |  |  |  |  |  |
| IT 146 | Multimedia Development (Cisco/Adobe Web Design) | X |  |  |  | X |  |
| IT 147 | Advanced CAD-Solid Modeling | X |  | X | X |  |  |
| IT 156 | Automated Systems II | X | X |  |  |  |  |
| IT 58 | Computer Networking I (CCNA Sem 1 & 2) | X | X | X | X | X |  |
| IT63 | Computer Networking II (CCNA Sem 3 & 4) | X | X |  |  | X |  |
| IT 164 | Routers & Internetworking I (CCNP Sem 5 & 6) |  | X |  |  | X |  |
| IT 165 | Routers & Internetworking II (CCNP Sem 7 & 8) |  | X |  |  | X |  |
| IT 177 | Computer-Aided Manufacturing Systems II-CNC & CAM Software  | X | X | X |  |  |  |
| IT184 | Advanced Manufacturing Processes | X |  |  |  |  |  |

1. **Basic Vehicle Systems (3) Spring**

Design, construction, and mechanical functions of vehicle engines, fuel systems, electrical systems, power transmission, brakes and wheel suspension; proper use and safety of tools and equipment. (2 lecture, 2 lab hours)

1. **Technology and Society (3) Fall, Spring**

Prerequisite: G.E. Foundation A2. Critical relationship between society and technology. Technology, as it applies to contemporary issues such as technology and gender, the fate of skill and labor’s power under changing conditions, technology and war, the problem of technocracy, technology and consumer culture, and technological relations to the natural environment. G.E. Breadth D3.

1. **Exploring Technology Systems (3)**

Survey of the technology systems discipline including history (medieval apprenticeship to present), technology subsystems (information and communications, transportation, manufacturing, construction), and relationships to other disciplines, including business, industry, and education. (2 lecture, 2 lab hours; field trips)

1. **Industrial Design Graphics (3) Fall**

Application of the fundamentals of industrial design graphics. Sketching, lettering, orthographic projection, working drawings, auxiliary views, dimensioning, developments, pictorial drawings, duplication; interrelationship to the design process. Introduction to CAD. (6 lab hours)

1. **Industrial Technology Exhibits and Competitions (3) Fall, Spring**

Provides a structure for students to be involved in various industrial technology exhibits and competitions, industrial technology research and development, project management, and team work. CR/NC grading only. (6 lab hours) (Formerly IT 145)

**52. Electricity and Electronics (3) Fall, Spring**

(Same as ME AG 53.) Introduction to electricity including fundamentals of electrostatics, alternating and direct current electrical circuits, electrical calculations, magnetics, circuit applications, electrical measuring, and test equipment. Schematics and wiring diagrams, standards, and codes. (2 lecture, 2 lab hours) (Course fee, $5)

**58. Applied Computer Networking I (4) Fall, Spring**

Prerequisite: IT 102. Internet, intranet, local area network concepts, protocols, architectures, and implementation issues. Data communication in office technology and manufacturing automation. (2 lecture, 4 lab hours; field trips)

1. **Basic Graphic Arts (3)**

Introduction to the graphic arts; letterpress, photo offset lithography, screenprinting; layout, composition, imposition, presswork, bindery. (6 lab hours; field trips) (Course fee, $6)

**63. Applied Computer Networking II (4) Spring**

Prerequisite: IT 158. Understanding complex networks, such as IP, IPX, Frame Relay and ISDN. An analysis of the technology used to increase bandwidth and quicken network response times. Network security, global intranet, custom queuing, and routed priority services. (2 lecture, 4 lab hours; field trips)

1. **Metallurgical Processes (3) Fall, Spring**

(Same as ME AG 50). Fundamentals of metallurgy; properties and characteristics of metals; survey of metal welding processes, equipment, and procedures; theory-discussion and laboratory experience in oxygen-fuel welding, cutting, brazing, and shielded metallic arc welding. (2 lecture, 3 lab hours) (Course fee, $7)

1. **Manufacturing Processes (3) Fall, Spring**

Study of how consumer and industrial products are manufactured, focusing on how raw materials (primarily metal and plastic) are changed into finished products. Topics include production processes of material addition, forming, casting, removal, separation, assembly, and finishing. (2 lecture, 2 lab hours) (Course fee, $7)

1. **Wood Processing Technology (3) Fall**

Wood properties, materials, finishing; hand, portable electric, and machine tool processing; design, production planning; safety, adhesives, and cutting principles; machine design and use. (6 lab hours) (Course fee, $10)

1. **Industrial Safety Management (3) Fall, Spring**

Principles of safety management in an industrial environment; safety legislation and programs; management/supervisory and employee responsibilities and attitudes; physical hazards associated with chemicals, equipment, fire, compressed gases; other topics include eye, stress, drugs, lifting, office, and noise safety.

1. **Globalization of Technology and Society (3)**

Prerequisite: junior or senior standing. Explores the impact of past and current technologies on the U.S. and world societies. Topics include the history of technology and how technology influences the environmental, cultural, economics, and political institutions of the U.S. and the world.

1. **Industrial Computer Concepts and Applications (3) Fall, Spring**

Introduction to industrial computer systems. Comprehensive view of the components of a modern industrial information processing system and the parts each component plays in the processing of data. (2 lecture, 2 lab hours)

**104. Product Development (3) Fall, Spring**

Prerequisites: IT114, IT115. Elements, principles, and methods of design. Emphasis will be placed on the development of models and prototypes with attention to standard components, productivity, and packaging. (2 lecture, 2 lab hours)

1. **Energy Conversion and Utilization (3)**

Fundamental sources of energy, including the following energy conversion systems: direct mechanical, external combustion, internal combustion, solar power, wind power, electrical and atomic systems. Experiments and demonstrations (2 lecture, 2 lab hours; field trips)

1. **Facilities Planning and Materials Handling (3) Fall, Spring**

Facility planning techniques as applied to facility location, zoning, building codes, line balancing, shipping-receiving, offices, material handling, storage, project scheduling, and computerized layout.

1. **Fluid Power (3) Spring**

Selective study of fluid power principles and applications; hydraulics, pneumatics, and vacuum; includes pumps, controls, transmission systems, actuators, and fluidics. In-depth study of air conditioning – heating theory and applications. (6 lab hours; field trips) (Course fee, $5)

1. **Industrial Process Control Systems I (3) Spring**

Prerequisite: IT 52. Process control principles; components and principles; transducers, actuators, sensors, and instrumentation; computer interface software, terminologies, standards, and trends in control technologies. Programmable logic controller principles, hardware, and software. (2 lecture, 2 lab hours)

1. **Industrial Materials (3) Fall, Spring**

Chemical and physical properties of metals, polymers, ceramics, composites. Atomic structure and phases of matter emphasizing crystalline and amorphous solids. Mechanical properties, strength and testing of materials including impact, hardness, and tensile. Metallographic, microscopic inspection of electronic and metallic specimens. (2 lecture, 2 lab hours)

1. **CAD Principles and Methods (3) Fall, Spring**

IT 41 recommended prior to enrollment. Computer-aided design applications. Special emphasis in manufacturing, construction, and interior design applications. Exposure to CAD software packages. (2 lecture, 2 lab hours)

1. **Applied Visual Programming (3) Spring**

Contemporary computer language used in office automation and manufacturing industry; basic concepts on structural programming, object-oriented language, programming mechanics, user interface development, and Internet applications. (2 lecture, 2 lab hours)

1. **Quality Assurance (3) Fall, Spring**

Prerequisite: DS73 or Math 11. Quality assurance principles and practices in industry: quality assurance systems, acceptance sampling, testing, source surveillance; probability and statistical concepts, process control techniques and measurement procedures as applied to quality.

1. **Production Operations (3) Fall, Spring**

A survey of production manufacturing operations: quality assurance, work sampling, testing, time and motion study; routing, scheduling, and inventory control; flow processes, material handling, and automation. (Field trips)

1. **Computer-Integrated Manufacturing Concepts (3)**

Prerequisites: a computer programming language; IT 118 or equivalent. Strategies on how to implement Computer-Integrated Manufacturing (CIM) for a complete manufacturing enterprise. Focuses on CIM systems, opportunities, concerns and solutions; design, development, implementation, and operations; and employees’ educational programs. Team efforts and management are emphasized. (2 lecture, 3 lab hours)

1. **Vehicle Engine Systems (3) Spring**

Prerequisites: IT 12, 52 or concurrently. Advanced study of vehicle engines and support systems. Includes engine theory, fuel and electrical systems, turbochargers, LPG, diesel, computerized emission and engine controls, and dynamometer testing analysis. (6 lab hours; field trips)

1. **Automotive Engine Machining (3) Spring**

Prerequisites: IT 12, 74. Advanced study of automotive engine machining including precision measurements, principles of engine operation, machining of engine components, crack detection, assembly procedures, lubricating and cooling systems. (6 lab hours; field trips) (Course fee, $6)

1. **Vehicle Chasses Analysis (3) Spring**

Prerequisite: IT 12. Advanced study of vehicle chasses components including power transmission, brake systems, wheel suspension, air conditioning, body repair and refinishing, computer controls and diagnostics. (2 lecture, 2 lab hours; field trips)

1. **Vehicle Design and Development (3) Spring**

Design and mechanical development of vehicles for intercollegiate competition events. Students will select one or more vehicle research projects: innovative future fuels, super mileage, mini Baja, formula, aero design, walking robot. (6 lab hours)

**129. Vehicle Diagnostic Procedures (3) Spring**

Prerequisites: IT 12, 52, or concurrently. Laboratory study and analysis of mechanical, electrical, and computer control problems. Technical reports. (2 lecture, 2 lab hours; field trips) (Course fee, $5)

**131. Automated Systems I (3) Fall**

Prerequisite: IT 52. Number systems, Boolean logic, and fundamentals of digital devices; basic applications of logic devices in computers and control systems. (1 lecture, 4 lab hours; field trips) (Course fee, $5)

**133. Industrial Process Control Systems II (3) Spring**

Prerequisite: IT 52. Programmable logic controller principles and equipment; programming languages, procedures, and documentation; equipment and software selection and application. (2 lecture, 2 lab hours)

**134. Computer-Aided Manufacturing Systems I (3) Spring**

Prerequisite: IT 74. Study, analysis, and evaluation of robotics systems. APT programming language for numerical control and application languages for robots. Use of robot vision and the geometry of computer vision applications. (2 lecture, 3 lab hours)

1. **International Quality Standards (3) Fall, Spring**

Prerequisite: IT 117. ISO 9000 and related international quality systems. Implementation process. Conformance standards, quality system requirements, and the registration and audit processes.

**144. Tool Design Graphics (3)**

Application of graphics to industrial work holding devices; their application, drawing, and design. Construction of working drawings aided by standards, company catalogs, and handbooks. Final designs subjected to student presentation and evaluation. (6 lab hours; field trips)

**146. Multimedia Development (3)**

Integration of a variety of media types: graphics, animation, digital video, and sound. Emphasis placed on development and creation of multimedia as applied to various CAD/CAM projects, the process of bringing live interactivity to the Internet, Web page development, and desktop publishing. (Formerly IT 191T)

**147. Advanced CAD Applications (3) Fall, Spring**

Prerequisites: IT 115. CAD as a tool to facilitate design activities. An overview of design processes and methods. Solid modeling techniques are introduced. A team approach in system design is emphasized. (2 lecture, 2 lab hours)

**148. Project Management and Control (3) Fall, Spring**

Project management process and tools, planning, scheduling, organizing, and controlling projects. Project planning and control using qualitative and quantitative methods. (2 lecture, 2 lab hours)

**156. Automated Systems II (3) Fall**

Prerequisite: IT 52. Study and analysis of the characteristics and industrial applications of electric motors. Major emphasis is placed on programmable, solid state, and electromechanical motor controllers. (2 lecture, 2 lab hours; field trips) (Course fee, $4)

**160. Graphic Communication Developments (3)**

Prerequisite: IT 60. An investigation of the graphic reproduction processes including laboratory experiences, practical application, and frequent industrial trade tours. In-depth study of individually selected topics resulting in written and oral research reports. (6 lab hours; field trips) (Course fee, $10)

**164. Routers and Internetworking I (4)**

Prerequisite: IT 163. Implementation of appropriate technologies to build a scalable routed network. Building of campus networks using multiplayer switching, technologies. Improving traffic flow, reliability, redundancy, and performance for campus LANs, routed and switched WANs, and remote access networks. (2 lecture, 4 lab hours)

**165. Routers and Internetworking II (4)**

Prerequisite: IT 164. Creation and deployment of a global internet. Troubleshooting an environment that uses routers and switches for multiprotocol client hosts and services. Addresses those tasks that network managers and administrators need to perform in managing access and controlling overhead traffic over LANs and WANs. Connecting corporate networks to an Internet Service Provider (ISP). (2 lecture, 4 lab hours)

**177. Computer-Aided Manufacturing Systems II (3) Spring**

Prerequisite: IT 74. Computer numerically-controlled hardware including milling and turning centers and flexible manufacturing systems. Programming in languages common to computer numerically controlled machine tools. Computer-controlled machining of industrial materials including aluminum, brass, steel, plastic, expanded foam, and wax. (2 lecture, 3 lab hours)

**184. Advanced Manufacturing Technology (3) Fall**

Prerequisite: IT 74. Production processing, using metallic and nonmetallic materials, including product design, work cells, tooling, capacity planning, material handling, scheduling and flow chart. (6 lab hours; field trips) (Course fee, $10)

1. **Independent Study (1-3; max total 6) Fall, Spring**

See Academic Placement – Independent Study in catalog. Approved for SP grading. (Course fee variable.)

**191T. Technical Topics in Industrial Technology (1-3; max total 6)**

Prerequisite: permission of instructor. Investigation and analysis of selected subjects in industrial technology. (2-6 lab hours)

**194. Cooperative Education in Industrial Technology (1-4; max total 12) Fall, Spring**

Prerequisites: courses appropriate to the work experience; permission of department cooperative education coordinator; junior standing. Integration of work experience with academic program individually planned through program adviser. CR/NC grading only.

**196. Senior Seminar (1) Fall, Spring**

Prerequisite: senior standing. Exploration of technology systems management trends and preparation for employment or further study in technical fields. Technology forecasting, orientation to professional certifications, employment correspondence, and interview techniques.

**198W. Technical Writing (3) Fall, Spring**

Prerequisites: satisfactory completion (“C” or better) of the ENGL 1 graduation requirement; to be taken no sooner than the term in which 60 units are completed. Preparation of technical reports, research proposals, specifications, resumes, and correspondence using effective writing techniques, formats, and styles. Meets upper-division writing skills requirement for graduation.

**199. Senior Problem in Industrial Technology (3) Fall, Spring**

Prerequisite: successful completion of Upper Division Writing Exam or IT 198W. Approved problem or research project, with seminar, in the area of the student’s option and emphasis. Approved for SP grading.