California State University, Fresno
Bachelor of Science in Industrial Technology
2004 – 2005

Mission

➢To prepare individuals for technical management careers in business, agriculture, government, and industry.

Employment opportunities

➢Typically, the graduate finds employment as manufacturing engineer, process engineer, quality systems engineer, computer networking systems administrator, technical specialist, and plant manager. Positions in industrial and technical sales, product design and testing also 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 - $55,000 in the Bay Area and Los Angeles area. A recent survey of alumni indicates that after eight years on the job, the typical graduate is making $55,000 - $89,000 and is in a technical management position.

Transfer Admission Requirements

To transfer to Fresno state, students who have 56 or more transferable units (84 quarter units) of community college work must:

Have at least a 2.0 cumulative grade point average (non-residents 2.4 GPA)
Complete 30 semester units (45 quarter units) of General Education coursework with a "C" or better grade in each General Education course;
Within the 30 units of General Education courses, complete 12 semester units of (G.E. Area A) English composition, speech, 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:

Submit high school transcripts;
Submit SAT or ACT scores, unless the high school GPA was 3.0 or above;
Have met the high school GPA/test score eligibility index and the required high school course pattern;
Have 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 124 units required for the B.S. in Industrial Technology degree.

Contact: Dr. Tony Au, Chair
Department of Industrial Technology
2255 E. Barstow Ave., Fresno, CA 93740-8002
Phone: (559) 278-2145 tonya@csufresno.edu
www.csufresno.edu/indtech

To Apply for Admission On-line www.my.csufresno.edu

Student:_____ Adviser:_____

ID #: _____ Phone: _____ Catalog Year:_____

GENERAL EDUCATION

G.E. Requirement: 51semester units minimum to include 12 upper-division semester units.

		Comp
	Area A	
A1	Oral Communication	( )
A2	Written Communication	( )
A3	Critical Thinking:	( )
	Area B	
	12 semester units minimum including 3 upper division. One course is required in each subarea.	
B1	Physical Science: **Phys 2A required**	( )
B2	Life Science	( )
B4	Quantitative Reasoning:	( )
IB	Upper-Division G.E. Integration, Area B	( )
	Area C	
	12 semester units minimum including 3 units upper division. Select one course from C1, C2, and IC plus one additional course from either C1 or C2.	
C1	Arts	( )
C2	Humanities	( )
IC	Upper-Division G.E. Integration, Area C	( )
C1/C2	One Additional Course from C1 or C2	( )
	Area D	
	15 semester units minimum including 6 units upper division. One course is required in each sub-area.	
D1	American History	( )
D2	American Government	( )
D3	Social Science: **IT 20 required**	( )
ID	Upper-Division G.E. Integration, Area D	( )
MI	Upper-Division G.E. Multicultural/International	( )
	Area E	
	3 semester units minimum	
E1	Lifelong Understanding and Self-Development	( )

Area A2 (Engl 1) must be completed before enrolling in C or D Breadth courses.

Area B4 (Quantitative Methods) must be completed before enrolling in a Breadth B1 course.

All of Foundation (A1, A2, A3, and B4) must be completed before enrolling in any upper div GE course.

MAJOR REQUIREMENTS

		2004-Req	2005 Comp
	Technical Core	**(29)**	
IT 52	Electricity and Electronics	3	( )
IT 74	Manufacturing Processes	3	( )
IT 102	Ind Computer Concepts+Apps	3	( )
IT 104	Product Design	3	( )
IT 114	Industrial Materials	3	( )
IT 115	CAD Principles and Methods	3	( )
DS 73	Statistics	3	( )
IT 196	Senior Seminar	1	( )
IT 199	Senior Problems	3	( )
Chem 3A	Intro to General Chemistry	4	( )
	Management Core	**(18)**	( )
IT 92	Industrial Safety Management	3	( )
IT 107	Facility Planning	3	( )
IT 117	Quality Assurance	3	( )
IT 118	Production Operations	3	( )
IT 148	Proj Mgt and Control	3	( )
IT 137	International Quality Standards	3	( )
	IT Core Total = 47 units		
	to develop 24-units ***Specialty Area***	***(25)***	
	CAD/CAM Sys Mgt		
	Industrial Control Sys Mgt		
	Quality Sys Mgt		
	Transportation Systems Mgt		
	Networking Sys Mgt		
	Additional Requirements		
IT 198W	Technical Writing		
	Students must pass the upper-division writing examor complete IT 198W with a grade "C" or higher(to be taken no sooner than the termin which 60 units are completed)		
	RECAP: **GE (51); Major (47) Electives (25)**		
	Total Units for the degree = 124		

Speciality Area Electives	***Select 25 units with advisor approval***								
Course	**Title**	**CAD/CAM**	**Industrial Controls**	**Quality**	**Transport-ation**	**Computer Networking**		**Course Substitution**	**Course Completion**
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 I Digital 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 158	Computer Networking I (CCNA Sem 1 & 2)	X	X	X	X	X			
IT163	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							

12. Basic Vehicle Systems (3)
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)

20. Technology and Society (3)
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.

30. 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)

41. Industrial Design Graphics (3)
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)

45. Industrial Technology Exhibits and Competitions (3)
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)
(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)

60. 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)

71. Metallurgical Processes (3)
(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)

74. Manufacturing Processes (3)
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)

80. Wood Processing Technology (3)
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)

92. Industrial Safety Management (3)
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.

101. 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.

102. Industrial Computer Concepts and Applications (3)
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 Design (3)
Prerequisite: IT 115. 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)

106. 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)

107. Facilities Planning and Materials Handling (3)
Facility planning techniques as applied to facility location, zoning, building codes, line balancing, shipping-receiving, offices, material handling, storage, project scheduling, and computerized layout.

110. Fluid Power (3)
Prerequisite: IT 52. 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)

112. Industrial Process Control Systems I (3)
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)

114. Industrial Materials (3)
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)

115. CAD Principles and Methods (3)
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)

116. Applied Visual Programming (3)
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)

117. Quality Assurance (3)
Prerequisite: IT 102. 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.

118. Production Operations (3)
Prerequisite: IT 102. 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)

119. 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)

120. Vehicle Engine Systems (3)
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)

121. Automotive Engine Machining (3)
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)

122. Vehicle Chasses Analysis (3)
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)

127. Vehicle Design and Development (3)
Design and mechanical development of vehicles for intercollegiate competition events. Students will select one or more vehicle research projects: innovative future fuels, supermileage, mini Baja, formula, aero design, walking robot. (6 lab hours)

129. Vehicle Diagnostic Procedures (3)
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)
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)
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)

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)

137. International Quality Standards (3)
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)
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)
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)
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)

158. Applied Computer Networking I (4)
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)

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)

163. Applied Computer Networking II (4)
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)

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)
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)
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)

190. Independent Study (1-3; max total 6)
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)

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)
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)
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)
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.