REQUIREMENTS FOR THE BACHELOR OF SCIENCE IN INDUSTRIAL ENGINEERING

2006

COLLEGE OF ENGINEERING
UNIVERSITY OF TEXAS AT ARLINGTON

General Requirements
Total Credit Hours = 128

FRESHMAN							
FIRST SEMESTER			**Hours**	**SECOND SEMESTER**			**Hours**
ENGL	1301	Critical Thinking, Reading and Writing I	3	ENGL	1302	Critical Thinking, Reading and Writing II	3
CHEM	1441	General Chemistry I	4	CHEM	1442	General Chemistry II	4
MATH	1426	Calculus I	4	MATH	2425	Calculus II	4
IE	1104	Intro to Engineering	1	PHYS	1443	Technical Physics I	4
IE	1105	Intro to IE lab	1	CSE	1320	Intermediate Programming	3
DG	1350	Graphics for Engineers	3				
TOTAL CREDIT HOURS			**16**	**TOTAL CREDIT HOURS**			**18**
SOPHOMORE							
FIRST SEMESTER			**Hours**	**SECOND SEMESTER**			**Hours**
MATH	2326	Calculus III	3	MATH	3319	Diff Equation & Linear Algebra	3
PHYS	1444	Technical Physics II	4				
HIST	1311	U.S. History to 1865	3	HIST	1312	U.S. History since 1865	3
POLS	2311	U.S. Government	3	POLS	2312	State & Local Government	3
IE	3312	Economics for Engineers	3	IE	3301	Engineering Probability	3
				IE	3315	Operations Research	3
TOTAL CREDIT HOURS			**16**	**TOTAL CREDIT HOURS**			**15**
JUNIOR							
FIRST SEMESTER			**Hours**	**SECOND SEMESTER**			**Hours**
IE	3314	Engineering Research Methods	3	IE	4302	Engineering Administration and Organization	3
IE	3343	Metrics and Measurements	3	IE	4322	Enterprise Simulation	3
IE	4315	Operations Research II	3	IE	4344	Human Factors Engineering	3
IE	4303	Production and Inventory Control	3	SPCH	3302	Professional & Technical Communication	3
◘ Fine Arts Elective			3	◘ English Literature Elective			3
				§ Technical Elective			3
TOTAL CREDIT HOURS			**15**	**TOTAL CREDIT HOURS**			**18**
SENIOR							
FIRST SEMESTER			**Hours**	**SECOND SEMESTER**			**Hours**
IE	4308	Quality Systems	3	IE	4318	Enterprise Design	3
IE	4325	Automation & Robotics	3	IE	4345	Knowledge & Technology Management	3
IE	4343	Facilities Planning & Design	3				
IE	4339	Product Dev, Producibility & Reliability Design	3	IE	4350	Industrial Engineering Capstone Design	3
§ Technical Elective			3	§ Technical Elective			3
				◘ Social/Cultural Elective			3
TOTAL CREDIT HOURS			**15**	**TOTAL CREDIT HOURS**			**15**

Students who do not have two units of a single foreign language in high school will be required to take two courses of a single foreign language in addition to the previously listed curriculum requirements.

§ To be chosen from the approved list of technical electives available in the IE office, 420 WH.

◘ To be chosen from the approved list of electives available in the IE office, 420 WH.

This document serves as a supplement to the UTA Undergraduate 2005-2007 Catalog. The Catalog is the official source of university information. Updated 10/23/2006

COURSES IN CHEMISTRY & BIOCHEMISTRY (CHEM)

CHEM 1441. GENERAL CHEMISTRY (3-4) 4 hours credit. (CHEM 1412). The lecture covers the fundamentals of atomic structure, chemical bonding, the periodic table, nomenclature, kinetic theory, gas laws, chemical equations, and solutions. The laboratory introduces the scientific method, experiment design, data collection and analysis, as well as illustrates fundamental principles presented in the lecture. Students who have not had high school chemistry are advised to take CHEM 1300 first. Semesters offered: Fa Prerequisite: MATH 1302 or equivalent

CHEM 1442. GENERAL CHEMISTRY (3-4) 4 hours credit. (CHEM 1412). Study of advanced atomic structure and bonding concepts, acid-base theory, kinetics and equilibria, thermodynamics, electrochemistry, the chemistry of some elements. The laboratory focuses on experimental design, data collection and analyses as well as chemical syntheses to illustrate fundamental principles presented in the lecture. Semesters offered: Fa Prerequisite: CHEM 1441 or the equivalent, which may include satisfactory grade on the Advanced Standing Examination offered through the Office of Measurement and Testing Services

COURSES IN COMPUTER SCIENCE ENGINEERING (CSE)

CSE 1320. INTERMEDIATE PROGRAMMING (3-2) 3 hours credit. Programming concepts beyond standard control structures in C/C++. Emphasis is given to data structures and modular design consistent with software engineering principles. Windows and UNIX operating systems are used. Prerequisite: CSE 1105 (or concurrently) and CSE 1310, or EE 1347; and MATH 1323

COURSES IN DESIGN GRAPHICS (DG)

DG 1350. GRAPHICS FOR ENGINEERS (2-3) 3 hours credit. Freehand, instrumental, and computer graphics, including CAD systems (including Autocad and Pro-E software packages) and graphical representation of data using microcomputer software. Emphasis on the use of computer software in the graphical process to originate ideas and to solve engineering problems and generate graphical representations to solutions. Prerequisite: Prerequisite or co-requisite: MATH 1426.

COURSES IN INDUSTRIAL ENGINEERING (I E)

IE 1104. INTRODUCTION TO ENGINEERING (1-0) 1 hours credit. Introduction to basic engineering concepts. Students will become familiar with engineering and its many sub-fields, ethical responsibilities, creativity and design. Prerequisite: Co-requisite: IE 1105

IE 1105. INTRODUCTION TO ENGINEERING LAB (0-3) 1 hours credit. Introduction to basic engineering concepts. Opportunities are provided to develop skills in oral and written communication, and department-specific material. Case studies are presented and analyzed. Prerequisite: Co-requisite: IE 1104

IE 3301. ENGINEERING PROBABILITY (3-0) 3 hours credit. Topics in industrial engineering that involve random processes. Applications and backgrounds for topics in reliability, inventory systems, and queuing problems, including absolute and conditional probabilities, discrete and continuous random variables, parameter estimation and hypothesis testing. Prerequisite: MATH 2326 or concurrent enrollment.

IE 3312. ECONOMICS FOR ENGINEERS (3-0) 3 hours credit. Tools and methods used for determining the comparative financial desirability of engineering alternatives. Prerequisite: MATH 1426 or concurrent enrollment.

IE 3314. ENGINEERING RESEARCH METHODS (3-0) 3 hours credit. A continuation of IE 3301. Primary emphasis on the construction of linear models of engineering data, testing hypotheses, and analyzing of variance. Prerequisite: IE 3301 and junior standing.

IE 3315. OPERATIONS RESEARCH I (3-0) 3 hours credit. Introduction to the major deterministic techniques of operations research and their application to decision problems. Linear programming, integer programming, network analysis, dynamic programming, nonlinear programming. Course software is used. Project required. Prerequisite: IE 3301 or concurrent enrollment and MATH 2326.

IE 3343. METRICS AND MEASUREMENT (2-3) 3 hours credit. This course presents methods for determining the most effective utilization of effort in the man-machine environment as well as systems and methods to measure enterprise performance. The computer competency evaluation is administered in this course for those students who have not had IE 1105. Prerequisite: MATH 2326, IE 3312 or concurrent enrollment, and IE 3301 or concurrent enrollment.

IE 4191, 4291, 4391. SPECIAL PROBLEMS IN INDUSTRIAL ENGINEERING (Variable credit from 1 to 3 semester hours as arranged, individual instruction). The investigation of special individual problems in industrial engineering under the direction of a faculty member. Prerequisite: consent of the head of the department.

IE 4300. TOPICS IN INDUSTRIAL ENGINEERING (3-0) 3 hours credit. A study of selected topics in industrial engineering. May be repeated when topics vary. Prerequisite: consent of instructor and undergraduate advisor.

IE 4302. ENGINEERING ADMINISTRATION AND ORGANIZATION (3-0) 3 hours credit. A survey of administration, control and organization of engineering and research activities. Strategic planning as well as project planning and control are discussed. Prerequisite: junior standing.

IE 4303. PRODUCTION AND INVENTORY CONTROL (3-0) 3 hours credit. Fundamental theory and design of systems for the control of production, inventories and their economic interaction, particularly in cases involving uncertainty of demand, of supply availability, and of production rates. Prerequisite: IE 3301 and 3315

IE 4304. ENTERPRISE SYSTEMS (3-0) 3 hours credit. An extension of Production and Inventory Control (IE 4303), this course covers enterprise resource planning systems (ERP) in manufacturing, E-Commerce and supply chain environments. ERP software and case studies are reviewed. Prerequisite: IE 4303

IE 4308. QUALITY SYSTEMS (3-0) 3 hours credit. A comprehensive coverage of modern quality systems techniques to include the design of statistical process control systems, acceptance sampling, and process analysis and design. Prerequisite: IE 3314 or concurrent enrollment. Prerequisite: IE 3314 or concurrent enrollment

IE 4310. INDUSTRIAL AND PRODUCT SAFETY (3-0) 3 hours credit. Scientific, managerial, and legal aspects of safety hazard control and elimination in the industrial workplace. Methods for enhancing product safety. Prerequisite: junior standing.

IE 4313. INDUSTRIAL HYGIENE ENGINEERING (3-0) 3 hours credit. Physical, physiological and psychological aspects of the interaction of workers with biological, chemical, and physical agents in the workplace. Design of work systems for control and elimination of these agents. Ethics and professional conduct are stressed. Prerequisite: IE 4344.

IE 4315. OPERATIONS RESEARCH II (3-0) 3 hours credit. A continuation of IE 3315 to probabilistic techniques of operations research and their application to decision models. Topics include z-transforms, linear difference equations, Markov chains, game theory, decision analysis, queueing theory, and non-quantitative aspects of decisions. Prerequisite: IE 3301, IE 3315, and MATH 3319.

IE 4318. ENTERPRISE DESIGN (3-0) 3 hours credit. Design, analysis, and modeling of enterprises. Topics include enterprise architectures, structured system modeling methods, enterprise integration, and enterprise transformation. Prerequisite: junior standing

IE 4322. ENTERPRISE SIMULATION (3-0) 3 hours credit. The design and analysis of complex manufacturing and service systems using computer-based discrete event simulation techniques. Topics include an introduction to simulation methods, and the design, construction and analysis of discrete-event simulation models, as well as their computer applications. The course also covers the execution and management of simulation projects and the formal presentation of their findings. Prerequisite: IE 3314 and IE 4315, or consent of instructor.

IE 4325. AUTOMATION AND ROBOTICS I (2-3) 3 hours credit. Study of the use of industrial automation and robotics technologies in manufacturing industries. The course introduces the major classes of industrial automation. Issues associated with the successful deployment of automation in the E-enterprise environment are presented. Laboratory exercises focus on a practical introduction to various automation technologies. Prerequisite: IE 4303 or concurrent enrollment.

IE 4339. PRODUCT DEVELOPMENT, PRODUCIBILITY AND RELIABILITY DESIGN (3-0) 3 hours credit. This course covers the product development and engineering design process with focus on collaborative design in the E-enterprise environment. Manufacturing, reliability, testing, logistical and product support considerations are emphasized. Prerequisite: junior standing

IE 4343. FACILITIES PLANNING AND DESIGN (3-0) 3 hours credit. The course covers strategic facilities planning through detailed facilities layout design. Considerations include product flow, space and activity relationships, personnel requirements, material handling, and layout. Traditional and contemporary issues in manufacturing and their impact on facilities design including receiving, shipping, warehousing and integration with manufacturing and supporting operations are explored. Facilities planning models and the process of evaluating, selecting, preparing, presenting, and implementing the facilities plan are covered. Prerequisite: IE 4303 or concurrent enrollment

IE 4344. HUMAN FACTORS ENGINEERING (2-3) 3 hours credit. Study of the interactions between people and their work, workplace, and the environment. Involves identification, measurement, analysis, and evaluation of interactions via human physical and mental capacities and limitations, and social interactions. Prerequisite: IE 3343

IE 4345. KNOWLEDGE AND TECHNOLOGY MANAGEMENT (3-0) 3 hours credit. Review of contemporary issues in knowledge management, knowledge engineering, technology management, and intelligent systems. Topics include knowledge acquisition, intelligent database design, decision support systems, artificial intelligence technologies, designs and tools, and collaborative development. Prerequisite: junior standing.

IE 4349. AUTOMATION AND ROBOTICS II (2-3) 3 hours credit. Study of the design, implementation, and operation of robotics technology. An in-depth study of the design and deployment of industrial automation and robotics technology to meet the needs of high-precision, multi-product production environments. The laboratory activities associated with the course provide practical experience in the areas of sensor-driven automated process development, industrial vision, modular and reconfigurable automation, simulation-based system design and an introduction to computer-based manufacturing control and execution technologies. Prerequisite: IE 4325.

IE 4350. INDUSTRIAL ENGINEERING CAPSTONE DESIGN (2-3) 3 hours credit. This course provides an open-ended design experience through the planning and design of an enterprise. The student selects a product; determines the necessary processes, equipment, capacities, routings, and personnel required; develops supporting material handling, inventory, and quality systems; and designs the fully integrated enterprise including facility layout with estimated cost of operation. Contemporary project management techniques are utilized. The design experience project includes submittal of approximately nine written and oral presentations culminating a written project report and oral presentation at the end of the semester. IE 4350 is the capstone design course and draws on material from the total industrial engineering curriculum. The impact of engineering design on society is discussed. Prerequisite: All required 4000 level IE courses or concurrent enrollment

COURSES IN MATHEMATICS (MATH)

MATH 1426. CALCULUS I (3-2) 4 hours credit. (MATH 2413). Concepts of limit, continuity, differentiation and integration; applications of these concepts. Prerequisite: MATH 1323 or MATH 1325.

MATH 2326. CALCULUS III (3-0) 3 hours credit. (MATH 2315). Partial differentiation, multiple integrals (with applications), line integrals, Green's Theorem, surface integrals, Stokes' Theorem, divergence theorem. Prerequisite: MATH 2425.

MATH 2425. CALCULUS II (3-2) 4 hours credit. (MATH 2314). Applications of integration, techniques of integration, parametric equations, polar coordinates, sequences and series. Prerequisite: MATH 1426.

MATH 3319. DIFFERENTIAL EQUATIONS AND LINEAR ALGEBRA (3-0) 3 hours credit. Introductory course with emphasis on solution techniques. Ordinary differential equations, vector spaces, linear transformations, matrix/vector algebra, eigenvectors, Laplace Transform, and systems of equations. Prerequisite: MATH 2326 or concurrent registration.

COURSES IN PHYSICS (PHYS)

PHYS 1443. GENERAL TECHNICAL PHYSICS I (3-3) 4 hours credit. (PHYS 2425). The first half of a one-year technical course. Required for many science and engineering majors, exceeds premedical requirement. The study of physical phenomena in the fields of mechanics, heat, and waves. Prerequisite: MATH 1426 or concurrent enrollment.

PHYS 1444. GENERAL TECHNICAL PHYSICS II (3-3) 4 hours credit. (PHYS 2426). The second half of a one-year technical course. The study of physical phenomena including electricity, magnetism, circuit theory, light, and optics. Prerequisite: PHYS 1443 and MATH 2325 or concurrent enrollment.