COMPUTER SCIENCE AND INDUSTRIAL TECHNOLOGY

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COMPUTER SCIENCE

COMPUTER SCIENCE (CMPS)

101. Introduction to Computer Science. Credit 3 hours. Prerequisite: Registration in or prior credit for Mathematics 155 or 161. Introduction to the major areas of computer science including operating systems, machine architecture, programming languages, data representation and storage, and algorithm development. Includes major emphasis in problem solving and simple programming concepts.

105. Computers in Society. Credit 3 hours. Topics include historical, modern, and future developments, as well as an overview of a computer system's hardware, software and people. Issues concerning security, privacy, and ethics will be discussed. Includes practical application of using communication software networks, including the Internet and the World Wide Web. This course does not satisfy the general requirement for computer literacy.

110. Computer Literacy. Credit 3 hours. An introduction to microcomputer hardware and software. Software includes an operating system, a user interface, networking, word processing, and electronic spreadsheets. Credit toward the degree will not be granted for both CMPS 110 and GBBT 210.

120. Microcomputers and BASIC Programming. Credit 3 hours. Prerequisite: Registration in or prior credit for Mathematics 161 or 165. Introduces microcomputers using the BASIC language. Includes a study of applications and characteristics of microcomputers.

159. Structured Programming I. Credit 3 hours. Prerequisite: Mathematics 155 or 161 or 165 or permission of the Department Head. Basic concepts of computer programming, problem solving, algorithm development, and coding using a high-level, block-structured language.

161. Algorithm Design and Implementation I. Credit 3 hours. Prerequisite: Mathematics 155 or 161 or 165 or permission of the Department Head. Basic concepts of computer programming, problem solving, algorithm development, and program coding using a high-level, block-structured language. Credit may be given for both Computer Science 110 and 161.

173. Software for Management of Data. Credit 3 hours. Prerequisite: Mathematics 155 or 161 or permission of the Department Head. Concepts of acquisition, organization, exchange and storage of quantitative data through the use of visual languages and packages.

169. Structured Programming II. Credit 3 hours. Prerequisite: Computer Science 159. A continuation of the basic concept of computer programming, problem solving, algorithm development, and coding using a high-level structured programming language. Credit may be given for only one of Computer Science 161 or 169.

225. Software Applications. Credit 3 hours. Prerequisite: Mathematics 241 or equivalent and Computer Science 110. Use of various software packages for data analysis including SAS, SPSS and BMDP. Credit toward the degree will not be granted for the Computer Science major.

233. Desk Top Publishing. Credit 3 hours. Prerequisite: Computer Science 110, or with permission of the Department Head. Topics include assembling, and design of document, fonts, art layout, photos, black and white images, shading, colors, graphics, using microcomputers, scanners, and other peripheral devices. Credit toward the degree will not be granted for the Computer Science majors or minors.

234. An Introduction to Applications of Database Management Systems. Credit 3 hours. Prerequisite: Computer Science 110 or with permission of the Department Head. A course for non-majors covering relational database basic structure, method of design, implementation, and manipulation. Student will design and implement a major database project using a production version database management system. Credit toward the degree will not be granted for the Computer Science majors or minors.

235. World Wide Web Publishing and Web Servers. Credit 3 hours. Prerequisite: Computer Science 110 or permission of the Department Head. Topics include Hyper-Text-Markup-Language, ISO SGML, Linux/Unix server setup on the Internet with operation, and security issues.

257. Discrete Structures. Credit 3 hours. Prerequisite: Computer Science 161 or 169 and Mathematics 161 or 165. Introduction to discrete structures of computing. Topics include sets, relations, functions, digraphs, matrices, recursion, partially ordered sets, Boolean Algebra, artificial languages, and finite state machines.

262. COBOL Programming. Credit 3 hours. Prerequisite: Registration in or prior credit for Mathematics 161 or 165. A study of the business oriented programming language COBOL, including a study of its more powerful capabilities such as the search, sort, and access techniques.

273. Software for Storing and Analyzing Data. Credit 3 hours. Prerequisites: Mathematics 165 or 241 and Computer Science 173 or permission of the Department Head. Topics include methods for designing database schema and spreadsheet programs based on quantitative data analysis requirements; implementation of spreadsheet programs and database schema using integrated methodologies with visual languages and software packages.

280. Algorithm Design and Implementation II. Credit 3 hours. Prerequisite: Computer Science 161 or 169. An intensive capstone of the material covered in Computer Science 161 or 169 and an introduction to elementary data structures, searches, simple and complex sorts, and objects. Credit may not be given for both Computer Science 280.

285. Software Development and Professional Practice. Credit 3 hours. Prerequisite: Computer Science 280 or permission of the Department Head. Introduction of the methods used for specifying, designing, implementing, and testing medium and large scale software systems; methods for organizing and managing software development projects; professionalism and ethical responsibilities in software development.

290. Computer Organization. Credit 3 hours. Prerequisite: Computer Science 280. An introduction to the structure and function of computing machines. The primary components of the computer are examined from an organizational and logical standpoint. Topics include introduction to digital systems; machine level representation of data; assembly level machine organization; memory system organization and architectures; and introduction to language translation.

293. Introduction to Assembly Language. Credit 3 hours. Prerequisite: Computer Science 280. Fundamentals of assembly language programming. Topics include machine representation of data, fixed point, floating point, and decimal arithmetic, macros, address modification, bit manipulation, and subroutine linkage.

294. Internet Programming. Credit 3 hours. Prerequisite: Computer Science 280. This course concerns the art and science of programming for WWW Internet applications from a client-side perspective. Basic and advanced HTML will be covered, with emphasis on current scripting technologies.

295. Special Problems. Credit 1-3 hours. Prerequisite: Computer Science 110 or equivalent. Independent investigation and application of computing software that is not covered in existing courses. May be repeated for up to 3 hours credit. Credit toward the degree will not be granted for Computer Science majors or minors.

297. Digital Logic. Credit 3 hours. Prerequisite: Computer Science 257. Principles of digital logic, to include gates, combinational circuits, flip-flops, registers, counters, timers, memory, buses, input/output interfaces and microprocessors.

309. Computer Networking. Credit 3 hours. Prerequisite: Computer Science 161 or 169, and Computer Science 293, and Mathematics 165. Fundamentals of computer networking and protocols used in local area and wide area networks. Topics include network selection, installation, customization, and administration.

315. System Administration. Credit 3 hours. Prerequisite: Computer Science 285. This course teaches skills and concepts that are essential to the administration of operation systems, networks, software, various computing support systems, and system documentation, policies, and procedures. This also includes education and support of the users of these systems.

319. Principles of Information Assurance. Credit 3 hours. Prerequisites: CMPS 110 and successful completion of any 200-level computer course; or permission of the Department Head. Conceptual and technical aspects of computing security and of the Information Assurance (IA) discipline; addresses knowledge areas specified in IA certification programs with emphasis on applying IA concepts to case studies from business, industry and government.

320. Applied Graphical User Interface (GUI) Concepts. Credit 3 hours. Prerequisite: Computer Science 280 or permission of the Department Head. Topics include GUI design styles and strategies for visual applications, development life cycle, flow diagrams, and application documentation.

333. Advanced Desktop Publishing and Multimedia. Credit 3 hours. Prerequisite: Computer Science 233. Students will develop various informative and promotional materials. Emphasis will be on independent work, and developing concepts with outside clients when possible. Projects will include work with traditional print media as well as digital media. Credit toward the degree will not be granted for Computer Science majors.

335. Advanced Web Publishing. Credit 3 hours. Prerequisite: Computer Science 235 and one introductory programming course or permission of the Department Head. Topics include using a variety of markup languages and scripting techniques for both server and client WWW applications.

355. Object-Oriented Programming. Credit 3 hours. Prerequisite: Computer Science 280. Introduction to the Object-Oriented Paradigm, including data abstraction, encapsulation, polymorphism, inheritance, and garbage collection. Implementation of these concepts using an Object-Oriented language.

375. Computer Architecture. Credit 3 hours. Prerequisite: Computer Science 293. Hardware organization and implementation of computer architecture. Instruction set considerations and addressing modes. System control concepts. CPU control, microprogramming, I/O interface and memory organization. Parallel and data flow architecture.

383. Information Systems. Credit 3 hours. Prerequisite: Computer Science 285. A study of file organization and management, analysis of the concept of information systems, approaches and techniques for evaluating information systems. Fourth generation languages will be explored.

387. Statistical Computing. Credit 3 hours. Prerequisites: Mathematics 200, 241, and Computer Science 280. Computer techniques in statistical analyses using standard statistical packages. Topics include frequency distributions, variances, confidence intervals, chi-square, linear regression and correlation analysis.

389. Computer Graphics. Credit 3 hours. Prerequisites: Mathematics 200 and Computer Science 280. Introduction and techniques of computer graphics. Topics include interactive versus passive graphics, input-output devices, and programming techniques suitable for the visual representation of data and images.

390. Data Structures. Credit 3 hours. Prerequisite: Computer Science 257, 280, and 285. Further study of trees, including: balanced trees, B-trees, 2-3 trees, and tries; external sorting, symbol tables, and file structures.

391. Numerical Methods. Credit 3 hours. Prerequisites: Computer Science 280 and Mathematics 201 or equivalent. Computer-oriented numerical methods for scientific problems. Topics include error analysis, Taylor series, solutions of equations, linear simultaneous equations, and interpolation.

393. Fundamental Algorithms. Credit 3 hours. Prerequisites: Computer Science 257, 390 and Mathematics 201. The design, implementation, and complexity of algorithms analysis.

394. Web Systems and Technologies. Credit 3 hours. Prerequisite: Computer Science 294. This course covers the setup and management of important web-based services, server-supported programming technologies, and some other host-management issues such as user support, security, staffing, and purchasing.

400. Internship. Credit 1-6 hours. Prerequisite: CMPS 390 and permission of the Department Head. Student must be an integral part of a software project team in industry during the semester. Graded as Pass/Fail only. Can be counted as a general elective only, not as a Computer Science Elective (300-400).

401. Survey of Programming Languages. Credit 3 hours. Prerequisite: Computer Science 390. Involves the formal study of programming languages, specification, and analysis in terms of data types and structures.

409. Advanced Computer Networking. Credit 3 hours. Prerequisite: Computer Science 309. Advanced computer networking. Topics include security, optimization, custom modules, protocols, information flow management, disaster recovery, wireless applications, and legal and ethical issues.

411. Software Engineering. Credit 3 hours. Prerequisite: Computer Science 390, must be taken in the academic year in which the student intends to graduate. Presents a formal approach to the top-down design, development, and maintenance of software systems. Includes organization and management of software projects, security, programmer teams, validation and verification.

411H. Honors Software Engineering. Credit 3 hours. Prerequisite: CMPS 390, must be taken in the year in which the student intends to graduate. In addition to satisfying all of the requirements for CMPS 411, the student must research a topic in contemporary software design methods or software validation/verification methods, write a report on his/her findings, and present those findings to his/her class in a session that will be open to all computer science majors and faculty.

420. Human Computer Interaction. Credit 3 hours. Prerequisite: Computer Science 390. Designing, implementing, and evaluating computer systems. Task analysis, prototyping, usability evaluation, dialogue specification, interaction styles and techniques, human factors, virtual reality, multimedia, and hypermedia systems.

421/521. Computers in Education. Credit 3 hours. Prerequisite: Permission of Department Head. Designed for the prospective graduate student and other students who are interested in the preparation and processing of data in research.

431. Operating Systems. Credit 3 hours. Prerequisite: Computer Science 375 and 390. Design and implementation of operating systems. Topics include process management, processor management, memory management, device management, file management, process synchronization and interprocess communication, and user interface. Other issues such as distributed computing and system performance may be discussed.

432. Compiler Construction. Credit 3 hours. Prerequisite: Computer Science 375 and 390. The design and construction of compilers including compile-time symbol tables, lexical scan, syntax scan and object code generation.

435. Real Time Software Systems. Credit 3 hours. Prerequisites: Computer Science 431 and Mathematics 200. Design of real time software systems including communications, interrupts and device control.

439/539. Database Systems. Credit 3 hours. Prerequisite: Computer Science 390. Design and implementation of database systems. Topics include hierarchical, relational, and network models, normalization of relations, data integrity and security, and database administration. A programming project using a relational DBMS is required.

441. Artificial Intelligence. Credit 3 hours. Prerequisites: Computer Science 390 and either Computer Science 387, Mathematics 241, or Mathematics 380. Introduction to intelligent processes and their performance by

a computer. Topics include computer representation of knowledge, problem solving, game playing, theorem proving, natural language understanding, computer vision, and robotics.

443/543. Simulation and Modeling. Credit 3 hours. Prerequisite: Computer Science 390 and Mathematics 380 or Computer Science 387. Construction and use of computer and mathematical models, parameter estimation, simulation techniques, applications of simulation, examples, and cases and studies taken from physical, social and life sciences, engineering, business and information sciences.

447. Robotic Software. Credit 3 hours. Prerequisites: Computer Science 161, 169, and 375 or equivalent and Physics 191, 193. An introduction to the study of robotic software with emphasis on basic concepts including motion, vision and speech.

449. Communications in Computing. Credit 3 hours. Prerequisite: Computer Science 390. Principles of computer communications and networks. Topics include communication codes, communication modes, communication media, networks, and communication applications.

450/550. Spatial Database and Applications. Credit 3 hours. Prerequisite: Computer Science 390. Topics include introduction to GIS, map projections and coordinate systems, spatial data structures , data entry, spatial database management, spatial analysis, remote sensing, GPS and GIS, internet GIS, and GIS scientific applications.

455/555. Computational Aspects of Game Programming. Credit 3 hours. Prerequisite: Computer Science 450/550. This course will investigate computational aspects of game programming, and students completing the course will have sufficient technical background, well founded in science, to be able to successfully develop computer video games. Topics covered include coordinate systems, geometric elements, transformations, hyperspace, numerical analysis, rendering, graphics, lighting, code optimization, and other system design and programming issues related to game programming.

458/558. Expert Systems. Credit 3 hours. Prerequisite: Computer Science 441. Introduction to Expert Systems. Topics include artificial intelligence techniques for Expert Systems, knowledge bases, knowledge representation, inference engines, system shells, natural language processing, heuristic techniques, rule-based systems, and meta level languages.

460. Design and Implementation of Neural Networks. Credit 3 hours. Prerequisite: Computer Science 441 and Mathematics 360. Introduction to Neural Networks. Topics include connections, processing elements, n-dimensional geometry, self-adaptive equations, data transformation structures, mapping networks, and neuro-computing applications.

470/570. Machine Learning. Credit 3 hours. Prerequisites: Computer Science 390 and Mathematics 241. Introduction to machine learning. Topics include genetic algorithms, inductive learning, statistical learning methods, reinforcement learning, neural networks, decision trees, analytical learning, and Bayesian learning.

479. Automata and Formal Languages. Credit 3 hours. Prerequisites: Computer Science 257 or Mathematics 223 and senior standing. Introduction to computing device capabilities through study of abstract machines and corresponding formal languages. Topics include Turing machines, recursion, Chomsky grammars, context-free languages, regular languages, and finite automata.

481. Seminar. Credit 1 hour. Prerequisite: Senior Classification. Discussion of social, ethical, and professional issues. Students present reports on topics of current interest in Computer Science.

487/587. Introduction to Operations Research. Credit 3 hours. Prerequisites: Math 200 and CMPS 280 or equivalent. An application-oriented survey of operations research topics including linear and integer programming, network analysis, dynamic programming, nonlinear programming, and decision analysis.

491/591. Selected Topics in Computer Science. Credit 3 hours. Prerequisite: Permission of Department Head. Selected topics in Computer Science that are new or unique and are not covered in existing courses. May be taken more than once for credit.

495/595. Special Problems. Credit 1-3 hours. Prerequisite: Permission of Department Head. Permits work by students on special projects in Computer Science. May be taken more than once for credit.

INDUSTRIAL TECHNOLOGY

CONSTRUCTION TECHNOLOGY (CTEC)

101.Construction Industry Systems. Credit 3 hours. A study of construction systems providing an understanding of how construction impacts life, socially and professionally. Industry fundamentals through analysis of architectural and engineering plans, specifications, and documents used in the planning, bidding, preconstruction, construction, and closeout phases of a typical construction project.

111.Construction Graphics. Credit 3 hours. An introduction to construction graphics the reading of blueprints; covering types of construction, specifications, site work, structural steel construction, reinforced concrete construction, mechanical and electrical systems, and finish construction.

121. Construction Materials. Credit!3 hours. Prerequisite: CTEC 111. An introduction to construction principles, materials, and methods in the construction industry. graphics: covering site work, concrete, masonry, metals, wood, plastic, doors and windows, and finishes. Two hours of lecture and two hours of laboratory per week. Laboratory fee: $10.00.

171. Survey Principles. Credit 3 hours. Prerequisite: CTEC 111 and IT 111. Theories and principles of traditional and state-of-the-art techniques in surveying as applied to the construction industry. Two hours of lecture and two hours of laboratory per week. Laboratory fee: $10.00.

201. Project Management. Credit 3 hours. Prerequisite: CTEC 101. An introduction to project management: covering human relations, labor law and relations, problem solving and decision making, construction planning, project scheduling, and quality control.

202. Project Supervision. Credit 3 hours. Prerequisite: CTEC 121. An introduction to project supervision: covering orientation to the job, construction documents and documentation, cost awareness and control, resource control, and safety.

203. Computer Planning and Scheduling. Credit 3 hours. Prerequisites: Credit for or enrollment in CTEC 202 and 271. Analysis and application of scheduling techniques. The use of critical path method (CPM), program evaluation and review (PERT), and PRIMAVERA.

271. Construction Estimating I. Credit 3 hours. Prerequisite: CTEC 121. An introduction to residential construction estimating: covering construction estimating, productivity records, cost accounting, project owner's estimate, pre-construction design estimates, detailed construction estimate, quantity surveying, how to determine direct cost for the project, and integrating estimating with project planning and control.

DESIGN DRAFTER TECHNOLOGY (DDT)

113. Architectural Drafting. Credit 3 hours. Prerequisite: Industrial Technology 111. Principles and practices of architectural drawing, terminology, and construction through residential planning and design, including floor plans, elevations, sectional details and plat plans. Two hours of lecture and two hours of laboratory per week. Laboratory fee: $25.00.

114. Technical Illustration. Credit 3 hours. Prerequisite: Industrial Technology 111 and Industrial Technology 215. The transmission of engineering drawings into three-dimensional drawings using principles and techniques of axonometric, perspective, and schematic drawing. Includes lettering, reproduction methods, color rendering, air brush techniques and various mechanical aids. Two hours of lecture and two hours of laboratory per week. Laboratory fee: $25.00.

211. Piping Drafting. Credit 3 hours. Prerequisite: Industrial Technology 215-Computer Aided Drafting and Industrial Technology 264-Industrial Fluid Power. Piping design and drafting fundamentals as used in process industries such as refineries and petrochemical plants. The study, use and drafting of pipes, fittings, flanges, valves, equipment and structural systems using the latest industry-standard software. Students will use industry standards to create schematic, plan, elevation, isometric, spool, and 3-D drawings of various process piping components/systems. Two hours of lecture and two hours of laboratory per week. Laboratory fee: $25.00.

212. Machine Design Drafting. Credit 3 hours. Prerequisite: Industrial Technology 111 - Engineering Drafting. Advanced study and applications of detailed and assembly drawings of machines, including precision dimensioning and tolerancing; specifications and symbols; notes, call-outs, material lists, treatments and finishes according to industry- based standards. Two hours of lecture and two hours of laboratory per week. Laboratory fee: $25.00.

215. Light Commercial Building Drafting. Credit 3 hours. Prerequisites: Industrial Technology 111 and Design Drafter Technology 113 [IT 113]. Analysis and solution of basic problems in the design and construction of small commercial properties using a variety of materials and methods of construction. Two hours of lecture and two hours of laboratory per week. Laboratory fee: $25.00.

216. Civil Drafting Technology. Credit 3 hours. Prerequisite: Industrial Technology 215. Basic concepts and techniques of civil technology, including leveling; longitude and latitude; map scales; symbols, directions; legal descriptions; plot plans, contours; profiles and highway cut and fill. Students will use Computer-Aided Design (CAD) software to complete projects relating to interpretation of survey data, profiles and cross sections, land subdivision, site and grading plans, and basic earthwork calculations. Two hours of lecture and two hours of laboratory per week. Laboratory fee: $25.00.

218. Special Topics in Drafting. Credit 3 hours. Prerequisites: A 2.000 adjusted major average, Sophomore standing and 15 semester hours of drafting or permission of the Department Head. A course designed to provide the student with an opportunity to gain greater specialization in a specific area or to develop skills in areas otherwise not covered in the curriculum. May be repeated for a maximum of six credit hours.

311. Process Piping/Plant Design. Credit 3 hours. Prerequisite: Design Drafting Technology 211. The general concepts and principles of process plant layout and design, including plant layout specifications, equip-

ment and component arrangement, and basic stress analysis using 3-D parametric plant design software.   Two hours of lecture and two hours of laboratory per week. Laboratory fee $25.00.

INDUSTRIAL TECHNOLOGY (IT)

111. Engineering Drafting. Credit 3 hours. The basic elements of drafting: selection and use of instruments, lettering, applied geometry, freehand sketching, orthographic projection, sectioning, dimensioning, isometric and oblique pictorial representation, fastener symbols and simple auxiliary views. Two hours of lecture and two hours of laboratory per week. Laboratory fee: $45.00.

112. Descriptive Geometry. Credit 3 hours. Prerequisite: Industrial Technology 111. Industrial and engineering application of design concepts involving the uses of points, planes, and lines; spatial relationships. The application of primary, secondary, and successive auxiliaries used in the various engineering disciplines. Two hours of lecture and two hours of laboratory per week. Laboratory fee: $45.00.

209. Special Topics. Credit 3 hours. Organized class or individual instruction. May be repeated when topics vary for a maximum of six credit hours.

215. Computer-Aided Drafting (CAD). Credit 3 hours. Prerequisites: Industrial Technology 111 and permission of Department Head. Study of terminology, concepts, theories, and fundamental skills necessary to understand and operate a CAD system. Two hours of lecture and two hours of laboratory per week. Laboratory fee: $45.00.

216. Advanced Computer-Aided Drafting and Design. Credit 3 hours. Prerequisites: Industrial Technology 215 and permission of Department Head. An advanced study of the terminology, concepts, and theory relating to applications in solid model development and their analysis, LISP routines, and user system configuration. Two hours of lecture and two hours of laboratory per week. Laboratory fee: $45.00

233. Introduction to Basic Electricity and Electronics. Credit 3 hours. The fundamental concepts of electricity and electronics that involve direct current (dc), alternating current (ac), series and parallel resistive circuits, network analysis, magnetism, inductance, capacitance, transformers, motors, residential wiring, electronic components, and various types of test equipment found in industry. Two hours of lecture and two hours of laboratory problem solving per week. Laboratory fee: $45.00.

236. Advanced Electronics. Credit 3 hours. Prerequisite: Industrial Technology 233. The study of semiconductor electronics beginning with the diode, progressing through transistors, amplifiers, JFETs, MOSFETs, OP-AMPs, power supplies, oscillators, thyristors, and integrated circuits (ICs). Two hours of lecture and two hours of laboratory problem solving per week. Laboratory fee: $45.00.

242. Materials and Processes. Credit 3 hours. An introductory study of materials and processes as applied to industrial materials with special emphasis on metals, plastics, woods and ceramics. Two hours of lecture and two hours of laboratory per week. Laboratory fee: $45.00.

256. Principles and Metallurgy of Welding. Credit 3 hours. Theory and practice in oxy-fuel gas and electric arc welding processes with emphasis on preparation of joints, manipulation in various weld positions, and the selection and use of welding accessories and equipment. Two hours of lecture and two hours of laboratory per week. Laboratory fee: $45.00.

262. Principles of Technology. Credit 3 hours. Prerequisite: Sophomore standing or permission of the Department Head. A course designed to help students perceive the interaction of science, technology, and society. Scientific theories and law are merged with technological skills through the study of mechanical, fluid, electrical, and thermal systems found in technological devices. Through experimentation, students learn that technology is the application of science to the solution of practical problems. Two hours of lecture and two hours of laboratory per week.

264. Industrial Fluid Power. Credit 3 hours. Theory and practice of hydraulic and pneumatic power for industrial production. Functional examination of units: pumps, valves, boosters, etc. Simulated systems used to emphasize design and other industrial materials. Two hours of lecture and two hours of laboratory per week. Laboratory fee: $45.00.

291. Industrial Internship. Credit 3 hours. Prerequisite: Sophomore standing and permission of the Department Head. This course is a cooperative venture between Southeastern Louisiana University and a variety of industries. It combines the student's academic and technical preparation at the university with actual on-the-job experiences in approved modern industrial enterprises. For three (3) hours credit a student must be employed a minimum of 20 hours per week during a regular semester and a minimum of 40 hours per week during the summer. Grades assigned on a Pass/Fail basis only.

292. Independent Study. Credit 3 hours. Prerequisites: A "B" average or recommendation by the faculty and approval of the Department Head. An honors course devoted to research and development through laboratory experimentation of selected problems of special interests. Enrollment limited. Grades assigned on a Pass/Fail basis only.

308 [408]. Production Planning and Controlling. Credit 3 hours. Prerequisite: Junior standing. A problem- based approach to the organization and control of production planning. The course also addresses reliability centered maintenance programs and automatic data collection relative to production and inventory control.

309. Special Topics. Credit 3 hours. Organized class or individual instruction. May be repeated when topics vary for a maximum of six credit hours.

311. Industrial Design. Credit 3 hours. Prerequisites: Industrial Technology 112, 215, and 242. A study of design principles as applied to systems design, product design, and machine-tool design. Two hours of lecture and two hours of laboratory per week. Laboratory fee: $45.00.

322. Materials Science and Metallurgy. Credit 3 hours. Prerequisite: Industrial Technology 242. Study of the major materials used in industrial engineering, considering structure and properties, testing methods (destructive and nondestructive), and microscopic examination. Two hours of lecture and two hours of laboratory a week. Laboratory fee: $45.00.

331. Industrial Control Systems. Credit 3 hours. Prerequisites: Industrial Technology 236 and 264. The study and the application of microprocessor based control systems in industrial operations. Two hours of lecture and two hours of laboratory per week. Laboratory fee: $45.00.

351. Machine Tool Technology. Credit 3 hours. Prerequisite: Industrial Technology 111 and 242. Principles and practices of metal machining involving lathes, shapers, millers, planers, and precision grinders. Two hours of lecture and two hours of laboratory per week. Laboratory fee: $45.00.

391. Industrial Internship. Credit 3-12 hours. Prerequisite: Permission of Department Head. Students receive on-the-job work experience with selected and approved industrial firms. For three hours credit a student must be employed a minimum of 20 hours per week during a regular semester and a minimum of 40 hours per week during the summer semester. Course may be repeated for a maximum of 12 credit hours. Grades assigned on a Pass/Fail basis only.

402. Industrial Supervision. Credit 3 hours. Prerequisites: Junior standing and credit for or enrollment in Management 351. The competencies and knowledge required of industrial supervisors to effectively manage production, groups and work teams in a dynamic workplace comprised of diverse populations.

405 [306]. Work Methods and Measurement. Credit 3 hours. Prerequisite: Industrial Technology 351. A study of the work methods and measurement concepts and techniques that are common to modern industry, including productivity improvement, work methods, work measurement, labor reporting, ergonomics, incentives and alternative methods for increasing productivity.

406 [304]. Facilities Planning and Design. Credit 3 hours. Prerequisite: Industrial Technology 405. A study of principles, methods, and techniques for analyzing existing and proposed facilities to achieve improvements in productivity. Major topics include strategic facilities planning; plant location; product, process and schedule requirements; materials handling and costing. Two hours of lecture and two hours of laboratory per week. Laboratory fee: $45.00.

407. Statistical Quality Assurance. Credit 3 hours. Prerequisite: Industrial Technology 405 and nine hours of Mathematics or permission of Department Head. Principles and practices of quality control, theory of statistical sampling and related economic analysis, followed by control charts, acceptance and standard sampling plans, reliability, quality cost, and product liability.

409. Special Topics. Credit 3 hours. Organized class or individual instruction. May be repeated when topics vary for a maximum of six credit hours.

442. CAD/CAM/Robotics. Credit 3 hours. Prerequisites: Industrial Technology 331 and 351 and a 200-level Computer Science Course. A course designed to cover the application of Computer-Aided Design, Computer-Aided Manufacturing and robotics in modern industrial settings. Two hours of lecture and two hours of laboratory per week. Laboratory fee: $45.00.

444.Computer-Integrated Manufacturing (CIM). Credit 3 hours. Prerequisites: Industrial Technology 442. This course will cover the integration of various automated systems and peripherals into a functioning and flexible manufacturing system. The interfacing of the central control computer and robot systems into a workable manufacturing cell will also be covered. Two hours of lecture and two hours of laboratory per week. Laboratory fee: $45.00.

492H. Research and Development in Industrial Technology. Credit 3 hours. Prerequisites: A "B" average or recommendation by the faculty and approval of the Department Head. An honors course devoted to research and development through laboratory experimentation of selected problems of specific interest. Course may be repeated for a total of six hours with no more than three hours in any one semester. Enrollment is limited. Grades assigned on a Pass/Fail basis only.

OCCUPATIONAL SAFETY, HEALTH, AND ENVIRONMENT (OSHE)

111. [115]. Introduction to Safety and Health. Credit 3 hours. This course introduces general safety and health concepts. Major topics include: occupational safety and health terms, historical developments, program

concepts and terms, legislative overview, including worker's compensation law, problem identification, hazard recognition, evaluation and control concepts, and an introduction to measurement and evaluation.

112. [121]. Design of Hazard Controls. Credit 3 hours. Prerequisites: Current enrollment or prior credit for OSHE 111[OSH 115]. This course studies the application of scientific and engineering principles and methods to achieve optimum safety and health conditions through the analysis and design of process, equipment, products, facilities, operations, and environments. Major topics include product design, plant layout, construction, maintenance, pressure vessels and piping, mechanical systems, materials handling and storage, ventilation, power tools, electrical equipment, and transportation vehicles and systems.

121. [120]. Safety and Health Program Management and Administration. Credit 3 hours. Prerequisite: Enrollment in or prior credit for OSHE 111[OSH 115]. This course studies the application of proven management principles and techniques to the management of safety and health and loss control programs. Major topics will include; planning, organizing, budgeting, resourcing, operating, implementing, and evaluating safety functions.

231. [221]. Safety Laws, Regulations, and Standards. Credit 3 hours. This course studies the development processes, sources, and applications for minimum safety requirements established by laws, regulations, standards, and codes. Major topics will include OSHA General Industry and Construction Standards, the enforcement of safety standards, and the role of NIOSH and ACGIH in the safety movement.

241. [122]. Principles of Industrial Hygiene & Toxicology. Credit 3 hours. This course introduces the basic industrial hygiene principles of anticipation, recognition, evaluation, and control of workplace conditions as they relate to occupational health. Major topics include: a variety of occupational hazards including air contaminants, chemical hazards, biological hazards, and physical hazards.

242. [124]. Ergonomics. Credit 3 hours. Prerequisite: Enrollment in or prior credit for Mathematics 241 and OSHE 241[OSH 122]. This course explores ergonomic design principles which involve the planning and adapting of equipment and tasks to promote the comfort and efficiency of workers. Major topics include: human characteristics, physiology, and anthropometry and the application of these principles to workstations, tool design, and material handling procedures.

251.[125]. Environmental Laws and Regulations. Credit 3 hours. This course is an introduction to federal and state environmental regulations which impact industry. Major topics include hazardous waste management, disposal and cleanup, prevention of air, water, and soil contamination and environmental program management.

261. [123]. Fire Protection and Prevention. Credit 3 hours. This course introduces the basic principles of fire and fire prevention in the work place. Major topics include: evaluating existing and planned facilities from a fire and explosion standpoint, and applying the basic principles of hazard recognition, evaluation, and control when developing fire prevention and emergency response activities.

281. [223]. Safety in Chemical and Process Industries. Credit 3 hours. Prerequisites: Enrollment in or prior credit for Chemistry 101 and Physics 191. The course introduces the fundamentals of chemical and process industry safety. Major topics include: toxic, fire, and pressure hazards inherent in chemical plants and petroleum refineries, and the methods used to identify, assess, and eliminate those hazards. It also introduces students to federal safety regulations for proves safety management.

282. [224]. Construction Safety. Credit 3 hours. Prerequisites: Enrollment in or prior credit for OSHE 111[OSH 115] and OSHE 121[OSH 120]. The course studies the application of management principles, communication and human relations factors, safety/health rules, industry and federal standards, accident investigation, and the job planning phases in the construction environment.

311. Safety & Health Program Development. Credit 3 hours. This course presents the key elements necessary to develop or to assess occupational safety and health programs. Major topics include management commitment and employee involvement; worksite analysis, hazard correction and control; training, and evaluation.

321. Measurement of Safety Performance and Accident Investigation and Analysis. Credit 3 hours. Prerequisite: Enrollment in or prior credit for Math 241. This course presents methods to objectively evaluate a company's safety progress. The course covers two distinct topics: (1) measuring safety performance, and (2) incident investigation and analysis. The first segment of the course addresses ways of measuring safety performance objectively and subjectively using safety audits, inspections, observations, performance appraisal systems, and injury/illness statistics. The second segment of the course addresses the causes of accidents, systematic ways of conducting investigations, documenting the findings, causes and other significant data, and drafting recommendations.

322. Behavioral Aspects of Safety. Credit 3 hours. Prerequisite: Psychology 101. This course will introduce students to the application of scientific research based principles and methods to bring about change in the work culture through attitude, behavior, and environmental conditions. Specific topics will include traditional approaches and philosophies for improving safety, environmental effects, incentives, developing and building cultural change, identifying critical behavior, developing checklists, giving and receiving recognition and measuring performance.

323. Product Safety and Liability. Credit 3 hours. This course examines the importance of considering the safety of a product in its ultimate use. Major topics include: aspects of product design, intended and improper use, and potential injury mechanisms. It uses classic product liability case studies to provide practical application of the principles learned. It also studies manufacturer liabilities through injury tort actions.

324. System Safety Methodologies. Credit 3 hours. Prerequisites: Mathematics 241, OSHE 111[OSH 115], and OSHE 121[OSH 120]. The course presents the concepts of Risk Management and Loss Control through the use of systematic approaches to hazard anticipation, identification, evaluation and control. Major topics include: an introduction to qualitative methods of evaluating the hazards and risks associated with systems, processes, equipment, and other entities. It also includes a review of techniques for mitigating or managing identified risks.

341. Field Methods of Industrial Hygiene and Toxicology. Credit 3 hours. Prerequisites: Mathematics 241 and OSHE 241. This course presents an examination of the methods used by the industrial hygienist for the identification and assessment of health hazards in the workplace. Major topics include: establishment and use of methodologies to sample and evaluate exposures to air contaminants (gases, vapors, aerosols, and particulates), microorganisms and allergens, noise, heat, and cold stress, electrical and magnetic radiation, and ionizing and ultraviolet radiation. The course also includes equipment use, maintenance, and calibration.

371. Education and Training Methods for Occupational Safety and Health. Credit 3 hours. This course introduces the concepts of adult training and education with emphasis on occupational safety and health. Major topics include: instructional system design, including performing a training needs assessment tasks analysis, program design goals and objectives, performance evaluation, delivery methods and media; computer-based training methods; systems to manage costs; and record keeping.

441. Industrial Toxicology. Credit 3 hours. Prerequisites: General Biology 151, Zoology 241, and OSHE 241[OSH 122]. This course examines the effects of industrial toxicants on the human body. Major topics include: the discipline of toxicology, acute and chronic exposures and effects, routes and characteristics of exposures, target organs and systems, dose and response, and carcinogenesis. It also discusses the toxic characteristics of various classes of toxic materials.

451. Industrial Waste Management. Credit 3 hours. Prerequisite: OSHE 251[125]. This course examines acceptable policies, procedures, and methods for the handling of oil and hazardous wastes produced by industry. Major topics include: advanced aspects of risk assessment, applicable environmental legislation, waste characterization and site assessment, waste minimization and recovery, chemical, physical, and biological waste treatment, thermal waste treatment, landfill disposal and injection well disposal. It also includes a section on the transportation of hazardous wastes.

PROCESS TECHNOLOGY (PTEC)

101. Introduction to Process Technology. Credit 3 hours. An introduction to the field of Process Technology and the role of process operators within the plant. Major topics to be studied include operator performance and responsibilities, employer expectations, plant safety, responsible care and compliance with regulations, instrumentation, plant equipment and processes, and industrial process control.

131. Instrumentation I. Credit 3 hours. An introduction to the common instrumentation components and their operation and their function within a control loop. Students will be introduced to pressure, temperature, level and flow measurement as well as controllers, valve positioners and relays. Two hours of lecture and two hours of laboratory per week. Laboratory fee: $15.00.

132. Instrumentation II. Credit 3 hours. Prerequisites: Process Technology 131 and Computer Science 110. A detailed study of instrumentation as applied to industrial process control. Major topics to be studied include control concepts, functional structure of feedback control, sensors and transmission systems, controllers, process dynamics and tuning control systems. Two hours of lecture and two hours of laboratory per week. Laboratory fee: $15.00.

161. Plant Equipment. Credit 3 hours. A study of industrial plant equipment, including their construction, principles of operation, and utilization within process systems. Equipment to be studied includes pumps, compressors, valves, instruments, boilers, furnaces, turbines, heat exchangers, and cooling towers. Two hours of lecture and two hours of laboratory per week. Laboratory fee: $15.00.

207. Statistical Quality Control. Credit 3 hours. Prerequisites: Process Technology 242 and Mathematics 161. A study of the statistical quality control requirement of process industries. Major topics include internal and external customer/supplier relationship, total quality management, statistical methods of quality control, and computer software SPC/SQC programs.

242. Unit Operations. Credit 3 hours. Prerequisites: Process Technology 101 and 161. A functional examination of the general types of processes found in the chemical and refining industries, including distillation and fractionation, reaction, absorptions, adsorption, extraction, stripping, cracking, albylation, hydroprocessing,

clarification and water treatment. Two hours of lecture and two hours of laboratory per week. Laboratory fee: $15.00.

243. Industrial Process Control. Credit 4 hours. Prerequisites: Process Technology 132 and 242 and Chemistry 101 and 103. An advanced study of the design and control of industrial processes. Students will be required to operate and monitor process plant simulators and troubleshoot system upsets. Two hours of lecture and four hours of laboratory per week. Laboratory fee: $15.00.

263. Fluid Mechanics. Credit 3 hours. Prerequisites: Process Technology 132 and Physics 191 and 193. A study of the principles of fluid mechanics which provide the theoretical foundation required for the design, construction, installation and operation of plant equipment and process unit.