

DEGREE PLAN INSTRUCTIONS FOR COMPUTER ENGINEERING

Fall 2002

The instructions contained in this packet are to be used as a guide in preparing the Departmental Computer Science Degree Plan Form for the Bachelor's Degree in Computer Engineering. After the student completes filling out the degree plan form, it is to be submitted to the Computer Science Undergraduate Advisor for approval. When the degree plan is approved by the Undergraduate Advisor, it will be returned to the student who will then **type** out a formal version and resubmit it for departmental approval by the Undergraduate Advisor. After signature by the Undergraduate Advisor, copies are given to the student and placed in the Computer Science Undergraduate Student's file in the Advising Office.

An upper division evaluation form needs to be submitted by the student and approved by the undergraduate advisor prior to enrollment in upper division computer science courses. **Students enrolling in upper division courses without CPSC/CECN designation will be removed from the courses. Computer Science courses 300 level and above and Electrical Engineering 200 level and above are the designated upper level courses.**

Degree audits are produced by the Registrar's Office and can be obtained for a fee of \$1.00. The audit should be carefully reviewed by the student and his/her advisor, to determine one's progress toward a degree. A final audit will be mailed to the student the semester of anticipated graduation.

Total Hours Required

The total hours on the degree plan must be at least 130.

Comments and Observations

Before visiting the Undergraduate Advisor about a degree plan, the student should make as many decisions as possible. One problem area is transfer credits, in that it is sometimes difficult to know which courses may be used. Efforts are made to allow 'reasonable' substitutions. A student must submit a copy of his/her transcript evaluation and a completed substitution form along with the degree plan form if credit for transferred courses is desired.

It is the student's responsibility to have a degree plan meet minimum requirements. Everyone involved will check, but if a graduating senior's degree plan is not acceptable (e.g. only 129 hours), the student will not graduate until the problems have been corrected.

Computer Science Courses

Twenty-eight (28) hours of computer science are required **which include CPSC 111-4, 211-4, 311-3, 321-4, 410-3, 431-3, 462-3, 483-3, and 481-1. These courses must each be passed with a grade of at least "C".**

Engineering Courses

Twenty-five (25) hours of engineering are required which include **ELEN 214-4, 248-4, 314-3, 325-4, ENGR 111-2, ENGR 112-2**. The above courses must also be passed with a grade of at least "C". **ENGR 211-3 and ENGR 212-3 need to be passed with a grade of at least a "D"** .

Mathematics and Statistics Courses

Twenty-three (23) hours of mathematics and statistics are required which include **MATH 151-4, 152-4, 251-3, 302-3, 308-3, 311-3 and STAT 211-3**. MATH 253-4 may be substituted for MATH 251. In addition all of the MATH courses (not STAT courses) must each be passed with a grade of at least "C".

Science Courses

Twelve (12) hours of science are required which include **CHEM 107-4, PHYS 218-4 and PHYS 208-4**. **CHEM 107, PHYS 218 and PHYS 208 must each be passed with a grade of at least "C"**.

Technical Elective Courses

Ten (10) hours of technical electives are required and should be chosen from the following CPSC, ELEN, or ENGR courses. One of the technical electives must be a 4 hour course including a lab.

Computer Science Courses

Take any 300+ or 400+ courses from the Computer Science Department which are not included in the required courses list.

Students wishing to use CPSC 485 or CPSC 489 must receive approval from the undergraduate advisor (CPSC dept).

Electrical Engineering Courses

Take ELEN 322, ELEN 326, ELEN 338, 370 or any 400+ course (**ELEN 449 MAY NOT BE USED**) offered by the Electrical Engineering Department. Students wishing to take ELEN 485 or ELEN 489 must receive approval from the undergraduate advisor (CPSC dept).

Engineering Courses

ENGR 385 (co-op) credits may be used to fulfill technical elective credits.

General Elective Course

Three (3) hours of general electives are required and should be chosen from the approved list from the Academic Advisors.

Humanities

ENGR 482 (PHIL 482) is a required course.

Visual and Performing Arts

Three (3) hours of visual and performing arts electives must be selected from the list of College of Engineering directed electives for visual and performing arts - please refer to the undergraduate catalog.

Social Science Elective Course

Three (3) hours of social science electives are required which must be selected from the list of College of Engineering directed electives for social science courses - please refer to the undergraduate catalog.

CITIZENSHIP

History Courses

Six (6) hours of American history are required (three hours of which may be in Texas State history). Students taking advanced ROTC may substitute 6-hours of advanced military science courses for 3-hours of American history.

Political Science Courses

Six (6) credit hours of political science are required which include **POLS 206-3** and **207-3**. Students taking advanced ROTC may substitute 6-hours of advanced military science courses for one of these courses.

Physical Education Courses

Two (2) hours of KINE courses are required. One (1) hour of **KINE 198 -- Health and Fitness** (these courses may be taken pass fail or for a grade); and one (1) hour of **KINE 199 -- Activity** (these courses must be taken pass/fail).

English, Speech and Writing Courses

Six (6) hours of English courses are required which include **ENGL 104-3** plus **ENGL 210** (technical writing) or **ENGL 301-3**. **ENGL 210 AP credit is not technical writing and may not be used to meet the technical writing requirement.**

Foreign Language Requirement

Proficiency in a foreign language is also required to graduate from Texas A&M University. This requirement can be met by:

Completing two units (two full years) of high school course work in the same foreign language.
Completing two semesters (one full year) of course work at the college level in the same foreign language, or
Demonstrating proficiency in a foreign language by examination. See catalog for additional requirements under graduation requirements and Foreign Language.

CATALOG DESCRIPTIONS OF COMPUTER SCIENCE COURSES

CPSC 110. Programming I. (3-2). Credit 4. I, II, S Basic concepts, nomenclature and historical perspective of computers and computing; internal representation of data; software design principles and practices; structured programming in a high-level language; use of terminals, operation of editors and execution of student-written programs. Prerequisite: None.

CPSC 111. Introduction to Computer Science Concepts and Programming. (3-2). Credit 4. I, II Introduction to computer science concepts including principles of program design, plus practice in object-oriented programming. Prerequisite: CPSC 110 or passing grade on qualifying exam.

CPSC 203. Introduction to Computing. (3-0). Credit 3. I, II, S Algorithms, programs and computers; basic programming and program structure; data representation; computer solution of numerical and non-numerical problems using a high-level programming language, FORTRAN.

CPSC 206. Structured Programming in C. (3-0). Credit 3. I, II, S Basic concepts, nomenclature and historical perspective of computers and computing; internal representation of data; software design principles and practices; structured programming in C; use of terminals, operation of editors and execution of student-written programs.

CPSC 210. Data Structures. (2-2). Credit 3. I, II, S Methods for organizing data; design of algorithms for efficient implementation and manipulation of data structures. Prerequisite: CPSC 120.

CPSC 211. Data Structures and Their Implementations. (3-2). Credit 4. I, II Specification and implementation of basic data structures, performance tradeoffs of different implementations. Analyses of run time and space usage. Compares and contrasts object-oriented vs. structured programming. Prerequisite: CPSC 111 or instructor's permission.

CPSC 310. Database Systems. (3-0). Credit 3. I, II, S File structures and access methods; database modelling, design and user interface; components of database management systems; information storage and retrieval, query languages, high level language interface with database systems. Prerequisite: CPSC 210 or CPSC 211.

CPSC 311. Analysis of Algorithms. (3-0). Credit 3. I, II, S Design of computer algorithms for numeric and non-numeric problems; relation of data structures to algorithms; analysis of time and space requirements of algorithms; complexity and correctness of algorithms. Prerequisites: CPSC 210 or CPSC 211, MATH 302.

CPSC 320. Artificial Intelligence. (3-0). Credit 3. I, II, S Fundamental concepts and techniques of intelligent systems; representation and interpretation of knowledge on a computer; search strategies and control; active research areas and applications such as notational systems; natural language understanding, vision systems and expert systems. Prerequisite: CPSC 311.

CPSC 321. Computer Architecture. (3-2). Credit 4. I, II, S Basic hardware/software components, assembly language, and functional architecture of computers; syntax and semantics of a typical microprocessor assembly language; instruction sets, construction and execution of an assembly program; the design of I/O modules, memory, control unit and arithmetic unit. Prerequisites: ELEN 220 or 248.

CPSC 410. Operating Systems. (3-0). Credit 3. I, II, S Hardware/software evolution leading to contemporary operating systems; basic operating systems concepts; methods of operating systems design and construction; algorithms for CPU scheduling, memory and general resource allocation; process coordination and management; case studies of several operating systems. Prerequisite: CPSC 321.

CPSC 431. Software Engineering. (2-2). Credit 3. I, II, S Application of engineering approach to computer software design and development; life cycle models software requirements and specification; conceptual model design; detailed design; validation and verification; design quality assurance; software design/development environments and project management. Prerequisite: Junior classification.

CPSC 432. Programming Language Design. (3-0). Credit 3. I, II Design of high level languages; criteria for language selection; specification techniques for syntax and semantics; trends in high level language design. Prerequisite: Junior classification.

CPSC 433. Formal Languages and Automata. (3-0). Credit 3. I Basic types of abstract languages and their acceptors, the Chomsky hierarchy; solvability and recursive function theory; application of theoretical results to practical problems. Prerequisite: CPSC 311.

CPSC 434. Compiler Design. (3-0). Credit 3. II Programming language translation: functions and general organization of compiler design and interpreters; theoretical and implementation aspects of lexical scanners; parsing of context free languages; code generation and optimization; error recovery. Prerequisite: CPSC 311.

CPSC 435. Structured Programming in Ada. (3-0). Credit 3. The Ada programming language; history and motivation; scalar and composite types; type and object attributes; control constructs; subprograms; packages and abstract types; numeric types; I/O; program structure; overloading and visibility; tasking; generics; programming style using Ada, Ada Programming Support Environments; bindings to common utilities, including GKS, SQL. Prerequisite: CPSC 210 or CPSC 211 or approval of instructor.

CPSC 441. Computer Graphics. (3-0). Credit 3. I, II, S Principles of interactive computer graphics; systems organization and device technologies for raster and vector displays; 2D and 3D viewing, clipping, segmentation and interaction handling. 3D geometrical transformations, projections and hierarchical data structures for graphics modeling. Prerequisite: CPSC 210 or CPSC 211; Junior classification.

CPSC 442. Scientific Programming. (3-0). Credit 3. II Introduction to numerical algorithms fundamental to scientific and engineering applications of computers; elementary discussion of error; algorithms, efficiency; polynomial approximations, quadrature and systems of algebraic and differential equations. Prerequisites: CPSC 120, MATH 308.

CPSC 452. Robotics and Spatial Intelligence. (3-0). Credit 3. II Algorithms for executing spatial tasks; path planning and obstacle avoidance in two and three dimensional robots--configuration space, potential field, free-space decomposition methods; stable grasping and manipulation; dealing with uncertainty; knowledge representation for planning--geometric and symbolic models of the environment; task-level programming; learning. Prerequisite: CPSC 320.

CPSC 456. Real-Time Computing. (3-3). Credit 4. Introduction to principles and applications of real-time computing; system architecture; D/A and A/D conversion; synchronous data acquisition and analysis; computers in real-time control; asynchronous monitoring and control; resource scheduling; interfacing issues; lectures and laboratory. Prerequisites; MATH 251; ELEN 220 or 248; knowledge of C or Ada, or approval of instructor.

CPSC 462. Microcomputer Systems. (2-2). Credit 3. II Microcomputers as components of systems; VLSI processor and co-processor architectures, addressing and instruction sets; I/O interfaces and supervisory control; VLSI architectures for signal processing; integrating special purpose processors into a system. Prerequisite: CPSC 410 or concurrent enrollment.

CPSC 463. Networks and Distributed Processing. (3-0). Credit 3. I, II Basic hardware/software, architectural components for computer communications; computer networks, switching, routing, protocols and security; multiprocessing and distributed processing; interfacing operating systems and networks; case studies of existing networks and network architectures. Prerequisite: CPSC 410.

CPSC 481. Seminar. (0-2). Credit 1. I, II, S Investigation and report by students on topics of current interest in computer science. Prerequisite: Senior classification.

CPSC 483. Computer Systems Design. (1-6). Credit 3. Engineering design; working as a design-team member, conceptual design methodology, design evaluations, total project planning and management techniques, design optimization, systems manufacturing costs considerations; emphasis placed upon students' activities as design professionals. Prerequisites: CPSC 431 and CPSC 462 and senior classification.

CPSC 485. Problems. Credit 1 to 6. I, II, S Permits work on special project in computer science. Project must be approved by the department. Prerequisite: Senior classification.

CPSC 489. Special Topics in ... Credit 1 to 4. Special topics in computer science that are new or unique that are not covered in existing courses.