Undergraduate Program Guide

Bachelor of Science

in

Computer Engineering

2011-2012

DEPARTMENT OF
COMPUTER SCIENCE and ENGINEERING

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Fall, 2011
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BSCpE UNDERGRADUATE PROGRAM GUIDE

PURPOSE

This document has been prepared to assist the new or prospective student in understanding the undergraduate program in Computer Engineering (CpE) offered by the University of Texas at Arlington.

The Undergraduate Catalog is the official source of university information. Each student should become familiar with it, and consult it for answers to questions regarding policies, regulations, and course descriptions. It is also important that all students watch for memos and notices posted on the CSE department bulletin boards and website that pertain to undergraduate students. These notices are of a current or real-time nature, dealing with required student actions or important opportunities.

PROGRAM OBJECTIVES

The BSCpE program has been formulated so that graduates will: (1) enter the engineering profession or advanced studies supported by their fundamental knowledge of mathematics, basic science, engineering principles, computing systems and science; (2) advance in the engineering profession supported by their ability to work in teams, analyze complex computing systems, design solutions and engineer these solutions using computer software and hardware tools and technologies; and (3) demonstrate success and leadership while advancing the practice of engineering by contributing to the growth of their employers, communities, and professional societies through their proficiency in communication, understanding of professional ethics, and the need for life-long learning.

PROGRAM OUTCOMES

From the educational objectives described above, the department designed the program to meet the following Program Outcomes, to ensure that its graduates have:

- an ability to apply knowledge of mathematics, science, and engineering
- an ability to design and construct experiments, as well as to analyze and interpret data
- an ability to design a system, component, or process to meet desired needs
- an ability to function on multidisciplinary teams
- an ability to identify, formulate, and solve engineering problems
- an understanding of professional and ethical responsibility
- an ability to communicate effectively
- the broad education necessary to understand the impact of engineering solutions in a global and societal context
- a recognition of the need for, and the ability to engage in, lifelong learning
- a knowledge of contemporary issues
- an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

This guide is not an official publication and the contents hereof are not official policy of The University of Texas at Arlington or of The University of Texas System. In all matters, the Rules and Regulations of the Regents of The University of Texas System, The Handbook of Operating Procedures of The University of Texas at Arlington, and the Undergraduate Catalog of The University of Texas at Arlington shall supersede this guide.
PROGRAM OVERVIEW

Historically, the computer science program started at UTA in the early 1970’s as a master’s level program within the Industrial Engineering Department. A Ph.D. program was started a few years later. The bachelor’s degree was first offered in 1978.

A separate Department of Computer Science and Engineering was established in 1980, and the undergraduate program was accredited by the Accreditation Board for Engineering and Technology (ABET) in 1983, and has maintained its accreditation ever since. This was the first CSE undergraduate program to be accredited in the state. The program received accreditation from the Computing Sciences Accreditation Board (CSAB) in 1995, making it the first program in Texas accredited by both ABET and CSAB. In 2001 the CSE department started the Bachelor of Science in Computer Science degree and the Bachelor of Science in Software Engineering degree.

Our graduates are readily recruited by industry and can be found in exciting computer related positions throughout the area and the nation.

DEGREE REQUIREMENTS

The degree requirements for the Bachelor of Science in Computer Engineering (BSCpE) degree are given below. The program is divided into two levels or subprograms: the pre-professional and the professional programs. All pre-professional courses must be passed (math, science, and engineering courses with at least a C grade), and a minimum UTA GPA of 2.25 must be earned before the student is admitted to the professional program.

Two four-hour freshman level foreign language courses in the same language are also required unless the student has completed at least two years of a foreign language in high school or English is his/her second language.

Pre-Professional Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>English:</td>
<td>ENGL 1301 and 1302.</td>
</tr>
<tr>
<td>Mathematics:</td>
<td>MATH 1426 and 2425.</td>
</tr>
<tr>
<td>Natural Science:</td>
<td>PHYS 1443 and 1444.</td>
</tr>
<tr>
<td>Computer Science &amp; Engr.:</td>
<td>CSE 1104, 1105, 1320, 1325, 2312, 2315, 2320, and 2441.</td>
</tr>
<tr>
<td>Electrical Engineering:</td>
<td>EE 2440.</td>
</tr>
</tbody>
</table>

General Education Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literature:</td>
<td>3 hours of literature (English or modern and classical languages) or approved substitute.</td>
</tr>
<tr>
<td>Liberal Arts:</td>
<td>COMS 3302.</td>
</tr>
<tr>
<td>Fine Arts:</td>
<td>3 hour approved fine arts elective (see page 9).</td>
</tr>
<tr>
<td>History:</td>
<td>HIST 1311 and 1312.</td>
</tr>
<tr>
<td>Political Science:</td>
<td>POLS 2311 and 2312.</td>
</tr>
<tr>
<td>Social/Cultural Studies:</td>
<td>3 hour approved social or cultural elective (see page 8).</td>
</tr>
</tbody>
</table>

Professional Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer Science &amp; Engr.:</td>
<td>CSE 3310, 3313, 3316, 3320, 3442, 4316, 4317, 4323, 4344, and 4345</td>
</tr>
<tr>
<td>Take at least one of:</td>
<td>CSE 4340, CSE 4342</td>
</tr>
<tr>
<td>Industrial Engineering:</td>
<td>IE 3301 and 3312.</td>
</tr>
<tr>
<td>Mathematics:</td>
<td>MATH 3330 and a three hour approved mathematics elective (see page 7).</td>
</tr>
<tr>
<td>Science:</td>
<td>4 hour approved science elective (see page 7).</td>
</tr>
<tr>
<td>Technical Electives:</td>
<td>6 hours of approved technical electives (see page 7).</td>
</tr>
</tbody>
</table>

Pre-Professional Total:        | 47 hours.                                                |
General Education Total:      | 24 hours.                                                |
Professional Total:           | 56 hours.                                                |
Total (for degree):           | 127 hours, plus modern and classical languages as required |
COURSE OFFERINGS

All 1000- and 2000-level CSE courses are typically offered each semester and in the 11-week summer session. All 3000-level courses and required 4000-level courses are typically offered at least twice per year. Other 4000-level courses are typically offered only once per year unless there is a high demand. Refer to the CSE department bulletin boards or Web site for more specific and current information. The CSE department reserves the right to move students among equivalent sections of the same course.

ADMISSION REQUIREMENTS

Requirements for admission as a Computer Engineering (CpE) pre-major or major are governed by the requirements stated under the College of Engineering section of the Undergraduate Catalog. Computer Engineering (CpE) pre-majors become majors upon completion of 12 hours of required science, mathematics and CSE courses with a 2.25 or better grade point average.

All entering students majoring in Computer Engineering are permitted to enroll in general education and pre-professional courses for which they are qualified. Students completing these pre-professional courses must meet the academic requirements specified by the College of Engineering prior to applying for admission to the professional program. The Department of Computer Science and Engineering requires a 2.25 grade point average on a 4.0 scale in each of three categories: (1) overall, (2) required science, mathematics, and engineering courses, and (3) required CSE courses. Students not in the professional program must have permission from the department chairperson to receive credit for courses listed in the professional program category. Application for admission to the professional program is made to the Department of Computer Science and Engineering. Application forms can be obtained from the departmental office or the advising Web page.

PRIOR PREPARATION

The baccalaureate program in Computer Engineering, BSCpE, is a four-year program, and requirements for the degree are based upon prior high school preparation through either an honors or college track. More specifically, entering students are expected to have a background in mathematics through pre-calculus, high school chemistry, and programming in a high-level language such as C, C++, Java or Python.

Students who have not had the appropriate preparation should contact the departmental advising office for assistance in structuring a degree plan that will include leveling courses. Students requiring leveling courses may require a longer period of time to complete their undergraduate program.

READINESS EXAMINATIONS

Students will be required to pass readiness examinations before enrolling in the courses listed below unless the course prerequisite was taken at U.T. Arlington and passed with a C or better grade. Students not passing the readiness examination must take the prerequisite course. A readiness examination may be taken only once, per course. Additional information is available in the departmental office.

- CSE 1320: Intermediate Programming
- CSE 1325: Object-oriented Programming

STUDENT ADVISING

Computer Engineering (CpE) pre-majors and majors are required to be advised by a departmental advisor each semester. Consult the departmental bulletin boards or Web site for advising hours. Continuing students are encouraged to submit advising requests via the CSE Web site. New and transfer students must also be advised prior to the beginning of the semester in which they first enroll.

TRANSFER STUDENTS AND TRANSFER CREDITS

After admission and prior to registration, transfer students should contact the Department of Computer Science and Engineering for advising. At the time of advising, a transfer student must present to the undergraduate advisor an official transcript (or copy) from each school previously attended. Only the equivalent courses in a program accredited by the Accreditation Board for Engineering and Technology (ABET), or equivalent freshman, sophomore, or general education courses accepted by the department chairperson can be counted toward a degree in computer science and engineering.
A student, once admitted to The University of Texas at Arlington and enrolled in the Computer Engineering (CpE) program, cannot enroll in courses at another college or university and transfer those courses for credit toward a Computer Engineering (CpE) degree without having obtained prior written permission from the chairperson of the Department of Computer Science and Engineering.

COOPERATIVE EDUCATION PROGRAM

Cooperative education or Co-op programs are arrangements where students interleave periods of full-time employment with periods of full-time study, usually during the last two years of a degree program. The employment is directly related to the student's major and pays an attractive salary. Thus, Co-op students gain valuable career related experience before graduating while earning a meaningful income. Cooperative education opportunities are plentiful for Computer Engineering (CpE) students.

HONORS PROGRAM

The Computer Science and Engineering department encourages qualified CpE majors to participate in the Honors College described in the Undergraduate Catalog. Projects may be pursued in any one of the areas of concentration within the Department of Computer Science and Engineering.

GRADUATE DEGREE PATHS

Computing is a rapidly changing discipline requiring lifelong learning by its professionals. Completing a graduate degree enhances an individual's ability to assimilate and apply their knowledge and skills to meet on the job challenges and the needs of society. Pursuing a graduate degree on a full-time basis immediately after completing the baccalaureate is an attractive option for many students. Students are encouraged to discuss possibilities with a Graduate Advisor upon advancement to a Bachelor of Science professional program.

Fast Track Program for Master's Degree in Computer Engineering

The Fast Track Program enables outstanding UT Arlington senior undergraduate students in Computer Engineering to satisfy degree requirements leading to a master's degree in Computer Engineering while completing their undergraduate studies. When senior-level students are within 15 hours of completing their undergraduate degree requirements, they may take up to 9 hours of graduate level coursework designated by the Computer Engineering Program to satisfy both undergraduate and graduate degree requirements. In the limiting case, a student completing the maximum allowable hours (9) while in undergraduate status would have to take only 21 additional hours to meet minimum requirements for graduation in a 30 hour thesis master's degree program (M.S.) or 27 additional hours for a non-thesis master's degree program (M.S.)

Interested UT Arlington undergraduate Computer Engineering students should apply to the Computer Engineering Program when they are within 30 hours of completing their bachelor’s degrees. They must have completed at least 30 hours at UTA, achieving a GPA of at least 3.0 in those courses, and have an overall GPA of 3.0 or better in all college courses. Additionally, they must have completed at least 11 hours of specified undergraduate foundation courses with a minimum GPA of 3.3 in those courses. Contact the Undergraduate Advisor or Graduate Advisor in Computer Science & Engineering for more information about the program.

Direct Acceptance to Doctoral Programs from Bachelor's Degree Program

Excellent undergraduate students may qualify for acceptance to doctoral studies without the intermediate completion of a masters degree. Students should discuss the expected level of commitment and possibilities for long-term support with a Graduate Advisor.

ELECTIVE COURSES

Courses that can be used to satisfy the various elective requirements in the CpE curriculum are listed below by category. Please note that courses listed in more than one category may be used to satisfy the requirements of only one of those categories.
Mathematics Electives (MEL)

Any of the following courses may be used to satisfy the mathematics/science elective requirement. The use of any other course for the mathematics/science elective must be approved in advance by the department chairperson. Consult the undergraduate catalog for course descriptions and prerequisites.

- MATH 2326 – Calculus III
- MATH 3300 - Introduction to Proofs
- MATH 3303 - Mathematical Game Theory
- MATH 3304 - Linear Optimization Applications
- MATH 3307 - Elementary Number Theory
- MATH 3315 - Mathematical Models
- MATH 3318 – Differential Equations
- MATH 3321 - Abstract Algebra
- MATH 3335 - Analysis I
- MATH 3345 - Numerical Analysis and Computer Applications

Science Electives (SEL)

Any of the following courses may be used to satisfy the science elective requirement. The use of any other course for the science elective must be approved in advance by the department chairperson. Consult the undergraduate catalog for course descriptions and prerequisites.

- BIOL 1441 – Cell and Molecular Biology
- BIOL 1442 – Structure and Function of Organisms
- CHEM 1441 – General Chemistry
- CHEM 1442 – General Chemistry
- CHEM 1465 – Chemistry for Engineers
- GEOL 1425 – Earth Systems
- PHYS 3445 - Optics

Technical Electives (TEEL)

Any of the following courses may be used to satisfy technical elective requirements. The use of any other course for a technical elective must be approved in advance by the department chairperson. The courses may be taken in any combination except one or more must be 4000-level CSE courses. Consult the undergraduate catalog for course descriptions and prerequisites.

- CSE 4303 - Computer Graphics
- CSE 4305 - Compilers for Algorithmic Languages
- CSE 4308 - Artificial Intelligence I
- CSE 4309 – Artificial Intelligence II
- CSE 4319 - Modeling and Simulation
- CSE 4321 - Software Testing and Maintenance
- CSE 4322 - Software Project Management
- CSE 4331 - Database Implementation and Theory
- CSE 4334 – Data Mining
- CSE 4340 – Mobile Systems Engineering
- CSE 4342 – Embedded Systems II
- CSE 4346 - Advanced Computer Networks
- CSE 4348 - Multimedia Systems
- CSE 4351 - Parallel Processing
- CSE 4360 - Autonomous Robot Design and Programming
- CSE 4361 - Software Design Patterns
- CSE 4380 – Information Security
- CSE 3311 – Object-Oriented Software Engineering
- EE 3317 - Linear Systems
- IE 3315 - Operations Research I
Social/Cultural Electives (SCEL)

Any of the following courses may be used to satisfy the social/cultural elective requirement. The use of any other course for the social/cultural elective must be approved in advance by the department chairperson. Consult the Undergraduate Catalog for course descriptions, prerequisites and special considerations of credit.

ADVERTISING (ADVT)
2337

ANTHROPOLOGY (ANTH)
1306  2322  3311  3325  3328  3330  3331  3333  3336  3338  3348  3350  3353
3355  3366  3369  3370  3371  3372  3373  4342  4348

ARCHITECTURE (ARCH)
2300

ART HISTORY (ART)
4301

BIOLOGY (BIOL)
2317

BUSINESS ADMINISTRATION (BUSA)
2302

CLASSICS (CLAS)
1300  2307  3310  3320  4335

COMMUNICATION (COMM)
1300  4305  4315  4325  4335

CRIMINOLOGY AND CRIMINAL JUSTICE (CRCJ)
3338  3380  4315  4380

ECONOMICS (ECON)
2305  2337

ENGLISH (ENGL)
2309  2319  2329  3301  3306  3339  3340  3351  3352  3370

FRENCH (FREN)
3311  3312  3316  3318

GEOGRAPHY (GEOG)
3350  3355  3371  4301  4310

GERMAN (GERM)
3301  3317  3318

HISTORY (HIST)
2301  2302  3309  3310  3311  3315  3326  3342  3345  3352  3353  3360  3362
3365  3366  3367  3368  3370  3382  4354  4355  4366  4367  4368  4374  4375

HONORS (HONR)
4310

HUMANITIES (HUMA)
2301

KINESIOLOGY (KINE)
3307

LINGUISTICS (LING)
2301  3311  4317  4318

MUSIC (MUSI)
2300
NURSING (NURS)  
3355

PHILOSOPHY (PHIL)  
1304  1310  2300  2312  2313  3301  3302  3303  3304  3316  3319  3320  3321  4388

POLITICAL SCIENCE (POLS)  
3304  3305  3314  3316  3317  3318  4317  4318  4319  4323  4336  4355  4361  4362  4365

PUBLIC RELATIONS (PREL)  
2338

PSYCHOLOGY (PSYC)  
2310  2317  3301  3310  3311  3312  3313  3315  3316

RUSSIAN (RUSS)  
3301  3306  3314  3322  3323

SOCIOLOGY (SOCI)  
1311  2312  3313  3317  3318  3320  3321  3322  3323  3327  3328  3331  3334  3336  3340  3346  3350  3351  3353  3356  3357  4303  4310  4315  4318  4320

SOCIAL WORK (SOCW)  
2311

SPANISH (SPAN)  
3302  3311  3312  3318  3320  3321

URBAN AND PUBLIC AFFAIRS (URPA)  
1301

WOMEN'S STUDIES (WOMS)  
2310  4318

Fine Arts Electives (FAEL)

Any of the following courses may be used to satisfy the fine arts elective requirement. This list has been substantially revised, and any course taken beginning with May 2000 to satisfy the fine arts elective must be on this list. The use of any other course for the fine arts elective must be approved in advance by the department chairperson. Consult the Undergraduate Catalog for course descriptions, prerequisites, and special considerations of credit.

ARCHITECTURE (ARCH)  
1301  2300  2303  2304  4305  4308  4309  4310

ART HISTORY (ART)  
1301  1309  1310  3302  3305  3306  3307  3308  3310  3311  3312  3313  3314  3315  3320  3325  3331  3389  3391  3392  4302  4303  4304  4306  4317  4330

CLASSICS (CLAS)  
3310  3320

DANCE (DNCE)  
1300

HONORS (HONR)  
2300

MUSIC (MUSI)  
1300  1301  1302  2300  2301  3300  3301

THEATER ARTS (THEA)  
1342  1343  3307  4303
BS in Computer Engineering (BSCpE), 2011-2012 catalog

Pre-professional program: all courses above this line must be completed to enter professional program.

CSE courses below this red line can only be taken after entering professional program. THIS INCLUDES YOUR CSE TECHNICAL ELECTIVES.

General Education
- Literature (ENGL 2309, 2319, or 2329)
- HIST 1311
- HIST 1312
- POLS 2311
- POLS 2312
- 3 hours Fine Arts elective
- 3 hours Social/Cultural elective

- 3 hours of Math electives
- 4 hours of Science electives
- 6 hours of Technical electives

See list of approved courses.

Foreign language (if required, two semesters of the same language)