Undergraduate Program Guide
Bachelor of Science
in
Computer Science

2012-2013

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BSCS UNDERGRADUATE PROGRAM GUIDE

PURPOSE

This document has been prepared to assist the new or prospective student in understanding the undergraduate program in Computer Science (CS) 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 BSCS program has been formulated so that graduates will: (1) enter the computing profession or advanced studies supported by their fundamental knowledge of mathematics, basic science, computing systems and science; (2) will advance in this profession supported by their ability to work in teams, analyze complex computing systems, design solutions and implement these solutions using computer software tools and technologies; and (3) demonstrate success and leadership while advancing the practice of computing by contributing to the growth of their employers, communities, and professional societies through their proficiency in communication, understanding of professional ethics and the ability to engage in continuing professional development.

PROGRAM OUTCOMES

From the educational objectives described above, the department designed the programs 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

1 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 Science (BSCS) 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 computer science 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>Subject</th>
<th>Courses</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 and 2320.</td>
</tr>
</tbody>
</table>

General Education Courses

<table>
<thead>
<tr>
<th>Subject</th>
<th>Courses</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 2302.</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 7).</td>
</tr>
</tbody>
</table>

Professional Courses

<table>
<thead>
<tr>
<th>Subject</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer Science &amp; Engr.</td>
<td>CSE 3302, 3310, 3315, 3316, 3320, 3330, 4316, and 4317</td>
</tr>
<tr>
<td>Industrial Engineering</td>
<td>One of: CSE 4303, CSE 4305, CSE 4308.</td>
</tr>
<tr>
<td>Mathematics</td>
<td>IE 3301 (or MATH 3313), and IE 3312.</td>
</tr>
<tr>
<td>Science</td>
<td>MATH 3330 and a three hour approved math elective (see page 6).</td>
</tr>
<tr>
<td>Technical Electives</td>
<td>4 hour approved science elective (see page 7).</td>
</tr>
<tr>
<td></td>
<td>15 hours of approved technical electives (see page 7).</td>
</tr>
<tr>
<td>Pre-Professional Total</td>
<td>39 hours.</td>
</tr>
<tr>
<td>General Education Total</td>
<td>24 hours.</td>
</tr>
<tr>
<td>Professional Total</td>
<td>58 hours.</td>
</tr>
<tr>
<td>Total (for degree)</td>
<td>121 hours, plus modern and classical languages as required.</td>
</tr>
</tbody>
</table>
COURSE OFFERINGS

All 1000- and 2000-level CSE courses are usually 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 Science pre-major or major are governed by the requirements stated under the College of Engineering section of the Undergraduate Catalog. Computer Science 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 Science 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 Computer Science and Engineering Department requires a 2.25 overall 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 science, BSCS, 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 Science (CS) 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 their 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.
A student, once admitted to The University of Texas at Arlington and enrolled in the Computer Science (CS) program, cannot enroll in courses at another college or university and transfer those courses for credit toward a degree in Computer Science (CS) 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 alternate 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 Science (CS) students.

HONORS PROGRAM

The Computer Science and Engineering department encourages qualified CS 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.

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 CS 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 elective requirement. The use of any other course for the mathematics 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 that four 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 4323 – Quantitative Computer Architecture
- CSE 4331 – Database Implementation and Theory
- CSE 4334 – Data Mining
- CSE 4340 – Mobile Systems Engineering
- CSE 4344 – Computer Network Organization
- CSE 4345 – Computational Methods in Computer Engineering
- 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
- CSE 3313 – Introduction to Signal Processing
- 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
<table>
<thead>
<tr>
<th>Subject</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>ART HISTORY (ART)</td>
<td>4301</td>
</tr>
<tr>
<td>BIOLOGY (BIOL)</td>
<td>2317</td>
</tr>
<tr>
<td>BUSINESS ADMINISTRATION (BUS)A</td>
<td>2302</td>
</tr>
<tr>
<td>CLASSICS (CLAS)</td>
<td>1300  2307  3310  3320  4335</td>
</tr>
<tr>
<td>COMMUNICATION (COMM)</td>
<td>1300  4305  4315  4325  4335</td>
</tr>
<tr>
<td>CRIMINOLOGY AND CRIMINAL JUSTICE (CRCJ)</td>
<td>3338  3380  4315  4380</td>
</tr>
<tr>
<td>ECONOMICS (ECON)</td>
<td>2305  2337</td>
</tr>
<tr>
<td>ENGLISH (ENGL)</td>
<td>2309  2319  2329  3301  3306  3339  3340  3351  3352  3370</td>
</tr>
<tr>
<td>FRENCH (FREN)</td>
<td>3311  3312  3316  3318</td>
</tr>
<tr>
<td>GEOGRAPHY (GEOG)</td>
<td>3350  3355  3371  4301  4310</td>
</tr>
<tr>
<td>GERMAN (GERM)</td>
<td>3301  3317  3318</td>
</tr>
<tr>
<td>HISTORY (HIST)</td>
<td>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</td>
</tr>
<tr>
<td>HONORS (HONR)</td>
<td>4310</td>
</tr>
<tr>
<td>HUMANITIES (HUMA)</td>
<td>2301</td>
</tr>
<tr>
<td>KINESIOLOGY (KINE)</td>
<td>3307</td>
</tr>
<tr>
<td>LINGUISTICS (LING)</td>
<td>2301  3311  4317  4318</td>
</tr>
<tr>
<td>MUSIC (MUSI)</td>
<td>2300</td>
</tr>
<tr>
<td>NURSING (NURS)</td>
<td>3355</td>
</tr>
<tr>
<td>PHILOSOPHY (PHIL)</td>
<td>1304  1310  2300  2312  2313  3301  3302  3303  3304  3316  3319  3320  3321  4388</td>
</tr>
<tr>
<td>POLITICAL SCIENCE (POLS)</td>
<td>3304  3305  3314  3316  3317  3318  4317  4318  4319  4323  4336  4355  4361  4362  4365</td>
</tr>
<tr>
<td>PUBLIC RELATIONS (PREL)</td>
<td>2338</td>
</tr>
</tbody>
</table>
### Fine Arts Electives (FAEL)

Any of the following courses may be used to satisfy the fine arts elective requirement. 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.

<table>
<thead>
<tr>
<th>Architecture (ARCH)</th>
<th>1301 2300 2303 2304 4305 4308 4309 4310</th>
</tr>
</thead>
<tbody>
<tr>
<td>Art History (ART)</td>
<td>1301 1309 1310 3302 3305 3306 3307 3308 3310 3311 3312 3313 3314</td>
</tr>
<tr>
<td>Classics (CLAS)</td>
<td>3310 3320</td>
</tr>
<tr>
<td>Dance (DNCE)</td>
<td>1300</td>
</tr>
<tr>
<td>Honors (HONR)</td>
<td>2300</td>
</tr>
<tr>
<td>Music (MUSI)</td>
<td>1300 1301 1302 2300 2301 3300 3301</td>
</tr>
<tr>
<td>Theater Arts (THEA)</td>
<td>1342 1343 3307 4303</td>
</tr>
</tbody>
</table>
BS in Computer Science (BSCS), 2012-2013 catalog

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

note 1: must take one of 4303, 4305, or 4308

Statistics note: MATH 3313 can be used instead of IE 3301, but it has a prerequisite of MATH 2326

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

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

ENGL 1301
ENGL 1302

IE 3301 Engineering Probability and Stats (see Statistics note)
MATH 3330 Linear Algebra

COMS 2302 Professional and Tech. Communication

IE 3312 Engineering Economics

3316 Professional Practices

IE 3312 Engineering Economics

3316 Professional Practices

4316 Senior Design I

4317 Senior Design II

4308 Artificial Intelligence I (note 1)
4305 Compilers (note 1)

4303 Computer Graphics (note 1)

note 1: must take one of 4303, 4305, or 4308

4310 Intro to Software Eng.
3320 Operating Systems

4315 Theoretical CS
3330 Databases

3310 Intro to Software Eng.
3320 Operating Systems

2312 Computer Organization

IE 3301 Engineering Probability and Stats (see Statistics note)
MATH 3330 Linear Algebra

3 hours of Math electives
4 hours of Science electives
15 hours of Technical electives
See list of approved courses.

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