

# **Undergraduate Program Guide**

## **Bachelor of Science**

**in**

## **Computer Science**

**2009-2010**

**DEPARTMENT OF  
COMPUTER SCIENCE and ENGINEERING**

**The University of Texas at Arlington**

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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.<sup>1</sup>

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

<sup>1</sup> 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

English:	ENGL 1301 and 1302.
Mathematics:	MATH 1426, 2425, and 2326.
Natural Science:	PHYS 1443 and 1444.
Computer Science:	CSE 1104, 1105, 1320, 1325, 2312, 2315 and 2320.

#### General Education Courses

Literature:	3 hours of literature (English or modern and classical languages) or approved substitute.
Liberal Arts:	COMS 3302.
Fine Arts:	3 hours of an approved fine arts elective (see page 11).
History:	HIST 1311 and 1312.
Political Science:	POLS 2311 and 2312.
Social/Cultural Studies:	3 hours of an approved social or cultural elective (see page 9).

#### Professional Courses

Computer Science:	CSE 3302, 3310, 3315, 3316, 3320, 3330, 4308, 4316, and 4317.
Industrial Engineering:	IE 3301 (or MATH 3313), and IE 3312.
Mathematics:	MATH 3330 and 3 hours of an approved math elective (see page 8).
Science:	4 hours of approved science electives (see page 8).
Technical Electives:	12 hours of approved technical electives (see page 9).

Pre-Professional Total:	42 hours.
General Education Total:	24 hours.
Professional Total:	55 hours.
Total (for degree):	121 hours, plus modern and classical languages as required.

**REPRESENTATIVE COURSE SEQUENCE  
COMPUTER SCIENCE (CS)**

**Freshman Year**

**First Semester**

CSE 1104 - Introduction to Engineering  
CSE 1105 - Introduction to CSE  
CSE 1320 - Intermediate Programming  
ENGL 1301 - Critical Thinking, Reading  
and Writing I  
MATH 1426 - Calculus I  
HIST 1311 - History of the United States  
Total Credit 15 Hours

**Second Semester**

CSE 1325 - Object-oriented Programming  
in Java  
ENGL 1302 - Critical Thinking, Reading  
and Writing II  
MATH 2425 - Calculus II  
PHYS 1443 – General Technical Physics I  
HIST 1312 - History of the United States  
Total Credit 17 Hours

**Sophomore Year**

**First Semester**

CSE 2315 - Discrete Structures  
CSE 2312 - Computer Organization & Assembly  
Language Programming  
MATH 2326 - Calculus III  
PHYS 1444 – General Technical Physics II  
POLS 2311 - Government of the United States  
  
Total Credit 16 Hours

**Second Semester**

CSE 2320 - Algorithms & Data Structures  
IE 3301 - Engineering Probability  
MATH 3330 - Introduction to Matrices & Linear  
Algebra  
POLS 2312 - State & Local Government  
COMS 3302 – Professional and Technical  
Communication  
Total Credit 15 Hours

**Junior Year**

**First Semester**

CSE 3310 - Fundamentals of Software  
Engineering  
CSE 3315 - Theoretical Concepts in CSE  
CSE 3320 – Operating Systems  
IE 3312 - Engineering Economy  
Literature Elective, 3 hours  
Total Credit 15 Hours

**Second Semester**

CSE 3302 - Programming Languages  
CSE 3316 – Professional Practices  
CSE 3330 - Database Systems & File Structures  
CSE 4308 – Artificial Intelligence I  
Science Elective, 4 hours  
  
Total Credit 16 Hours

**Senior Year**

**First Semester**

CSE 4316 – Computer System Design Project I  
Technical Electives, 6 hours  
Math Elective, 3 hours  
Social/Cultural Elective, 3 hours  
Total Credit 15 Hours

**Second Semester**

CSE 4317 – Computer System Design Project II  
Technical Electives, 6 hours  
Fine Arts Elective, 3 hours  
  
Total Credit 12 Hours

**TOTAL CREDIT HOURS = 121 hours, plus modern and classical languages as required.**

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## **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++ or Java.

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 in Java

## **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 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 three or more must be CSE courses. Recommended technical electives for the CS degree are indicated by an asterisk (\*). **Consult the undergraduate catalog for course descriptions and prerequisites.**

CSE 4301 - Contemporary Programming Practices  
 CSE 4303 - Computer Graphics\*  
 CSE 4305 - Compilers for Algorithmic Languages\*  
 CSE 4309 – Artificial Intelligence II  
 CSE 4311 - Object-Oriented Software Engineering  
 CSE 4313 - Introduction to Signal Processing  
 CSE 4319 - Modeling and Simulation  
 CSE 4321 - Software Testing and Maintenance  
 CSE 4322 - Software Project Management  
 CSE 4323 - Computer Architecture II  
 CSE 4331 - Database Implementation and Theory\*  
 CSE 4344 - Computer Network Organization\*  
 CSE 4346 - Advanced Computer Networks  
 CSE 4348 - Multimedia Systems\*  
 CSE 4351 - Parallel Processing\*  
 CSE 4353 - Distributed Computing\*  
 CSE 4360 - Autonomous Robot Design and Programming  
 CSE 4361 - Software Design Patterns  
 EE 3317 - Linear Systems  
 IE 3315 - Operations Research I  
 ENGR 4191 and 4291 – Autonomous Vehicle System Development – I and II

### 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 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. 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