DEPARTMENT OF COMPUTER SCIENCE

The programs offered by the Department of Computer Science lead to the Bachelor of Science or the Master of Science in Computer Science. Majors in other disciplines at TSU are also welcome to take Computer Science as a minor. These programs are designed primarily to prepare graduates for productive work in highly computer-dependent areas of business, government, and industry. In recent years, majors graduating from the program have attained their first jobs in business applications, computer software development, scientific and applied mathematical programming, and have gone to graduate school.

Computer Science is a rapidly evolving field, it is therefore important that the graduate's education be broad and fundamental so that new trends can more readily be followed. Our goal is to balance fundamentality and breadth with sufficient supervised practice so that our graduates are productive at the time they graduate but ready and willing to change with the field. Most graduates will be called to work in cooperation with professionals trained in other areas. Hence, the ability to work and communicate with others of different educational backgrounds is an important characteristic. Additionally, we require Computer Science majors to take a strong minor, preferably in Business or Mathematics.

Students majoring in Computer Science should set their goals beyond simple programming and should be preparing to:
1. Program well, both in design and implementation phases, and document what they have programmed
2. Analyze real-world problems in preparation for program design and implementation
3. Manage activities that are strongly computer dependent
5. Improve the tools that programmers and systems analysts use, i.e., to develop better software systems, better languages for communicating with computers, better web-based interfaces and databases, better problem solving methods.

Requirements for the Bachelor of Science in Computer Science are summarized below. Each student must be admitted by the Department, as a major before attempting to meet all of the requirements for the degree. The admission procedures are under continual review by the Departmental Admissions Committee. Interested students are asked to contact the Department Office during their freshman year in order to gain admission as majors. Students are responsible for completing ASSET requirements and prerequisites administered through the General University Academic Center (GUAC) prior to admission to the department. The Department offices and facilities are housed on the first floor of Nabrit Center with the Department Office located in Room 100.

Students pursuing a Bachelor degree in CS must also have a declared minor in another academic discipline as first-time seekers of an undergraduate degree. The degree requirements along with the sequence in which major courses must be taken are provided at the end of this section.

Students must earn grades of “C” or better (where grades of “C-” are unacceptable) in all courses specific to either the major or the minor in Computer Science. Graduating seniors are also required to take an exit examination. In addition, the following four courses must be completed with a grade of “B-” or better once admitted by the University:

Computer Science 120 (Introduction to Programming in C++)
Computer Science 124 (Fundamentals of Machine Computation)
Computer Science 140 (Advanced Programming in C++)
Computer Science 243 (Computer Organization)

Students transferring to the University are cautioned that Computer Science credits transferred from other colleges and universities must be evaluated by the Department before being used to fulfill requirements for the major in Computer Science. These credits may or may not be acceptable. If these credits are judged to be unacceptable by the Department, students may be able to use them to fulfill elective requirements.

In selecting a minor, as required for completion of the B.S. in Computer Science, students should seek detailed advisement from their designated advisors because the selection of a minor having representative courses in the core curriculum could impact the total number of credits required. In no case will students qualify for graduation at the undergraduate level with fewer than 124 semester credit hours satisfactorily completed.
For a Computer Science minor, twenty-one (21) semester credit hours are required through enrollment in the following courses: CS 124, CS140, CS 241, CS 243, CS 246 and six (6) additional junior/senior level CS credits of choice. Prior to pursuing this minor, students must seek advisement and approval from the Department Office. The prerequisites for CS 140 and CS 124 must also be met before pursuing this minor.

Students admitted to the Department as majors, as well as students pursuing a minor are each expected to maintain an overall GPA of 2.50 or better, or they could be dismissed from the Department if more than thirty (30) semester credit hours are still required for graduation. If individual GPA's fall below 2.50 and students are within thirty (30) semester credit hours of graduation, they will be refused the privilege of recommendations from members of the faculty, but will retain official status in the Department.

Upon admission to the Department, students are each assigned an official advisor. They are expected to keep the Department Office informed of changes in address and/or telephone numbers up to the time of graduation.

In summary, an interested student must first gain admission to the University; must meet his/her ASSET responsibility; and finally, must apply for admission to the Department once prerequisites and ASSET requirements have been met. Acceptance to major standing is not automatic, but subject to the decision of a Departmental Admissions Committee. Each student is provided with extensive advisement once admitted to the department before further progression toward the completion of degree requirements is undertaken, and an exit examination is required. Questions may be directed to the Department Office at (713)-313-7991.
<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Education</th>
</tr>
</thead>
</table>
| Criner, Oscar H.    | Professor            | B.S., Howard University  
Ph.D., University of California at Berkeley                                |
| Lin, Cheng-Feng     | Assistant Professor  | B.S., North East Missouri University  
M.S., University of Texas at Arlington  
Ph.D., Kennedy-Western University |
| Ghemri, Lila        | Assistant Professor  | B.S., M.S., University of Algiers  
Ph.D., University Of Bristol                                                  |
| Liu, Yiwei          | Visiting Assistant Professor | B.S., Harbin Institute of Technology  
Ph.D., University of Houston                                                  |
| Javadi, John        | Visiting Instructor  | B.S., Texas Southern University  
M.S., University of Houston-Clear Lake                                        |
| Ma, Li              | Visiting Instructor  | B.S., Peking University  
M.S., University of California at Los Angeles  
Ph.D. Candidate, University of California at Los Angeles                     |
| Javadian, Mohsen    | Associate Professor  | B.S., Texas Southern University  
M.S., University of Houston - Clear Lake                                      |
| Roosta, Seyed       | Associate Professor  | B.S., University of Tehran  
M.S., University of Iowa  
Ph.D., University of Iowa                                                     |
| Kamel, Khaled       | Professor            | B.S., University of Cairo  
B.S., Ain-Shams  
M.S., University of Waterloo  
M.S., University of Cincinnati  
Ph.D., University of Cincinnati                                                |
| Singh, Tarsem       | Professor            | B.S., M.S., San Jose State University  
Ph.D., Texas A & M University                                                  |
COMPUTER SCIENCE COURSES

CS 116  Introduction to Computer Science I (non-majors)  (3)
Study of fundamental concepts of computing: how computers work, what they can do, and how they can be used effectively. Topics covered: spreadsheets, word processing, databases, presentation software, multimedia/graphics software, program design and implementation, and fundamental computing theories. Three hours of lecture per week.  Listed in the Texas Common Course Numbering System as COSC 1300.

CS 117  Introduction to Computer Science II (non-majors)  (3)
Introduction to World Wide Web applications and design, including Web scripting languages and HTML editors. Three hours of lecture per week.

CS 120  Introduction to Programming in C++  (3)
Introduction to principles of programming using the C++ programming language as a problem-solving tool. Analysis and formulation of problems for computer solutions. Systematic design, construction, and testing of programs. Required for computer science majors and minors. Three hours of lecture per week.  Corequisite: CS120L

CS 120L  Introduction to Programming in C++ Laboratory  (1)
Programming lab sessions during which, students acquire and strengthen their programming skills in C++. One hour of laboratory per week.  Corequisite: CS120.

CS 124  Fundamentals of Machine Computation  (3)
Study of the theory and applications of discrete mathematical structures as a foundation for topics in computer science. Required for computer science majors and minors. Three hours of lecture per week. Prerequisite: MATH 136.

CS 140  Advanced Programming in C++  (3)
Extensive programming using concepts of structures, pointers, advanced file operations, classes, Inheritance, and polymorphism. Three hours of lecture per week.  Prerequisite: CS 120

CS 216  Advanced Applications I (non-majors)  (3)
Designed for students interested in learning computer programming applications using VISUAL BASIC. Design, implementation, and testing of programs and graphical user interfaces. Process of using VISUAL BASIC to access object oriented model of other applications also considered. Three hours of lecture per week.  Prerequisite: CS 117.

CS 241  Object Oriented Programming Using JAVA  (3)
The use of modern object oriented programming methodologies such as class inheritance, polymorphism, multithreading, generics, GUI components, and exceptions. JAVA programming language is used. Required for computer science majors and minors. Three hours of lecture per week.  Prerequisite: CS 140.

CS 243  Computer Organization  (3)
Basic concepts of digital computers: Boolean algebra, combinatorial and sequential logic design, arithmetic/logic units, control units, memory units, and input/output units, flip flops, synchronized and asynchronized counters. Required for computer science majors and minors. Three hours of lecture per week. Prerequisites: CS 124 and CS 140.

CS 246  Data and File Structures  (3)
Advanced programming techniques and data structures including tables, linked lists, queues and stacks. Abstract data types, recursion, searching and sorting, hashing, binary trees. External storage devices and sequential and direct file organization, file processing techniques. Required for computer science majors and minors. Three hours of lecture per week. Prerequisites: CS 124, CS 140.
CS 248 Theory of Computation (3)
Introduction to automata and languages, computability and complexity of algorithms. This course covers graph theory, finite state automata, determinism non-determinism, regular expressions, context free and non-context free grammars, algorithm definition, algorithm complexity, class P, class NP algorithms and NP-completeness. Required for computer science majors. Three hours of lecture per week. Prerequisites: MATH 241, CS 243. Corequisite: CS 246.

CS 342 Programming Languages and Design (3)
Introduction to the structure and design of the programming language paradigm, formal specification of syntax, semantics, functional languages, logic languages, parallel languages, data types and interfacing procedures. Required for computer science majors. Three hours of lecture per week. Prerequisites: CS 241, CS 248.

CS 343 Assembly and Computer Architecture (3)
Rigorous study of the architecture, applications, programming, and interfacing of current microprocessors, co-processors, and controllers. Hardware and software structures found in modern digital computer systems. Parallel architectures included. Required for computer science majors. Three hours of lecture per week. Prerequisite: CS 243.

CS 344 Compiler Design and Construction (3)
Concepts, design, implementation and construction techniques for programming language translators, simple one-pass compiler; lexical analysis; semantics analysis, top-down, bottom-up and operator precedence parsing, left-left and left-right parser techniques. Three hours of lecture per week. Prerequisite: CS 342.

CS 346 Database Management Systems (3)
Theory and current practices in database management systems, data organizational models, including hierarchical and networked, with relational and semantic models stressed. Required for computer science majors. Three hours of lecture per week. Prerequisites: CS 246, CS 248.

CS 354 Logic Programming Using Prolog (3)
A thorough introduction to logic programming using Prolog. Includes a description of Prolog data objects such as predicates, clauses, facts, and queries and introduces the concepts of goal resolution though unification and negation as failure. Programming techniques using control, meta-logical and extra-logical predicates and arithmetic operations are also studied. Three hours of lecture per week. Prerequisite: CS 342.

CS 356 Numerical Analysis (3)
Numerical solution of nonlinear equations, integration, interpolation and data smoothing, systems of linear and nonlinear equations. Three hours of lecture per week. Prerequisites: MATH 242, MATH 330, and CS 140.

CS 415 Computer Ethics and Society (1)
A study of the ethical and social issues related to computers and computer networks. Introduction to the legal, social, and ethical issues of information technology and use. Information rights, property rights, professional conduct, social responsibility, and rigorous standards for software testing and reliability. Required for computer science majors. One hour of lecture per week. Prerequisite: Consent of the Faculty Chair.

CS 444 Operating Systems (3)
Introduction to the function, internal data structures, and operations of operating systems and their associated file systems. Required for computer science majors. Three hours of lecture per week. Prerequisites: CS 343 and CS 346.
CS 448  **Computer Networking**  (3)
Study of current practices in computer networking including ISO standards, layered models, and protocols. Required for computer science majors. Three hours of lecture per week. Prerequisite: CS 444.

CS 456  **Software Engineering and Testing**  (3)
Study of the principles and practices of software engineering. Topics include software quality concepts, process models, and analysis of software requirements, design methodologies, software testing, and software maintenance. Required for computer science majors. Three hours of lecture per week. Prerequisite: CS 444

CS 457  **Artificial Intelligence**  (3)
Introduction to the fundamental theories, algorithms and representational structures underlying Artificial Intelligence and practice techniques for programming AI applications using Prolog. General areas covered include search techniques, production systems, planning, learning, and connectionist systems. Three hours of lecture per week. Prerequisites: CS 354 and CS 346

CS 460  **Computer Graphics**  (3)
Basic concepts of computer graphics, including programming, hardware, display technology, and data structures for both micros and high-performance workstations. Three hours of lecture per week. Prerequisites: CS 248, CS 356 and MATH 333

CS 497  **Advanced Topics**  (3)
Presentation of advanced topics in computer science by faculty and students. Three hours of lecture per week. Corequisite: CS 456.

CS 498  **Senior Comprehensive**  (0)
Senior Comprehensive examinations for graduating seniors. Prerequisites: Major Standing and Consent of the Faculty Chair.

CS 499  **Capstone Project**  (3)
Option for outstanding students to encourage independent study and development. Proposal must be submitted and approved during term preceding enrollment. Three hours of lecture per week. Prerequisite: Consent of the Faculty Chair. Corequisite: CS 456.
## CURRICULUM SUMMARY FOR
### BACHELOR OF SCIENCE DEGREE IN COMPUTER SCIENCE
#### TOTAL CREDITS REQUIRED: 134

<table>
<thead>
<tr>
<th>CORE CURRICULUM (STANDARD)*</th>
<th>MAJOR (COMPUTER SCIENCE)</th>
<th>OTHER REQUIREMENTS</th>
<th>MINOR REQUIREMENTS</th>
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<tr>
<td>45 credits</td>
<td>43 credits</td>
<td>25 credits</td>
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<tr>
<td>ENG 131 (3)**</td>
<td>CS 124 (3)</td>
<td>MATH 241 (4)</td>
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<td>ENG 132 (3)</td>
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<td>SC 135 or 136 (3)</td>
<td>CS 241 (3)</td>
<td>MATH 330 (3)</td>
<td>choice after</td>
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<tr>
<td>MATH 136 (3)</td>
<td>CS 243 (3)</td>
<td>MATH 333 (3)</td>
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<td>CS 246 (3)</td>
<td>MATH 473 (3)</td>
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<td>CS 342 (3)</td>
<td>PHYS 216 (1)</td>
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<td>MUSI 131</td>
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<td>POLS 232 (3)</td>
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<td>ECON 231 (3)</td>
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<td>CS 120, 120L (4)</td>
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* Students should be advised by a major advisor prior to registering for any credit, particularly any core curriculum credit as listed.

** (N) represents the number of course credits.
MAJOR/ASSOCIATED COURSES FOR THE
BACHELOR OF SCIENCE DEGREE IN COMPUTER SCIENCE
BY LEVEL AND SEQUENCE

Freshman

First Semester
CS 120 (Introduction to Programming in C++), 3 cr
CS 120L (Introduction to Programming in C++ Lab), 1 cr
MATH 136 (Pre-calculus Mathematics), 3 cr

Second Semester
CS 124 (Fundamentals of Machine Computation), 3 cr
CS 140 (Advanced Programming in C++), 3 cr
MATH 241 (Calculus and Analytic Geometry I), 4 cr

Sophomore

First Semester
CS 241 (Object Oriented Programming Using JAVA), 3 cr
CS 243 (Computer Organization), 3 cr
MATH 242 (Calculus and Analytic Geometry II), 4 cr

Second Semester
CS 246 (Data and File Structures), 3 cr
CS 248 (Theory of Computation), 3 cr
MATH 330 (Linear Algebra), 3 cr

Junior

First Semester
CS 342 (Programming Languages and Design), 3 cr
CS 343 (Assembly and Computer Architecture), 3 cr

Second Semester
CS 346 (Database Management Systems), 3 cr
CS Upper- 300 Level Elective, 3 cr
MATH 333 (Differential Equations), 3 cr

Senior

First Semester
CS 415 (Computer Ethics and Society), 1 cr
CS 444 (Operating Systems), 3 cr
CS 448 (Computer Networking), 3 cr
MATH 473 (Probability and Statistics), 3 cr

Second Semester
CS 456 (Software Engineering and Testing), 3 cr
CS Upper- 400 Level Elective, 3 cr
CS 498 (Senior Comprehensive), 0 cr