

DEPARTMENT OF COMPUTER SCIENCE

The primary mission of Computer Science Department is designed to expose students to the most current trends in both computer software and hardware. It involves the study and design of computer systems and associated system software. Particular emphasis is given to programming techniques, software engineering, computer networks, and distributed systems. The students acquired knowledge would enable them to convert the small box called computer into information processing tools to be applied in real-life problems. It introduces detailed understanding of constructing and maintaining systems by taking part in research projects. It generates ideas by means of dynamic education methods that will improve the creative thinking abilities of students. It educates students and increases their employment opportunities. It prepares graduate students with adequate knowledge to pursue in post graduate educations.

The following is a listing of the educational objectives of the Computer Science program:

- Prepare students for successful and productive careers as specialized CS professionals in industry and government.
- Prepare students for the successful pursuit of graduate studies and commitment to life-long learning.
- Prepare students to use their education to address the needs of society.
- Prepare students to have the knowledge and skills to adapt to a dynamic Multidisciplinary technological environment through teamwork, ethical concerns, and effective communications.

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 select a strong minor, preferably in Business, Science or Communications.

Students majoring in Computer Science should set their goals beyond simple programming and be prepared to:

1. Program well in design and implementation phases and document work.
2. Analyze real-world problems in preparation for program design and implementation
3. Manage activities that are strongly computer dependent.
4. Advance the fundamental theory of digital information processing.
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 admissions procedures are under continual review by the **Departmental Curriculum and 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 AS-SET 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 Science Center with the Department Office located in Room 100. The department website is <http://itscience.tsu.edu>.

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 in all courses specific to either the major or the minor in Computer Science.

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 120, CS 124, CS140, CS 241, CS 243, CS 246 and one additional junior/senior level CS course of choice. Prior to pursuing this minor, students must seek advisement and approval from the Department Office.

In order for students to pursue either majors or minors in the Department, they must petition for admission to the Department by completing the appropriate form which is available through the Department Office. The petition must be returned to the Department Office and must be reviewed by the Departmental Curriculum and Admissions Committee. Students must have **completed** the courses listed below or their equivalents:

English 131 Freshman English I
Math 136 Pre-Calculus Mathematics
CS 120 Introduction to Programming in C++
CS 124 Fundamentals of Machine Computation

Each student applying for major or minor status must have an overall grade point average (GPA) of 2.50 or better and must have earned grades of "C" or better (grades of "C-" are unacceptable) in the above courses. The petition must be returned to the Department Office by the appropriate deadlines given below to be considered by the Departmental Curriculum and Admissions Committee:

October 15 during Fall

March 15 during Spring

June 15 during Summer

The number of students admitted to major and minor status on an ongoing basis is dependent upon the availability of resources on a year-to-year basis, on performance in the four courses targeted above, and on overall GPA's earned. Preference will be given to students earning the highest overall GPA's above the required minimum of 2.50. Each student will be notified of the decision of the Departmental Curriculum Admissions Committee with regard to his/her status approximately one month after the above deadlines.

Once students have been admitted to the Department as major or minor status, they are each expected to maintain an overall GPA of 2.25 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 2.25 and students are within thirty (30) semester credit hours of graduation, they must contact the department advisor for a plan of action.

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 Curriculum and 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. Questions may be directed to the Department Office at (713)-313-7991 or to cs@tsu.edu.

LISTING OF FACULTY IN THE DEPARTMENT

<p>Criner, Oscar Professor B.S., Howard University Ph.D., University of California at Berkeley</p>	<p>Khan, M. Farrukh Assistant Professor B.S., California Institute of Technology M.S., University of Southern Mississippi Ph.D., Purdue University</p>
<p>Dotson, Ulysses Visiting Instructor B.S., Texas Southern University M.S., Texas Southern University</p>	<p>Li, Wei Wayne Professor B.S., Shaanxi Normal University M.S., Hebei University of Technology Ph.D., Chinese Academy of Sciences</p>
<p>Ghemri, Lila Assistant Professor B.S., University of Algiers Ph.D., University of Bristol</p>	<p>Lin, Cheng-Feng Assistant Professor B.S., North East Missouri University M.S., University of Texas at Arlington</p>
<p>Gonzales, Michael Visiting Instructor B.S., Texas Southern University M.S., Texas Southern University</p>	<p>Ma, Li Visiting Instructor B.S., Peking University M.S., University of California at Los Angeles</p>
<p>Javadi, John Visiting Instructor B.S., Texas Southern University M.S., University of Houston-Clear Lake</p>	<p>Singh, Tarsem Professor B.S., San Jose State University M.S., San Jose State University Ph.D., Texas A&M University</p>
<p>Javadian, Mohsen Associate Professor B.S., Texas Southern University M.S., University of Houston-Clear Lake</p>	<p>Sleem, Aladdin Assistant Professor B.S., Cairo University M.B.A., Maastricht School of Management M.S., University of Louisville Ph.D., University of Louisville</p>
<p>Kamel, Khaled Professor B.S., Cairo University B.S., Ain-Shams University M.S., University of Waterloo M.S. University of Cincinnati Ph.D., University of Cincinnati</p>	

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. Programming lab sessions during which, students acquire and strengthen their programming skills in C++ are integral part of this course. Required for computer science majors and minors. Two hours of lecture and two hours of laboratory per week.
- 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 217 Advanced Applications II - NON MAJORS (3)**
Continuation of CS 216. Advanced study of application software development in the WINDOWS environment. Development of customized software products with applications to subject matter area studied by students. Three hours of lecture per week. Prerequisite: CS 216.
- 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 asynchronous counters. Required for computer science majors and minors. Three hours of lecture per week. Prerequisites: CS 124.
- 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, 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 graph theory, automata and languages, computability and complexity of algorithms. This course covers partial order relations, scheduling PERT, CPM, introduction to graph theory: Euler, Hamiltonian and Dijkstra algorithms, finite state automata, regular expressions, grammars, algorithm definition, and algorithm complexity. 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. Social implications of technology and safety issues are also covered. Required for computer science majors. Three hours of lecture per week. Prerequisites: CS 241, CS 248.
- CS 343** **Microprocessor Design (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. A detailed case study using a commercial microprocessor or microcontroller will be covered. 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 and introduces the concepts of goal resolution through unification and negation as failure. Programming techniques using control, and 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 (3)**
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 to software testing and reliability standards. Safety and relevant legal cases will be covered. Required for computer science majors. Three hours of lecture per week. Prerequisite: Junior level standing.
- 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. Prerequisites: 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, and CS 356
- CS 497 Advanced Topics in CS (3)**
Consideration of contemporary topics and issues in computer science and associated technology. Three hours of lecture per week.
- CS 499 Capstone Project (3)**
A CS required capstone design course to encourage independent study, project design, and development. Proposal must be submitted and approved during term preceding enrollment. Three hours of lecture per week. Prerequisite: Consent of the Faculty Chair and Senior Level standing.

Bachelor of Science Degree in Computer Science
Four Year Degree Plan - Total Credits: 134

First Year			
First Semester		Second Semester	
CS 120 Introduction to Programming C++	3	CS 124 Fund of Machine Comp	3
Math 136 Precalculus	3	CS 140 Advanced programming in C++	3
CHEM 131, 111 or BIOL 143 General Chemistry & Lab I, Survey of Life Science	4	MATH 241 Calculus & Analytic Geometry I	4
ENG 131 Freshman English I	3	ENG 132 Freshman English II	3
HIST 231 Social & Political History of the United States to 1877	3	HIST 232 Social & Political History of the United States since 1877	3
	16 hrs		16 hrs

Second Year			
Third Semester		Fourth Semester	
CS 241 Object Oriented Programming	3	CS 246 Data & File Structures	3
CS 243 Computer Organization	3	CS 248 Theory of Computation	3
MATH 242 Calculus & Analytic Geometry. II	4	MATH 250 Linear Algebra	3
PHYS 213 College Physics Lab I	1	PHYS 214 College Physics Lab II	1
PHYS 237 College Physics I	3	PHYS 238 College Physics II	3
MINOR COURSE	3	MINOR COURSE	3
	17 hrs		16 hrs

Third Year			
Fifth Semester		Sixth Semester	
CS 342 Programming Languages and Design	3	CS UPPER- 300 Level Elective	3
CS 343 Microprocessors Design	3	CS415 Computer Ethics and Society	3
CS 346 Database Management Systems	3	CS 444 Operating Systems	3
POLS 231 American Political Systems I	3	POLS 232 American Political Systems II	3
ENG 2__ Any 200 Level ENG may be selected	3	SC 135 or 136 Business & Professional Communication or Public Address	3
MINOR COURSE	3	MINOR COURSE	3
	18 hrs		18 hrs

Fourth Year			
Seventh Semester		Eighth Semester	
CS UPPER- 400 Level Elective	3	CS 456 Software Engineering and Testing	3
CS UPPER- 400 / 500 Level Elective	3	CS 499 Capstone Project	3
CS 448 Computer Networking	3	ECON 231 Principles of Economics I	3
MATH 473 Probability and Statistics	3	MINOR COURSE	3
MINOR COURSE	3	MINOR COURSE	3
MUSI 131 or ART 131 Intro to Music or Drawing and Comp. I	3		
	18 hrs		15 hrs

Bachelor of Science Degree in Computer Science
Five Year Degree Plan - Total Credits: 134

First Year			
First Semester		Second Semester	
ENG 131 Freshman English I	3	CS 120 Introduction to Programming C++	3
CHEM 131, 111 or BIOL 143 General Chemistry & Lab I, Survey of Life Science	4	Math 136 Precalculus	3
HIST 231 Social & Political History of the United States to 1877	3	ENG 132 Freshman English II	3
MUSI 131 or ART 131 Intro to Music or Drawing and Comp. I	3	HIST 232 Social & Political History of the United States since 1877	3
	13 hrs		12 hrs

Second year			
Third Semester		Fourth Semester	
CS 124 Fund of Machine Comp	3	CS 241 Object Oriented Programming	3
CS 140 Advanced programming in C++	3	CS 243 Computer Organization	3
MATH 241 Calculus & Analytic Geometry I	4	MATH 242 Calculus & Analytic Geometry. II	4
MINOR COURSE	3	MINOR COURSE	3
	13 hrs		13 hrs

Third year			
Fifth Semester		Sixth Semester	
CS 246 Data & File Structures	3	CS 342 Programming Languages and Design	3
CS 248 Theory of Computation	3	CS 343 Microprocessors Design	3
MATH 250 Linear Algebra	3	PHYS 214 College Physics Lab II	1
PHYS 213 College Physics Lab I	1	PHYS 238 College Physics II	3
PHYS 237 College Physics I	3	MINOR COURSE	3
	13 hrs		13 hrs

Fourth year			
Seventh Semester		Eighth Semester	
CS 346 Database Management Systems	3	CS UPPER- 400 Level Elective	3
CS UPPER- 300 Level Elective	3	CS415 Computer Ethics and Society	3
POLS 231 American Political Systems I	3	CS 444 Operating Systems	3
ENG 2__ Any 200 Level ENG may be selected	3	POLS 232 American Political Systems II	3
MINOR COURSE	3	MINOR COURSE	3
	15 hrs		15 hrs

Fifth Year			
Ninth Semester		Tenth Semester	
CS UPPER- 400 / 500 Level Elective	3	CS 456 Software Engineering and Testing	3
CS 448 Computer Networking	3	CS 499 Capstone Project	3
MATH 473 Probability and Statistics	3	ECON 231 Principles of Economics I	3
SC 135 or 136 Business & Professional Communication or Public Address	3	MINOR COURSE	3
MINOR COURSE	3		
	15 hrs		12 hrs

Bachelor of Science Degree in Computer Science
Six Year Degree Plan - Total Credits: 134

First year			
First Semester		Second Semester	
ENG 131 Freshman English I	3	CS 120 Introduction to Programming C++	3
CHEM 131, 111 or BIOL 143 General Chemistry & Lab I, Survey of Life Science	4	Math 136 Precalculus	3
HIST 231 Social & Political History of the United States to 1877	3	ENG 132 Freshman English II	3
MUSI 131 or ART 131 Intro to Music or Drawing and Comp. I	3	HIST 232 Social & Political History of the United States since 1877	3
	13 hrs		12 hrs

Second Year			
Third Semester		Fourth Semester	
CS 124 Fund of Machine Comp	3	CS 241 Object Oriented Programming	3
CS 140 Advanced programming in C++	3	CS 243 Computer Organization	3
MATH 241 Calculus & Analytic Geometry I	4	MATH 242 Calculus & Analytic Geometry. II	4
MINOR COURSE	3	MINOR COURSE	3
	13 hrs		13hrs

Third Year			
Fifth Semester		Sixth Semester	
CS 246 Data & File Structures	3	CS 342 Programming Languages and Design	3
CS 248 Theory of Computation	3	CS 343 Microprocessors Design	3
POLS 231 American Political Systems I	3	POLS 232 American Political Systems II	3
MINOR COURSE	3	MINOR COURSE	3
	12 hrs		12 hrs

Fourth Year			
Seventh Semester		Eighth Semester	
CS 346 Database Management Systems	3	CS UPPER- 300 Level Elective	3
MATH 250 Linear Algebra	3	CS415 Computer Ethics and Society	3
MINOR COURSE	3	MINOR COURSE	3
ENG 2__ Any 200 Level ENG may be selected	3	SC 135 or 136 Business & Professional Communication or Public Address	3
	12 hrs		12 hrs

Fifth Year			
Ninth Semester		Tenth Semester	
CS 444 Operating Systems	3	CS 448 Computer Networking	3
CS UPPER- 400 Level Elective	3	ECON 231 Principles of Economics I	3
PHYS 213 College Physics Lab I	1	PHYS 214 College Physics Lab II	1
PHYS 237 College Physics I	3	PHYS 238 College Physics II	3
	10 hrs		10 hrs

Sixth Year			
Eleventh Semester		Twelfth Semester	
CS UPPER- 400 / 500 Level Elective	3	CS 456 Software Engineering and Testing	3
MATH 473 Probability and Statistics	3	CS 499 Capstone Project	3
MINOR COURSE	3		
	9 hrs		6 hrs