Department of Computer Science

When introduced in 1983, the main emphasis was to provide a solid foundation in algorithm design and implementation based upon a strong background in mathematics. Since that time we have expanded our offerings to include more theoretical-based computer science courses while retaining the original objective. We also have strengthened the program with "core" courses in computer science that reflect a broader emphasis and a greater variety of electives.

Program Educational Objective (3-5 years after graduation)

- have a diverse group of graduates take on successful leadership roles in Computer Science related fields;
- have graduates remain current in their field through the pursuit of lifelong learning;
- have graduates work effectively with others to make positive contributions to their employers and to society.

Outcomes

Upon graduation, students with a BS majoring in Computer Science will have:

- an ability to apply knowledge of computing and mathematics appropriate to the discipline;
- an ability to analyze a problem, and identify and define the computing requirements appropriate to its solution;
- an ability to design, implement and evaluate a computer-based system, process, component, or program to meet desired needs;
- an ability to function effectively on teams to accomplish a common goal;
- an understanding of professional, ethical, legal, security, and social issues and responsibilities;
- an ability to communicate effectively with a range of audiences;
- an ability to analyze the local and global impact of computing on individuals, organizations, and society;
- recognition of the need for, and an ability to engage in, continuing professional development;
- an ability to use current techniques, skills, and tools necessary for computing practices;
- an ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices;
- an ability to apply design and development principles in the construction of software systems of varying complexity.


Computer Science Concentration


CSCI 1230 Introduction to BASIC Programming
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Basic concepts, logic, and syntax of BASIC programming language. Elementary programming techniques and algorithms. Topics include: arithmetic operations, input/output, strings, GUI design, IF blocks, loop structures, subprograms, one- and two-dimensional arrays, file processing and applications.
**Prerequisite(s):** 3 credit hours of basic math.

CSCI 1236 Introduction to FORTRAN Programming
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Basic concepts, logic and syntax of the FORTRAN programming language. Elementary programming techniques and algorithms. Topics include: arithmetic operations, input/output, IF blocks, loop structures, subprograms, one- and two-dimensional arrays, file processing and applications.
**Prerequisite(s):** 3 credit hours of basic math.

CSCI 1236 Introduction to Java Programming
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Basic concepts, logic and syntax of the Java programming language. Elementary programming techniques and algorithms. Topics include: arithmetic operations, input/output, data types, variables, selection and control statements, applications, applets, strings, and event-driven programming.
**Prerequisite(s):** A minimum grade of "C" in MATH 1111 or MATH 1113 or MATH 1232 or MATH 1441.

CSCI 1301 Programming Principles I
0.4 Credit Hours. 3 Lecture Hours. 2 Lab Hours.
Provides a fundamental understanding of the development of computer solutions to solve problems with emphasis on structured, top-down development and testing. Concepts include the following: an overview of computer system design, problem solving and procedural abstraction design of computer solutions, algorithm development using simple data types and control structures, implementation and testing of programmed problem solutions, design modularization using subprograms and structured and user-defined data types.
**Prerequisite(s):** A minimum grade of "C" in MATH 1113 or MATH 1232 or MATH 1441.
**Cross Listing(s):** CSCI 1301H, CSCI 1301S.

Computer Science Major

- Computer Science B.S. (http://catalog.georgiasouthern.edu/archive/2015-2016/undergraduate/allen-paulson-engineering-information-technology/computer-science/computer-science-bs)

Computer Science Minor

- Computer Science (http://catalog.georgiasouthern.edu/archive/2015-2016/undergraduate/allen-paulson-engineering-information-technology/computer-science/computer-science-minor)
CSCI 1301H Programming Principles I  
0.4 Credit Hours. 3 Lecture Hours. 2 Lab Hours.  
Provides a fundamental understanding of the development of computer solutions to solve problems with emphasis on structured, top-down development and testing. Concepts include the following: an overview of computer system design, problem solving and procedural abstraction design of computer solutions, algorithm development using simple data types and control structures, implementation and testing of programmed problem solutions, design modularization using subprograms and structured and user-defined data types.  
Prerequisite(s): A minimum grade of "C" in MATH 1113 or MATH 1232 or MATH 1441.  
Cross Listing(s): CSCI 1301, CSCI 1301S.  
CSCI 1301S Programming Principles I  
0.4 Credit Hours. 3 Lecture Hours. 2 Lab Hours.  
Provides a fundamental understanding of the development of computer solutions to solve problems with emphasis on structured, top-down development and testing. Concepts include the following: an overview of computer system design, problem solving and procedural abstraction design of computer solutions, algorithm development using simple data types and control structures, implementation and testing of programmed problem solutions, design modularization using subprograms and structured and user-defined data types.  
Prerequisite(s): MATH 1113 or MATH 1232 or MATH 1441.  
Cross Listing(s): CSCI 1301S, CSCI 1301H.  
CSCI 1302 Programming Principles II  
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.  
This course is a continuation of CSCI 1301. Emphasis is on advanced techniques such as recursion, regular expressions, refactoring, object oriented programming concepts and constructs, reusing components, templates/generics, interfaces and classes. Experiences include use of an integrated development environment and shared (code) repositories.  
Prerequisite(s): A minimum grade of "C" in MATH 1441, MATH 2130, CSCI 1301.  
CSCI 2120 Computers, Ethics and Society  
2 Credit Hours. 2 Lecture Hours. 0 Lab Hours.  
An investigation of issues related to the use of computers and computer technology including the following: computer ethics, professional standards, and social impact of computer applications. Some topics to be researched include: philosophical ethics, the application of ethical theory to situations involving computer technology, codes of conduct, privacy, data protection, employee privacy, data regulation, artificial intelligence, copyright/patent issues, computer malfunction liability, computer crime and responsibilities of computer users.  
Prerequisite(s): A minimum grade of "C" in CSCI 1301.  
CSCI 3230 Data Structures  
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.  
Introduction to abstract data types such as lists, stacks, queues, and trees, and algorithm analysis.  
Prerequisite(s): A minimum grade of "C" in CSCI 1302, MATH 2130.  
CSCI 3231 Logic Circuits and Microprocessors  
0.3 Credit Hours. 0.2 Lecture Hours. 0.2 Lab Hours.  
Digital system and Logic Circuits Design. Topics include the study of the Logic gate, Boolean Functions representation and Minimization, Combinational and Sequential logic circuits, Programmable Logic Arrays, Data Representation, RAM, ROM, and Cache Memories, Register Transfer Language and micro-operations, Hardware Description Language (VHDL), Microprocessor Organization and Design, Assembly Language, Computer Aided Design Tools and Filed Programmable Gate Arrays.  
Prerequisite(s): CSCI 1302.  
CSCI 3232 Systems Software  
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.  
Provides basic concepts of computer software systems including operating systems, language translators, utilities, linkers and loaders, system component interface, diverse programming language concepts, and interfaces.  
Prerequisite(s): A minimum grade of "C" in CSCI 1302.  
Corequisite(s): CSCI 3230.  
CSCI 3232H Systems Software (Honors)  
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.  
Provides basic concepts of computer software systems including operating systems, language translators, utilities, linkers and loaders, system component interface, diverse programming language concepts, and interfaces.  
Prerequisite(s): A minimum grade of "C" in all of the following: CSCI 1302 and prior or concurrent enrollment in CSCI 3230.  
CSCI 3236 Theoretical Foundations  
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.  
A study of languages, formal grammars, and abstract representations of computation.  
Prerequisite(s): A minimum grade of "C" in MATH 2130, CSCI 1302.  
Cross Listing(s): CSCI 3236H.  
CSCI 3236H Theoretical Foundations  
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.  
A study of languages, formal grammars, and abstract representations of computation.  
Prerequisite(s): A minimum grade of "C" in MATH 2130, CSCI 1302.  
Cross Listing(s): CSCI 3236.  
CSCI 3432 Database Systems  
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.  
The fundamental concepts of database management systems (DBMS) including logical and physical database organization, data models and design issues. Emphasis will be placed upon the rational data model including design and implementation using commercial database systems.  
Prerequisite(s): A minimum grade of "C" in CSCI 1301, MATH 2130 or Permission of Instructor.  
CSCI 4132 Data Warehouse Design  
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.  
The course will cover data warehouse design principles and technical problems. Topics will include: data warehouse architectures, organizing data warehouse design projects, analyzing data and requirements. SQL aggregate and analytic functions, materialized views, star-joins and other DW related features, data vault modeling, dimensional modeling, physical design and implementation of integrated data warehouse using commercial ROLAP engines such as Oracle or SQL Server.  
Prerequisite(s): A minimum grade of "C" in CSCI 3432.  
CSCI 4235 Human Computer Interaction  
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.  
Human-Computer Interaction applies knowledge about how human beings perceive the world, think, remember and solve problems to the design of complex computer software. HCI goes beyond the construction of good user interfaces to specify how software projects are developed, tested and deployed. An important part of this course will emphasize field work practices for such things as user requirements gathering and usability testing.  
Prerequisite(s): A minimum grade of "C" in CSCI 3230 or Permission of Instructor.  
Cross Listing(s): CSCI 4235H.
CSCI 4235H Human Computer Interaction
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Human-Computer Interaction applies knowledge about how human beings perceive the world, think, remember and solve problems to the design of complex computer software. HCI goes beyond the construction of good user interfaces to specify how software projects are developed, tested and deployed. An important part of this course will emphasize field work practices for such things as user requirements gathering and usability testing.
Prerequisite(s): A minimum grade of "C" in CSCI 3230 or Permission of Instructor.
Cross Listing(s): CSCI 4235.

CSCI 4439 Game Programming
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
An introduction to game design and development including game physics, using game engines, using AI in games, creating multithreaded games, and creating networked games.
Prerequisite(s): A minimum grade of "C" in CSCI 1302 or Permission of Instructor.

CSCI 4534 Software Testing and Quality Assurance
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Essential concepts and technology for software systems quality assurance and testing. Course covers software testing and the quality assurance body of knowledge including theory, models and methods, as well as contemporary standards and tools.
Prerequisite(s): A minimum grade of "C" in CSCI 3236 or Permission of Instructor.

CSCI 4537 Broadband Networks
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
The basic concepts of broadband networks including an introduction to broadband networks, principles and systems are presented. Basic concepts and terminology needed for an understanding of broadband networks which support a variety of service requirements. Emphasis is on structures and principles of broadband networks. Major concepts and principles will be examined along with their corresponding mathematical analysis.
Prerequisite(s): A minimum grade of "C" in CSCI 5332 or Permission of Instructor.

CSCI 4539 Optical Networks
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Basic concepts of optical networks will be explored including a summary of fundamental mechanisms and recent developments and deployments of optical networks and the network and software architecture to implement optical networks designed to transport IP traffic.
Prerequisite(s): A minimum grade of "C" in CSCI 5332 or Permission of Instructor.

CSCI 4790 Special Problems/CO-OP
1-3 Credit Hours. 0 Lecture Hours. 0 Lab Hours.
Work experience in computer science through the CO-OP program. A student may enroll in this course more than once, but cumulative credit may not exceed three credit hours.
Prerequisite(s): Acceptance as a CO-OP student in the area of Computer Science.

CSCI 4890 Directed Study in Computer Science
1-3 Credit Hours. 0 Lecture Hours. 0 Lab Hours.
Directed study under faculty supervision. Seminar with at least one hour to be used as student engagement in service work.
Prerequisite(s): Permission of Instructor and Department Chair.

CSCI 5090 Selected Topics in Computer Science
1-3 Credit Hours. 1-3 Lecture Hours. 0-2 Lab Hours.
Specialized study in a selected area of Computer Science. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.
Prerequisite(s): Permission of Instructor.
Cross Listing(s): CSCI 5090G.

CSCI 5130 Data Management for Math and the Sciences
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Topics in data management, including operating systems, word processing, spreadsheets, and database management and their applications to mathematics education. Intended primarily for those majoring in Mathematics and Mathematics Education. For those majoring or minoring in Computer Science, this course may not be used as an upper level Computer Science elective. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.
Prerequisite(s): CSCI 1230 or Permission of Instructor.
Cross Listing(s): CSCI 5130G.

CSCI 5230 Discrete Simulation
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Introduction to discrete simulation models and their implementation on computers. Topics include modeling techniques, experiment design, analysis and validation of results. Students will be exposed to one or more computer simulation languages. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.
Prerequisite(s): A minimum grade of "C" in STAT 2231 and CSCI 3230 or Permission of Instructor.
Cross Listing(s): CSCI 5230G.

CSCI 5235H Human Computer Interaction-Hon
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Human-Computer Interaction applies knowledge about how human beings perceive the world, think, remember and solve problems to the design of complex computer software. HCI goes beyond the construction of good user interfaces to specify how software projects are developed, tested and deployed. An important part of this course will emphasize field work practices for such things as user requirements gathering and usability testing.
Prerequisite(s): A minimum grade of "C" in CSCI 3230.
Cross Listing(s): CSCI 5235G, CSCI 5235.

CSCI 5330 Algorithm Design and Analysis
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
An in-depth study of the design, implementation, testing, and analysis of algorithms. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.
Prerequisite(s): A minimum grade of "C" in CSCI 3236 and MATH 2242.
Cross Listing(s): CSCI 5330G.

CSCI 5331H Computer Architecture
0.3 Credit Hours. 0.2 Lecture Hours. 0.2 Lab Hours.
Digital logic: transistors, circuits, sensors, robotic control; registers and register banks; arithmetic-logic units; data representation: big-endian and little-endian integers; one and two's complement arithmetic; signed and unsigned values; Von-Neumann architecture and bottleneck; instruction sets; RISC and CISC designs; instruction pipelines and stalls; rearranging code; memory and address spaces; physical and virtual memory; interleaving; page tables; memory caches; bus architecture; polling and interrupts; DMA; sensor and device programming; assembly language; optimizations; parallelism; data pipelining. Graduate students will be given extra assignments determined by the instructor that undergraduates will not be required to do.
Prerequisite(s): A minimum grade of "C" in CSCI 3232.
Cross Listing(s): CSCI 5331H, CSCI 5331G.
CSCI 5331H Computer Architecture
0.3 Credit Hours. 0.2 Lecture Hours. 0.2 Lab Hours.
Digital logic: transistors, circuits, sensors, robotic control; registers and
register banks; arithmetic-logic units; data representation; big-endian and
little-endian integers; one and two complement arithmetic; signed and
unsigned values; Von-Neumann architecture and bottleneck; instruction
sets; RISC and CISC designs; instruction pipelines and stalls; rearranging
code; memory and address spaces; physical and virtual memory;
interleaving; page tables; memory caches; bus architecture; polling and
interrupts; DMA; sensor and device programming; assembly language;
optimizations; parallelism; data pipelining. Graduate students will be given
extra assignments determined by the instructor that undergraduates will
not be required to do.
Prerequisite(s): A minimum grade of “C” in CSCI 3231.
Cross Listing(s): CSCI 5331, CSCI 5331G.

CSCI 5332 Data Communications and Networking
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Fundamental concepts of data communications including architecture
models, protocol suites, network programming, signal and data
transmissions, error detection, and performance analysis.
Prerequisite(s): A minimum grade of “C” in CSCI 3232 and STAT 2231.
Cross Listing(s): CSCI 5332H, CSCI 5332G.

CSCI 5332H Data Communications and Networking
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Fundamental concepts of data communications including architecture
models, protocol suites, network programming, signal and data
transmissions, error detection, and performance analysis.
Prerequisite(s): A minimum grade of “C” in CSCI 3232 and STAT 2231.
Cross Listing(s): CSCI 5332, CSCI 5332G.

CSCI 5335 Object-Oriented Design
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Introduction to concepts, methods, and current practice of object oriented
design and analysis. Topics include the study of the Unified Modeling
Language (UML), which has become an industry standard notation.
UML topics will include use cases, diagramming notation (class, object,
sequence) and object state diagrams. Students will use UML to design
and implement individual and small group projects. Additional topics
include understanding design patterns in building applications. Graduate
students will be given an extra assignment determined by the instructor
that undergraduates will not be required to do.
Prerequisite(s): A minimum grade of “C” in CSCI 3230.
Cross Listing(s): CSCI 5335G.

CSCI 5430 Artificial Intelligence
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Introduction to different paradigms for creating software that can reason,
access a knowledge base, handle uncertainty, learn, communicate,
perceive and act. Graduate students will be given an extra assignment
determined by the instructor that undergraduates will not be required to do.
Prerequisite(s): A minimum grade of “C” in CSCI 3230 and CSCI 5330 or
Permission of Instructor.
Cross Listing(s): CSCI 5430G.

CSCI 5431 Computer Security
0.3 Credit Hours. 0.2 Lecture Hours. 0.2 Lab Hours.
Computer security theory and practice fundamentals including methods
of attack, defending against attacks, privacy vs security, methods of
encryption, authentication, writing secure code, web security, and network
security. Graduate students will be given an extra assignment determined
by the instructor that undergraduates will not be required to do.
Prerequisite(s): A minimum grade of “C” in CSCI 2120.
Corequisite(s): CSCI 5332.
Cross Listing(s): CSCI 5431G.

CSCI 5432 Database Systems
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
The fundamental concepts of database management systems (DBMS)
including logical and physical database organization, data models and
design issues. Emphasis will be placed upon the relational data model
including design and implementation using commercial database systems.
Cross Listing(s): CSCI 5432G, CSCI 5432H.

CSCI 5432H Database Systems (Honors)
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
The fundamental concepts of database management systems (DBMS)
including logical and physical database organization, data models and
design issues. Emphasis will be placed upon the relational data model
including design and implementation using commercial database systems.
Cross Listing(s): CSCI 5432, CSCI 5432G.

CSCI 5436 Distributed Web Systems Design
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
This course involves programming methodologies for the World Wide
Web. Topics include: Client-side programming, distributed transactions,
remote procedure calls, component objects, server side programming and
network load balancing.
Prerequisite(s): A minimum grade of “C” in CSCI 3432.
Cross Listing(s): CSCI 5436G, CSCI 5436H.

CSCI 5436H Distributed Web Systems Design
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
This course involves programming methodologies for the World Wide
Web. Topics include: Client-side programming, distributed transactions,
remote procedure calls, component objects, server side programming and
network load balancing.
Prerequisite(s): A minimum grade of “C” in CSCI 5432 or CSCI 3432.
Cross Listing(s): CSCI 5436G, CSCI 5436.

CSCI 5437 Computer Graphics
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Course covers fundamentals of the theory of computer graphics, including
raster systems, 3D viewing, illumination, shading and solid modeling. A
standard computer graphics language is introduced. Graduate students
will be given an extra assignment determined by the instructor that
undergraduates will not be required to do.
Prerequisite(s): A minimum grade of “C” in CSCI 3230 and CSCI 3236.
Cross Listing(s): CSCI 5437G.

CSCI 5438 Animation
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Course covers mechanism of computer animation and their
implementation in OpenGL, together with advanced graph theory.
Graduate students will be given an extra assignment determined by the
instructor that undergraduates will not be required to do.
Prerequisite(s): A minimum grade of “C” in CSCI 5437.
Cross Listing(s): CSCI 5438G.

CSCI 5530 Software Engineering
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
This course serves as a major integrative, capstone experience for
students and requires teamwork. A study of the development and
management of software; strategies and techniques of design, testing,
documentation and maintenance. Graduate students will be given an extra
assignment determined by the instructor that undergraduates will not be
required to do.
Prerequisite(s): A minimum grade of “C” in CSCI 5330 and CSCI 5335
and CSCI 5432 or CSCI 3432.
Cross Listing(s): CSCI 5530G.
CSCI 5531 Systems and Software Assurance
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
This course presents a body of knowledge in systems and software assurance and evaluation including security, safety, and integrity analysis. The core part of the course is software assurance where students are exposed to code and architectural analysis, secure coding practices, standards, and tools. The course also explores standards in modeling internal security at the organizational level and will involve students in risk assessments, comprehensive assurance planning, as well as an array of countermeasure considerations. Graduate students will be required to complete an individual research project not required of undergraduate students.
Prerequisite(s): A minimum grade of "C" in CSCI 1302 and CSCI 3432.
Cross Listing(s): CSCI 5531G.

CSCI 5532 Network Management Systems
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
Theory and practice of network management systems architectures and protocols, including fundamentals of standards models, languages, SNMP, broadband and Web-based tools and applications. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.
Prerequisite(s): A minimum grade of "C" in CSCI 5332.
Cross Listing(s): CSCI 5532G.

CSCI 5538 Wireless and Mobile Systems
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
This course deals with the basics of cellular and mobile communication systems, multiple radio access procedures and channel allocation techniques, the architecture and functioning of satellite systems including global positioning system different wireless LAN technologies and personal area networks with an emphasis on Bluetooth networks and mobile application development required for mobile and wireless handheld devices like PDAs and cell phones. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.
Prerequisite(s): A minimum grade of "C" in CSCI 5332 and MATH 1441 or Permission of Instructor.
Cross Listing(s): CSCI 5538G.