

The University of Tampa's B.S. in Computer Science

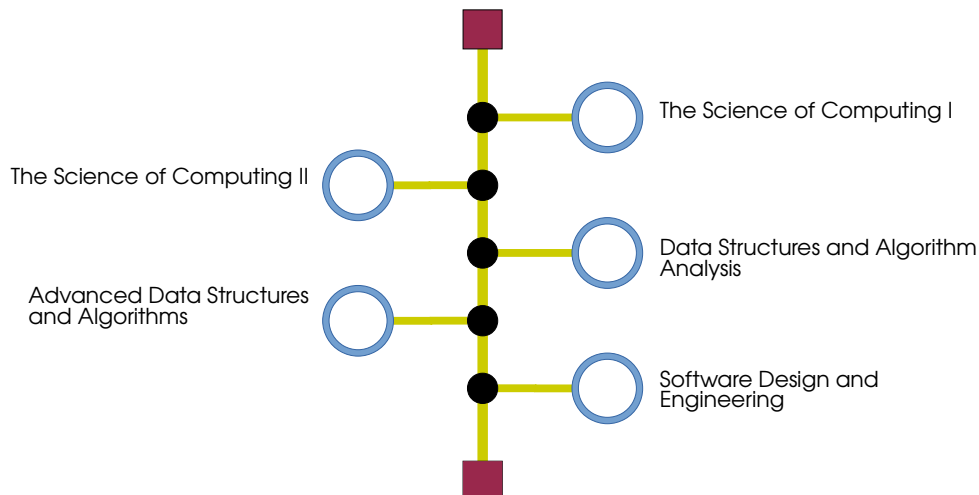
The University of Tampa's major in computer science is a cutting-edge program that teaches students core and contemporary topics in computing to prepare graduates for a challenging position in industry or for further graduate study. Students receive a comprehensive study of computing that focuses on both the core fundamentals and applied aspects of hardware and software as well as exposure to advanced topics in areas such as machine learning and artificial intelligence; data mining and data management; computer networking and security; web programming and development; and human-computer interaction. The curriculum begins with a unique freshman experience that features a Raspberry Pi computing platform; provides students with many hands-on, projects-based opportunities; and culminates with a rigorous, team-based capstone experience that embraces industry engagement.

Curriculum

The curriculum includes a set of core courses that provide a strong foundation in computer science. Moreover, the core provides breadth and depth in computer science. It is composed of 11 courses totaling 40 credit hours:

Course	Title	Credit Hours
CSC 101	The Science of Computing I	4
CSC 102	The Science of Computing II	4
CSC 201	Data Structures and Algorithm Analysis	4
CSC 210	Computer Organization and Architecture	4
CSC 220	Operating Systems and Systems Programming	4
CSC 230	Software Design and Engineering	4
CSC 301	Advanced Data Structures and Algorithms	4
CSC 310	Ethics and Impact of Computing (W)	4
CSC 320	Theory of Computation	4
CSC 401	Senior Capstone I	2
CSC 402	Senior Capstone II	2
TOTAL		40

A subset of these courses forms the “backbone” of the curriculum – those courses that provide the foundations of computing and are expected knowledge in many of the other courses in the curriculum (see the figure below):



The computer science program also has a set of electives that provide additional depth in computer science, three of which must be taken by all majors – for a total of 12 additional credit hours. The following electives are currently offered by the program:

Course	Title	Credit Hours
CSC 330	Introduction to Computer Network Security	4
CSC 340	Database Management Systems	4
CSC 350	Web Programming and Development	4
CSC 410	Artificial Intelligence and Machine Learning	4
CSC 420	Programming Languages and Compilers	4

As new faculty are hired and more students enroll in the program, we expect elective topics to increase as needed. Students also have the option of taking elective courses in other disciplines if desired. Currently, the following courses are approved:

Course	Title	Credit Hours
FMX 210	Digital Media	4
FMX 310	Creative Coding	4
FMX 311	Online Production	4
FMX 339	Mobile Application Production	4
FMX 430	Spatial Computing	4
ITM 280	Network and Cloud Infrastructure	4
ITM 375	Information Security Standards, Risk Management and Compliance	4
ITM 380	Network Security	4
ITM 480	Ethical Hacking	4

Mathematics requirements include four courses totaling 16 credit hours and include calculus, discrete mathematics and linear algebra:

Course	Title	Credit Hours
MAT 260	Calculus I	4
MAT 261	Calculus II	4
MAT 270	Discrete Mathematics for Computer Science	4
MAT 271	Computational Linear Algebra	4
TOTAL		16

Lastly, natural science requirements include two courses (with laboratories) totaling 8 credit hours:

Course	Title	Credit Hours
PHY 205	General Physics with Calculus I	4
PHY 205L	General Physics with Calculus I Laboratory	0
PHY 206	General Physics with Calculus II	4
PHY 206L	General Physics with Calculus II Laboratory	0
TOTAL		8

Throughout the curriculum, hands-on, projects-based opportunities engage students and provide important and meaningful opportunities for students to apply what they learn – which aligns well with the University’s mission that students balance “learn by thinking” with “learn by doing.”

Schedule of Courses Offerings

A majority of the program's core courses are offered throughout the academic year (i.e., during both the fall and spring semesters). Typically, electives are offered once per year. The table below shows when courses are typically offered:

Course	Title	Credit Hours	Fall	Spring
CORE				
CSC 101	The Science of Computing I	4	✓	✓
CSC 102	The Science of Computing II	4	✓	✓
CSC 201	Data Structures and Algorithm Analysis	4	✓	✓
CSC 210	Computer Organization and Architecture	4	✓	
CSC 220	Operating Systems and Systems Programming	4		✓
CSC 230	Software Design and Engineering	4		✓
CSC 301	Advanced Data Structures and Algorithms	4	✓	
CSC 310	Ethics and Impact of Computing (W)	4		✓
CSC 320	Theory of Computation	4		✓
CSC 401	Senior Capstone I	2	✓	
CSC 402	Senior Capstone II	2		✓
ELECTIVES				
CSC 330	Introduction to Computer Network Security	4		✓
CSC 340	Database Management Systems	4		✓
CSC 350	Web Programming and Development	4		✓
CSC 410	Artificial Intelligence and Machine Learning	4	✓	
CSC 420	Programming Languages and Compilers	4	✓	
OTHER				
CSC 450	Independent Study in Computer Science	1-4	✓	✓
CSC 499	Special Topics in Computer Science	4	✓	✓

A curriculum flowchart that helps to identify course prerequisites is included at the end of this document.

Course Descriptions

CSC 101 The Science of Computing I

An introduction to computing. Topics include problem solving, algorithm analysis and development, computer programming in Python, data structures, computer organization and architecture, and the object-oriented paradigm.

Prerequisites: None

CSC 102 The Science of Computing II

More in-depth coverage of computing. Topics include problem solving, algorithm analysis and development, object-oriented programming in Python, high-level data structures, computer organization and architecture, and various applications of computing.

Prerequisites: CSC 101 (with a C or better)

CSC 201 Data Structures and Algorithm Analysis

The storage and manipulation of basic data structures such as arrays, linked lists, stacks, queues, trees, hash tables, and graphs.

Prerequisites: CSC 102 (with a C or better)

CSC 210 Computer Organization and Architecture

Architecture and organization of computer systems. Computer organization topics include data representation, digital logic, Boolean algebra, minimization techniques. Computer architecture topics include the CPU, instruction set architectures, memory hierarchy and management, input/output systems, alternative architectures, performance measurement and analysis.

Prerequisites: CSC 102 (with a C or better)

CSC 220 Operating Systems and Systems Programming

An introduction to systems programming (in the context of Linux and C/C++) and operating systems. Topics include linking, writing scripts, performing system calls, managing memory, and using concurrency; process management, storage management, device management, performance, and security.

Prerequisites: CSC 201 (with a C or better)

CSC 230 Software Design and Engineering

Design, construction, and maintenance of large software systems. Project planning, requirements analysis, software design methodologies, software implementation and testing, maintenance.

Prerequisites: CSC 201 (with a C or better)

CSC 301 Advanced Data Structures and Algorithms

Advanced data structures and algorithm design and analysis. Topics include analysis techniques, advanced searching and sorting, advanced data structures (e.g., specialized trees, graphs), algorithm design techniques, and NP-completeness.

Prerequisites: CSC 230 (with a C or better)

CSC 310 Ethics and Impact of Computing (W)

An examination of the ethical, social, and legal implications of computers, computing, communications, and other digital technologies. Emphasis is placed on writing and professional presentations (including debates). This course includes a significant amount of writing through several standalone essays and a major paper that is developed in an iterative process with frequent feedback.

Prerequisites: CSC 230 (with a C or better)

CSC 320 Theory of Computation

An overview of formal languages, the abstract models of computing capable of recognizing those languages, and the grammars used to generate them.

Prerequisites: CSC 301 (with a C or better) and MAT 270 (with a C or better)

CSC 330 Introduction to Computer Network Security

Overview of cyber security. Provides students with practical cyber security experience based on theoretical foundations. Topics include: cryptography, computer network defense, covert channels, reverse engineering, steganography, access control, website exploitation, and other relevant and current topics in security.

Prerequisites: CSC 201 (with a C or better)

CSC 340 Database Management Systems

The theory, design, and implementation of relational database management systems. Topics include effective storage, security, and applied applications of legacy storage. Emphasis on the practical steps towards the creation of effective database management systems and the implementation of a simple database.

Prerequisites: CSC 201 (with a C or better)

CSC 350 Web Programming and Development

A comprehensive overview of website development. Includes both server- and client-side installation, configuration, and programming; database integration; and an overview of security implications and considerations.

Prerequisites: CSC 230 (with a C or better)

CSC 401 Senior Capstone I

This course allows students to integrate what they have learned throughout the curriculum in an applied, real world setting. Students work in teams on a major project, applying software engineering principles along the way. The course also emphasizes professional presentations and technical reports at various points in the project. This is the first half of the senior capstone experience, where teams will begin their work on a major project.

Prerequisites: CSC 301 (with a C or better)

CSC 402 Senior Capstone II

This course allows students to integrate what they have learned throughout the curriculum in an applied, real world setting. Students work in teams on a major project, applying software engineering principles along the way. The course also emphasizes professional presentations and technical reports at various points in the project. This is the second half of the senior capstone experience, where teams will finish their work on a major project and present their results.

Prerequisites: CSC 401 (with a C or better)

CSC 410 Artificial Intelligence and Machine Learning

An overview of AI, including history, impact, implications, and the potential of artificial intelligence. Machine learning: perceptrons, multi-layer networks, and deep learning. Classical AI: game playing and search, propositional logic, first order logic, inference. Knowledge representation.

Prerequisites: CSC 301 (with a C or better)

CSC 420 Programming Languages and Compilers

Techniques for specifying the syntax and semantics of programming languages, including language concepts, execution environments, comparative analysis of programming languages. Principles of compiler design, including lexical analysis, syntax analysis, error detection and recovery.

Prerequisites: CSC 301 (with a C or better)

CSC 450 Independent Study in Computer Science

Independent project developed under the guidance of a computer science faculty member. Students can apply by consulting with and submitting a project proposal to a computer science faculty member for 1-4 credits.

Prerequisites: Junior status, minimum 3.0 GPA, and consent of instructor

CSC 499 Special Topics in Computer Science

A special topics course that allows faculty members to explore topics in computer science. May be repeated for additional credit, with a maximum of 8 credits total.

Prerequisites: consent of instructor

