

# B.A. IN COMPUTER SCIENCE

## Overview

The major in Computer Science for BA students consists of a core of 17 credits of Computer Science courses, 7 credits of Mathematics courses, and 9 credits of elective Computer Science courses or approved courses from another department.

## Curriculum Requirements for B.A. in Computer Science and for Additional Major in Computer Science Fundamentals

Code	Title	Credit Hours
<b>Core Computer Science Courses</b>		
CSC 120	Computer Programming I	4
CSC 220	Computer Programming II	4
CSC 314	Computer Organization and Architecture	3
CSC 322	System Programming	3
CSC 317	Data Structures and Algorithm Analysis	3
or CSC 431	Introduction to Software Engineering	
<b>Core Mathematics Courses</b>		
MTH 161	Calculus I (or equivalent - MTH 140 and MTH 141, MTH 151, or MTH 171)	4
MTH 309	Discrete Mathematics I	3
<b>Electives Requirement</b>		
Select 9 approved credit hours of the following:		9
Any CSC 2XX, CSC 3XX, CSC 4XX, CSC 5XX <sup>1,2</sup>		
CSC 115	Python Programming for Everyone <sup>3</sup>	
At most one of the following may be used as an elective towards the major from the list below separated by "or" (this constraint holds, whether choosing a course to serve as an approved substitute for CSC115 or choosing another elective from the list): <sup>4</sup>		
CSC 116	Cybersecurity: An Introduction to Security in Cyberspace	
or CSC 119	Computers and Society	
or BTE 120	Introduction to Business Technology and Programming	
or BTE 320	Python Programming: Fundamentals and Algorithms	
or ECE 118	Introduction to Programming	
or GEG 310	Geographic Information Systems I	
or JMM 341	Web Design	
or MSC 203	Foundations of Computational Marine Science	
BIL 552	Bioinformatics Tools	
BTE 360	Systems Analysis and Design	
BTE 465	Web Application Development	
BTE 524	Mobile Apps Development	
BTE 535	Cybersecurity	
BTE 565	Mobile to Cloud: Developing Distributed Applications	
CIM 423	Building Virtual Worlds	
CIM 433	Augmented Reality	
CIM 453	Dynamic Data	
ECE 368	Internet Computing I	
ECE 414	Computer Organization and Design	
ECE 481	Senior Project I <sup>5</sup>	
ECE 482	Senior Project II <sup>5</sup>	
ECE 514	Computer Architecture	
ECE 548	Machine Learning	
ECE 553	Neural Networks	
ECE 570	Network Client-Server Programming	

ECE 572	Object-Oriented and Distributed Database Management Systems	
ECE 574	Agent Technology	
ECE 576	Internet and Intranet Security	
ECE 577	Data Mining	
ECE 579	Mobile Computing	
ECE 596	Special Topics in Computer Engineering	
GEG 410	Geographic Information Systems II	
MMI 504	Audio Software Development II	
MMI 505	Current Trends in Music Engineering I	
MSC 321	Scientific Computing in Marine and Atmospheric Sciences	
MTH 320	Introduction to Numerical Analysis	
MTH 505	Theory of Numbers	
MTH 520	Numerical Linear Algebra	
MTH 521	Numerical Methods in Differential Equations	
MTH 524	Introduction to Probability	
MTH 525	Introduction to Mathematical Statistics	
MTH 542	Statistical Analysis	
<b>General Education Requirements</b>		
Written Communication Skills:		
WRS 105	First-Year Writing I	3
WRS 106 or ENG 106	First-Year Writing II Writing About Literature and Culture	3
Quantitative Skills:		
MTH 161 or MTH 140 or MTH 151 or MTH 171	Calculus I (fulfilled through the major) Calculus Concepts with Foundations A Calculus I for Engineers Calculus I	
Areas of Knowledge:		
Arts and Humanities Cognate		9
People and Society Cognate		9
STEM Cognate (9 credits) (fulfilled through the major)		
<b>Additional Requirements for the B.A.</b> <sup>6</sup>		
Language Requirement		3-9
Natural Sciences Course		3
Minor Requirement (must be non-STEM)		15
Electives		42-36
<b>Total Credit Hours</b>		<b>120</b>

<sup>1</sup> CSC40X - Computer Science Practicum courses must be taken at the same time as their host courses.

<sup>2</sup> Maximally 6 credits from CSC481 - Undergraduate Teaching Assistant in Computer Science.

<sup>3</sup> CSC115 can be used as an elective towards the major only if taken before CSC120.

<sup>4</sup> BTE 120, BTE 320, ECE 118, or MSC203 may be taken from this list as an elective towards the major only as an approved substitute for CSC115 before CSC120.

<sup>5</sup> ECE 481 and 482 may also be used to replace any requirement for CSC410 or CSC411.

<sup>6</sup> For the Additional Major in Computer Science, Fundamentals, B.S. students in the College of Arts and Science should use the requirements of the B.S. in place of the additional requirements listed here. Students not in the College of Arts and Sciences should use the requirements of their school or college's degree,

## Suggested Plan of Study

Year One		Credit Hours
<b>Fall</b>		
CSC 120	Computer Programming I <sup>1</sup>	4
MTH 161	Calculus I	4

WRS 105	First-Year Writing I	3
Language Course		3
Elective		3
	<b>Credit Hours</b>	<b>17</b>
<b>Spring</b>		
CSC 220	Computer Programming II	4
MTH 309	Discrete Mathematics I	3
WRS 106 or ENG 106	First-Year Writing II or Writing About Literature and Culture	3
Language Course		3
Minor Course		3
	<b>Credit Hours</b>	<b>16</b>
<b>Year Two</b>		
<b>Fall</b>		
CSC 314	Computer Organization and Architecture	3
Natural Science Course		3
Language Course		3
Minor Course		3
People and Society Cognate Course		3
	<b>Credit Hours</b>	<b>15</b>
<b>Spring</b>		
CSC 322	System Programming	3
Minor Course		3
Arts and Humanities Cognate Course		3
People and Society Cognate Course		3
Writing Intensive Course		3
	<b>Credit Hours</b>	<b>15</b>
<b>Year Three</b>		
<b>Fall</b>		
CSC 317	Data Structures and Algorithm Analysis	3
Minor Course		3
Arts and Humanities Cognate Course		3
People and Society Cognate Course		3
Elective		3
	<b>Credit Hours</b>	<b>15</b>
<b>Spring</b>		
CSC 431	Introduction to Software Engineering	3
Writing Intensive Course		3
Minor Course		3
Arts and Humanities Cognate Course		3
Elective		3
	<b>Credit Hours</b>	<b>15</b>
<b>Year Four</b>		
<b>Fall</b>		
Computer Science Elective		3
Elective		3
Elective		3
Elective		3
Elective		3
	<b>Credit Hours</b>	<b>15</b>
<b>Spring</b>		
Computer Science Elective		3

Writing Intensive Course	3
Elective	3
Elective	3
<b>Credit Hours</b>	<b>12</b>
<b>Total Credit Hours</b>	<b>120</b>

<sup>1</sup> The prerequisites for CSC 120 are CSC 115 or MTH 141 or MTH 151 or MTH 161 or MTH 171 or MAS 110 or a score of 4 or 5 in AP Computer Science Principles (UM equivalency CSC 119).

## Mission

The Department's mission is to educate and perform scholarly activities in the discipline of Computer Science, in order to meet national and international demand for trained computer scientists who are capable of building the robust computation structures upon which society is becoming increasingly dependent.

## Goals

Students will acquire understanding and capability for the structure and developmental processes of software systems, from the translation of domain problems to forms amenable to software solution, through the production of efficient and robust computer programs, to the supporting systems and hardware components.

Students will acquire these abilities through a combination of classroom instruction, laboratory work, independent project work, and group project work.

Graduates will be prepared to work in industries that are directly involved in the development of fundamental computing resources (e.g., Microsoft, Apple, IBM, Intel, etc.), and in industries that rely on computation in support of their core businesses (e.g., banking, transport, manufacturing, medical, etc.).

Faculty and students will engage in activities that support and achieve the development of new techniques and software that can contribute to the science, and where appropriate contribute to the teaching objectives. Examples of such activities include academic research, development of novel techniques and software products, consulting and internship activities in local industries, and maintaining awareness of cutting edge approaches to Computer Science.

## Student Learning Outcomes

- Students must be able to translate domain problems to forms amenable to software solution.
- Students must be able to produce efficient and robust computer programs.
- Students must be able to build and deploy a completed, integrated, and documented (Advanced Writing and Communication Skills) software solution to a domain problem.
- Students must have understanding and competence in the mathematical foundations of Computer Science.