COMPUTER SCIENCE, M.S.

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Program Mission:

The computer science (CS) graduate program provides a quality CS education to students, especially those from underrepresented populations, by strengthening their leadership, analytical, and research skills to empower them to fulfill their career aspirations and to become productive computer science professionals.

The Master of Science (M.S.) degree requires 30 graduate credit hours of course work including a thesis (6 credits), or 33 graduate credit hours of course work including a project (3 credits). No more than twelve (12) graduate credits may be transferred from other graduate schools. Full-time students starting with a B.S. degree in Computer Science should expect to take 1-1/2 to 2 years to complete the Master of Science degree. Part-time students starting with a B.S. degree in Computer Science should complete the degree within four calendar years. Students in the accelerated online program should expect to take one (1) year to complete the M.S. degree.

There are four tracks of study:

1. Computer Science*
2. Emphasis in Information Assurance
3. Emphasis in Data Science and Machine Learning
4. Emphasis in Communication Networks

 *This track is also offered as an **accelerated online** program for project students only.

STANDARD M.S. PROGRAM

The M.S. program requires 30-33 graduate credit hours of course work including a thesis or a project. The 30 credits for the thesis track and 33 credits for project track which include 12 credits of core courses for all students. Thesis students need 12 elective course credits and 6 thesis credits. Project students need 18 elective credits and 3 project credits. All degree requirements must be completed within four calendar years.

Full-time students with a B.S. degree in Computer Science or related field should expect to complete the M.S. degree with thesis in 2 years and project in 1-1/2 to 2 years years. A cumulative GPA of 3.0/4.0 is required for graduation.

ACCELERATED ONLINE PROGRAM

The Accelerated Online program is designed for the adult learner, especially working professionals who wish to further their skills in an online format for students interested in Computer Science. Courses are offered in 7-week formats that allow flexibility to take one or two courses per term. Students can complete their degree in 12-months. For more information on this option see our website (https://online.nsu.edu/degrees/technology/masters-computer-science/general/).

B.S./M.S. ACCELERATED PROGRAM

The Accelerated Master of Science in Computer Science program allows promising students enrolled in the BS in Computer Science program, including any of its tracks, to gain admission to the Accelerated Master of Science program in Computer Science at Norfolk State University. Students that meet the eligibility requirements can enter the program, and upon designation of Junior standing in the Computer Science curriculum, can take any 500-level course with subject designation CSC for dual-credit toward the BS and MS degree programs. A maximum of 12 credits may be dual-counted toward the BS and MS degree requirements. Upon completion of the Accelerated Master of Science in Computer Science program, students will have earned the BS in Computer Science and the MS in Computer Science degrees. The dual-counted courses allow completion of the combined degrees on an accelerated time-scale.

Program Goal

To graduate students who are prepared to work in a computer science-related field or to enroll in a doctoral program in a computer science-related discipline, and who demonstrate creativity and innovative problem-solving skills.

Program Learning Outcomes

1. Demonstrate the ability to conduct independent research.

2. Demonstrate knowledge of the body of literature in one or more advance topics in computer science through critically analyzing and evaluating research findings..

3. Apply computing fundamentals in one or more areas of computer science.

4. Demonstrate proficiency in post undergraduate topics in the core areas of **data communication**, **operating systems**, **analysis of algorithms**, and **advanced computer architecture**.

Admissions

Apply online (https://www.nsu.edu/Admissions-Aid/Apply-Online/). Once your application is complete, the departmental Graduate Program Committee will review your package and decide on admission.

Application Requirements

M.S. Standard Program Admissions Requirements

1. Undergraduate degree from an accredited 4-year college or university in Computer Science, Computer Engineering, or related degree such as Electrical Engineering.
2. Generally, an overall major GPA of at least 2.8.
3. CV/Resume
4. Personal Statement
5. Three (3) letters of recommendation
6. Unofficial Transcript (An official transcript with your degree conferred is required upon acceptance for admission)

M.S. Accelerated Program Admissions Requirements

1. Undergraduate degree from an accredited 4-year college or university in Computer Science, Computer Engineering, or related degree such as Electrical Engineering.
2. Generally, an overall major GPA of at least 2.8.
3. CV/Resume
4. Personal Statement
5. One (1) letter of recommendation

6. Unofficial Transcript (An official transcript with your degree conferred is required upon acceptance for admission)

B.S./M.S. Admissions Requirements

1. Minimum CGPA: 3.0/4.0
2. Minimum CGPA: 3.0/4.0 across all Computer Science courses
3. Enrolled and in good academic standing in BS.CSC (any track)
4. Completion of BS.CSC, BS.CSC.CET, BS.CSC.DNIMAS, BS.CSC.CET.DNIMAS, BS. CSC.SET, or BS.CSC.CYBT curriculum through the third year
   a. Students must have earned at least **89** credits by the semester in which they seek to enroll in any MS.CSC courses
5. Personal Statement of motivation and career objectives (1 page)
6. Resume to include experience and qualifications
7. Letter of Reference from one (1) Computer Science, Engineering, Science or Mathematics Faculty

All required application materials must be uploaded to the application portal on or before the deadline. Enrollment in the program begins the semester following admission. Applications are available online (https://www.nsu.edu/Admissions-Aid/Apply-Online/).

Application Deadlines

M.S. Standard Program: **May 1** of each year for Fall and November 1 for Spring.

M.S. Accelerated Program: The Accelerated Online option accepts students **three (3) times per year**. Application deadlines can be found at Online NSU (https://online.nsu.edu/degrees/technology/masters-computer-science/general/).

BS/MS Program: **June 1** after completing at least 89 credits.

International Students

For international students, an official evaluated transcript is required for the application to be considered complete.

English Proficiency
To meet the English Proficiency requirement for admission, a TOEFL score of at least 80 or an IELTS score of at least 6.5 should be achieved. The TOEFL will be waived if a student has completed at least one year of full-time study at a college or university in an English-speaking country.

Financial Assistance

Financial assistance is available for graduate work and can include standard federal and state financial aid. There may be a limited number of teaching, research, and laboratory assistantships (TA, RA, and LA) awarded each year for students with a GPA of 3.0 or above.

Renewals of TA, RA, and LA awards are not automatic and are subject to annual review and availability of funding. The length of support does not exceed two academic years with one intervening summer (5 semesters total).

M.S. Standard Program
Summary of Graduation Requirements
Students completing a thesis will complete 30 credit hours and students completing a project will complete 33 credit hours.

Subject Area	Credits
Core Courses	12
Major Requirements	18-21
Total Credit Hours	**30-33**

Curriculum

Code	Title	Credits
Core Courses		**15-18**
CSC 530	Data Communication	
CSC 564	Operating Systems	
CSC 625	Analysis of Algorithems	
CSC 668	Advanced Computer Architecture	
CSC 798 & CSC 799	Masters Thesis I and Masters Thesis II	
or CSC 795	Masters Project	
Electives		**12-18**
Thesis students take 12 credits of elective courses; Project students take 18 credits of elective courses.		
CSC 571	Game Design and Development	
CSC 572	3D Game Programming	
CSC 573	Principals of Modeling and Simulation	
CSC 576	Advanced Computer Topics III	
CSC 577	Advanced Computer Topics IV	
CSC 580	Computer Graphics	
CSC 593	Systems Programming	
CSC 596	Compiler Construction	
CSC 611	Machine Learning	
CSC 612	Computational Science	
CSC 630	Computer Networks	
CSC 635	Computer Security II	
CSC 650	Cryptography	
CSC 660	Parallel Computing	
CSC 678	Scientific Visualization	
CSC 691	Graduate Independent Study I	
CSC 720	Wirless Sensor Networks	
CSC 730	Advanced Topics in Networking	
CSC 745	Network Defense	
CSC 755	Cloud Computing	
CSC 750	Evolutionary Computing	
CSC 760	Secure Software Development	
CSC 765	Advanced Topics in Information Assurance	
CSC 781	Advanced Graduate Topics I	
CSC 782	Advanced Graduate Computer Topics II	
CSC 791	Graduate Independent Study II	

Tracks

Information Assurance

Code	Title	Credits
CSC 535	Computer Security I	3
CSC 555	Management of Information Security	3
CSC 635	Computer Security II	3
CSC 650	Cryptography	3
CSC 745	Network Defense	3
CSC 760	Secure Software Development	3
CSC 765	Advanced Topics in Information Assurance	3-0
Total Credits		**21-18**

Communication Networks

Code	Title	Credits
CSC 530	Data Communication	3
CSC 630	Computer Networks	3-0
CSC 720	Wirless Sensor Networks	3
CSC 730	Advanced Topics in Networking	3-0
CSC 745	Network Defense	3
CSC 782	Advanced Graduate Computer Topics II	3-0
Total Credits		**18-9**

Data Science and Machine Learning

The Data Science and Machine Learning track at Norfolk State University equips students with the skills needed to organize, collect, analyze, and draw inferences from large unstructured and structured data sets. Graduates of this track will master the theory, algorithms and state-of-the-art tools used by professionals for collecting, mining, and analyzing large data sets. Graduates also will learn the skills needed to clearly communicate results make recommendations based on those results.

Requirements:

All students taking this track are required to take CSC 611 and CSC 614

- Thesis students are required to take at least 2 more courses from the list
- Project students are required to take at least 4 more courses from the list

Code	Title	Credits
CSC 521	Database Principles and Design	3-0
CSC 535	Computer Security I	3-0
CSC 570	Artificial Intelligence	3-0
CSC 611	Machine Learning	3-0
CSC 612	Computational Science	3-0
CSC 660	Parallel Computing	3-0
CSC 678	Scientific Visualization	3-0
CSC 750	Evolutionary Computing	3-0
CSC 755	Cloud Computing	3-0

PLAN OF STUDY OPTIONS

Option 1 (Thesis)

First Year		Credits
CSC 530	Data Communication	3
CSC 564	Operating Systems	3
CSC 625	Analysis of Algorithems	3
CSC 668	Advanced Computer Architecture	3
CSC XXX	Graduate Elective or Emphasis Course	3
CSC XXX	Graduate Elective or Emphasis Course	3
	Credits	**18**
Second Year		
CSC 798	Masters Thesis I	3
CSC XXX	Graduate Elective or Emphasis Course	3
CSC XXX	Graduate Elective or Emphasis Course	3
CSC 799	Masters Thesis II	3
	Credits	**12**
	Total Credits	**30**

Option 2 (Project)

First Year		Credits
CSC 530	Data Communication	3
CSC 564	Operating Systems	3
CSC 625	Analysis of Algorithems	3
CSC 668	Advanced Computer Architecture	3
CSC XXX	Graduate Elective or Emphasis Course	3
CSC XXX	Graduate Elective or Emphasis Course	3
	Credits	**18**
Second Year		
CSC XXX	Graduate Elective or Emphasis Course	3
CSC XXX	Graduate Elective or Emphasis Course	3
CSC XXX	Graduate Elective or Emphasis Course	3
CSC XXX	Graduate Elective or Emphasis Course	3
CSC 795	Masters Project	3
	Credits	**15**
	Total Credits	**33**

M.S. Accelerated Program

Summary of Graduation Requirements

Subject Area	Credits
Core Courses	12
Major Requirements	21
Total Credit Hours	**33**

Sample Plan of Study (Course sequence varies based on start term)

Course	Title	Credits
First Year		
Fall Mini-Term O		
CSC 530	Data Communication	3
CSC 611	Machine Learning	3
Fall Mini-Term P		

CSC 564	Operating Systems	3
CSC 745	Network Defense	3
Spring Mini-Term O		
CSC 555	Management of Information Security	3
CSC 625	Analysis of Algorithms	3
Spring Min-Term P		
CSC 535	Computer Security I	3
CSC 668	Advanced Computer Architecture	3
Summer Mini-Term O		
CSC 571	Game Design and Development	3
CSC 795	Master's Project	3
Summer Mini-Term P		
CSC 572	3D Game Programming	3
	Credits	**33**
	Total Credits	**33**

BS/MS ACCELERATED PROGRAM

Program Expectations

Accelerated students must:

- maintain required minimum CGPA's overall and in Undergraduate Computer Science courses
- earn a B-grade or higher in all attempted dual-credit courses
- earn the MS degree within two regular semesters of the conferral semester projected at the time of admission to the Accelerated Master of Science in Computer Science program; otherwise, they shall be dismissed from the Accelerated Master's program.
- If a student in the Accelerated Master of Science in Computer Science program has already completed CSC 430 and/or CSC 464 in the undergraduate program, then to fulfill the total credits requirement for the MS.CSC program s/he will be required to take suitable substitutions for CSC 530 and/or CSC 564, subject to approval by the GPC and the School of Graduate Studies as applicable.
- Students dismissed from the Accelerated program may not re-apply to it; however they may:
  - remain eligible to complete any remaining requirements to earn the BS.CSC as applicable;
  - apply for regular admission to NSU graduate programs for which they qualify, including but not limited to MS.CSC.

Summary of Graduation Requirements

Subject Area	Credits
BS Degree Requirements	108-114
MS Core Courses	12
MS Elective Courses	18
Project	3
Total Credit Hours	**141-147**

Dual Credit: Any 500 level courses with subject designation CSC will be eligible for credits in the BS.CSC, BS.CSC.D, BS.CSC.CET, BS.CSC.CET.D, BS.CSC.SET, BS.CSC.CYBT, and BS.CSC.CYBT.D programs. Students must achieve a B grade or higher in the designated 500-level courses to count towards MS.CSC degree requirements. Therefore, total degree requirements range from 141 to 147.

BS.CSC/MS.CSC plan of study

Take 500 level courses as shown below then complete the required and elective courses from the MS.CSC Curriculum.

Course	Title	Credits
Junior		
CSC 292	Unix and C Programming	3
CSC 380	Software Engineering	3
CSC 468	Computer Architecture	3
Science	First Semester Science Sequence	4
MTH 351	Probability & Statistics I	3
CSC 530	Data Communication	3
Elective	Computer Science Elective 300 level or above	3
Humanities	Humanities Elective	3
CSC 275	Fundamentals of Cybersecurity	3
	Credits	**28**
	Total Credits	**28**

Course	Title	Credits
Senior		
CSC 498	Computer Science Seminar I	2
CSC 564	Operating Systems	3
CSC XXX	Graduate Elective	3
CSC XXX	Computer Science Elective 300 level or above	3
Cultural	Social Science Cultural Elective	3
Cultural	Humanities Cultural Elective	3
CSC 499	Computer Science Seminar II	2
CSC XXX	Computer Science Elective 300 level or above	3
CSC XXX	Graduate Elective	3
CSC XXX or	Graduate Elective	3
MTH XXX	Mathematics Elective 300 level or above	
Elective	Free Elective	3
	Credits	**31**
	Total Credits	**31**

BS.CSC.D/MS.CSC PLAN OF STUDY

Take 500 level courses as shown below then complete the required and elective courses from the MS.CSC Curriculum.

Course	Title	Credits
Senior		
APS 410	Applied Science Seminar	0
CSC 530	Data Communication	3
CSC 564	Operating Systems	3
CSC 498	Computer Science Seminar I	2
CSC XXX	Graduate Elective	3
CSC XXX	Comptuer Science or Mathematics Electives 300 level or above	3
Cultural	Humanities Cultural Elective	3
APS 411	Applied Science Seminar	0
CSC 468	Computer Architecture	3

CSC 499	Computer Science Seminar II	2
CSC XXX	Graduate Elective	3
CSC XXX	Comptuer Science or Mathematics Electives 300 level or above	3
Cultural	Social Science Cultural Elective	3
	Credits	**31**
	Total Credits	**31**

BS.CSC.CET/MS.CSC PLAN OF STUDY

Take 500 level courses as shown below then complete the required and elective courses from the MS.CSC Curriculum.

Course	Title	Credits
Senior		
EEE 431	Microcontrollers	3
CSC 275	Fundamentals of Cybersecurity	3
Humanities	Humanities Elective	3
CSC 468	Computer Architecture	3
CSC 498	Computer Science Seminar I	2
Cultural	Social Science Cultural Elective	3
Cultural	Humanities Cultural Elective	3
CSC XXX	Graduate Elective	3
CSC 530	Data Communication	3
CSC 564	Operating Systems	3
CSC 499	Computer Science Seminar II	2
	Credits	**31**
	Total Credits	**31**

BS.CSC.CET.D/MS.CSC PLAN OF STUDY

Take 500 level courses as shown below then complete the required and elective courses from the MS.CSC Curriculum.

Course	Title	Credits
Senior		
APS 410	Applied Science Seminar	0
CSC 530	Data Communication	3
CSC 564	Operating Systems	3
CSC 498	Computer Science Seminar I	2
Cultural	Humanities Cultural Elective	3
ENG 303	Professional & Technical Writing	3
APS 411	Applied Science Seminar	0
EEE 231	Digital Logic Design	3
EEE 231L	Digital Logic Design Laboratory	1
CSC 468	Computer Architecture	3
CSC 499	Computer Science Seminar II	2
Elective	Foreign Language Elective	3
CSC XXX	Graduate Elective	3
Cultural	Social Science Cultural Elective	3
	Credits	**32**
	Total Credits	**32**

BS.CSC.SET/MS.CSC PLAN OF STUDY

Take 500 level courses as shown below then complete the required and elective courses from the MS.CSC Curriculum.

Course	Title	Credits
Junior		
CSC 372	Data Structures	3
ENG 303	Professional & Technical Writing	3
Cultural	Social Science Cultural Elective	3
MTH 351	Probability & Statistics I	3
Science	Second Science and Laboratory Elective	4
CSC 361	Survey of Programming Languages	3
CSC 420	Database Principles and Design	3
CSC 380	Software Engineering	3
CSC XXX	Graduate Elective	3
Humanities	Humanities Elective	3
	Credits	**31**
Senior		
CSC 498	Computer Science Seminar I	2
CSC 564	Operating Systems	3
CSC 485	Software Quality Assurance and Testing	3
CSC 530	Data Communication	3
CSC 486	Software Project Management	3
CSC 499	Computer Science Seminar II	2
CSC 468	Computer Architecture	3
Cultural	Humanities Cultural Elective	3
CSC 488	Distributed Software Systems	3
CSC 487	Engineering Secure Software Systems	3
	Credits	**28**
	Total Credits	**59**

BS.CSC.CYBT/MS.CSC PLAN OF STUDY

Take 500 level courses as shown below then complete the required and elective courses from the MS.CSC Curriculum.

Course	Title	Credits
Junior		
CSC 292	Unix and C Programming	3
CSC 380	Software Engineering	3
CSC 530	Data Communication	3
Science	First Semester of Science Sequence	4
MTH 351	Probability & Statistics I	3
CSC 449	Cryptography and Network Security	3
Humanities	Humanities Elective	3
CSC 420	Database Principles and Design	3
CSC 361	Survey of Programming Languages	3
CSC 535	Computer Security I	3
	Credits	**31**
Senior		
CSC 445	Computer Network Defense	3
CSC 498	Computer Science Seminar I	2
CSC 564	Operating Systems	3
CSC XXX	Graduate Elective	

CSC 313	Network Administration	3	CSC 5xx or above	Graduate Elective	18
Cultural	Social Science Cultural Elective	3	CSC 795	Master's Project	3
CSC 468	Computer Architecture	3			
CSC 499	Computer Science Seminar II	2			
CSC 494	Digital Forensics	3			
Cultural	Humanities Cultural Elective	3			
	Credits	**25**			
	Total Credits	**56**			

BS.CSC.CYBT.D/MS.CSC PLAN OF STUDY

Take 500 level courses as shown below then complete the required and elective courses from the MS.CSC Curriculum.

Course	Title	Credits
Junior		
APS 310	Applied Science Seminar	0
CSC 292	Unix and C Programming	3
CSC 361	Survey of Programming Languages	3
MTH 351	Probability & Statistics I	3
CSC XXX	Graduate Elective	3
ENG 285H	Honors Public Speaking	3
APS 311	Applied Science Seminar	0
CSC 372	Data Structures	3
CSC 380	Software Engineering	3
Elective	Foreign Language Elective	3
ENG 303	Professional & Technical Writing	3
PED 100	Fundamentals of Fitness for Life	1
HED 100	Personal and Community Health	2
	Credits	**30**
Senior		
APS 410	Applied Science Seminar	0
CSC 530	Data Communication	3
CSC 564	Operating Systems	3
CSC 498	Computer Science Seminar I	2
CSC 313	Network Administration	3
Cultural	Humanities Cultural Elective	3
APS 411	Applied Science Seminar	0
CSC 468	Computer Architecture	3
CSC 499	Computer Science Seminar II	2
CSC 494	Digital Forensics	3
CSC 449	Cryptography and Network Security	3
Cultural	Social Science Cultural Elective	3
	Credits	**28**
	Total Credits	**58**

MS.CSC PLAN OF STUDY

Code	Title	Credits
CSC 530	Data Communication	3
CSC 564	Operating Systems	3
CSC 625	Analysis of Algorithms	3
CSC 668	Advanced Computer Architecture	3