

Computer Science (BS): Game Development Concentration

Program Overview

The Department of Computer Science in the College of Engineering at NC State University offers a Bachelor of Science in Computer Science degree. The program is accredited by the Computing Accreditation Commission of ABET, <https://www.abet.org>.

Students complete the standard set of engineering first-year courses, which include courses in the humanities, chemistry, mathematics, physics, and computing. Students may apply to join the Department of Computer Science as degree-seeking students via the CODA process (<https://www.engr.ncsu.edu/academics/undergrad/coda/>).

The Computer Science curriculum teaches students the skills needed to understand, design, implement, test, and deploy computer systems and software systems. Core courses provide a foundation for all students in programming languages, data structures, software engineering, computer architectures, the theory of computation, the basics of building secure software and systems, teaming and communication, and the social and ethical dimensions of the practice of computer science.

All Computer Science majors must complete a team project in Senior Design. Projects under the auspices of the department's Senior Design Center (<https://sdc.csc.ncsu.edu/>) have industrial sponsors, so student teams gain experience working jointly with industry representatives to achieve project goals. Senior Design teams are expected to solve a technical computing problem while effectively communicating their work and process to various audiences.

To see more about what you will learn in this program, visit the Learning Outcomes website (<https://apps.oirp.ncsu.edu/pgas/>)!

Game Development Concentration

Computer games are some of the most complex software development projects and employ some of the most advanced technologies of any application area of computer science. The entertainment software sector is a multi-billion dollar industry with increasing demand for new employees trained in these technologies and methods. In addition to the more familiar entertainment sector, these technologies also have applications to such areas as training, education, visualization, and social interaction forums — so-called “serious games.” North Carolina is now among the top tier of US states with centers of game industry employment. As the game industry continues to grow, demand by North Carolina companies for new graduates with a strong background in computer science with a focus on game development will also expand.

Many aspects of computer game development are unique to the game industry and the Game Development Concentration provides specialized coursework in these areas. The Game Development Concentration focuses on game development technologies while preserving the breadth and depth of the general computer science BS degree. The concentration requires that students take 21 hours of games-focused courses. Of the nine credit hours required for other electives, students in the concentration must select three courses from a list that spans topics such as fiction writing, film, and music. These courses provide grounding

in the creation of conventional media and provide the background in these disciplines needed to participate in the multidisciplinary aspects of the design of games. Finally, students must complete a games-focused semester-long project either through Senior Design or an independent study/research project.

Departmental Information

The Department of Computer Science is located in Engineering Building II on NC State's Centennial Campus.

Department of Computer Science

Contact Computer Science Academic Advising

Plan Requirements

Code	Title	Hours	Counts towards
Major Field of Study Requirements			
Math			
MA 141	Calculus I ^{1,2}	4	
MA 241	Calculus II ^{1,2}	4	
MA 242	Calculus III	4	
MA 305	Introductory Linear Algebra and Matrices	3	
ST 370	Probability and Statistics for Engineers	3	
Sciences			
CH 101 & CH 102	Chemistry - A Molecular Science and General Chemistry Laboratory ^{1,2}	4	
PY 205 & PY 206	Physics for Engineers and Scientists I and Physics for Engineers and Scientists I Laboratory ^{1,2}	4	
PY 208 & PY 209	Physics for Engineers and Scientists II and Physics for Engineers and Scientists II Laboratory	4	
Basic Science Elective (p. 2)		3	
CSC Major			
CSC 116	Introduction to Computing - Java ²	3	

CSC 216 & CSC 217	Software Development Fundamentals and Software Development Fundamentals Lab ²	4
CSC 226	Discrete Mathematics for Computer Scientists ²	3
CSC 230	C and Software Tools	3
CSC 246	Concepts and Facilities of Operating Systems for Computer Scientists	3
CSC 316	Data Structures and Algorithms	3
CSC 326	Software Engineering	4
CSC 333	Automata, Grammars, and Computability	3
CSC 379	Ethics in Computing	1
CSC 492	Senior Design Project	3
Other Major		
CSC Restricted Elective (p.)		3
Other Restricted Electives 300+ (p.)		3
ENG 331	Communication for Engineering and Technology	3
Concentration Courses/Groups/ Electives		
CSC 481	Game Engine Foundations ²	3
CSC Games Core (p. 3) ²		3
CSC Games Restricted Elective (p. 3) ²		6
Games Restricted Electives (p. 3)		9
Games Project (verify requirement) ⁴		
College Requirements		
E 101	Introduction to Engineering & Problem Solving ^{1,3}	1
E 102	Engineering in the 21st Century ²	2

E 115	Introduction to Computing Environments ¹	1
EC 205	Fundamentals of Economics	3
or EC 201	Principles of Microeconomics	
or ARE 201	Introduction to Agricultural & Resource Economics	

General Education Program Requirements

ENG 101 ^{1,3}		4
GEP Humanities (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/)		6
GEP Social Sciences (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/)		3
GEP US Diversity, Equity, and Inclusion (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-usdei/)		3
GEP Interdisciplinary Perspectives (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/)		3
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)		2
GEP Global Knowledge (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-global-knowledge/) (verify requirement)		
Foreign Language Proficiency (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/foreign-language-proficiency/) (verify requirement)		
Total Hours		121

¹ College of Engineering CODA classes

² Grade of C or higher required

³ Grade of C minus or higher required

⁴ Students must complete a departmentally approved Games-focused project as part of CSC 492, CSC 498, or CSC 499.

Basic Science Elective

Code	Title	Hours	Counts towards
BIO ***			
CH 201	Chemistry - A Quantitative Science	3	

MEA ***

PB ***

PY 123	Stellar and Galactic Astronomy	3
PY 124	Solar System Astronomy	3
PY 328	Stellar and Galactic Astrophysics	3
PY 341	Relativity, Gravitation and Cosmology	3
PY 401	Quantum Physics I	3
PY 402	Quantum Physics II	3
PY 407	Introduction to Modern Physics	3
PY 411	Mechanics I	3
PY 412	Mechanics II	3
PY 413	Thermal Physics	3
PY 414	Electromagnetism I	3
PY 415	Electromagnetism II	3

ZOO ***

CSC Games Core

Code	Title	Hours	Counts towards
CSC 461	Computer Graphics	3	
CSC 486	Computational Visual Narrative	3	

CSC Games Restricted Electives

Code	Title	Hours	Counts towards
CSC 411	Introduction to Artificial Intelligence	3	
CSC 454	Human-Computer Interaction	3	
CSC 461	Computer Graphics	3	
CSC 462	Advanced Computer Graphics Projects	3	
CSC 48*		3	
CSC 582	Computer Models of Interactive Narrative	3	
CSC 584	Building Game AI	3	

Games Restricted Electives

Code	Title	Hours	Counts towards
CSC 281	Foundations of Interactive Game Design	3	
COM 327	Critical Analysis of Communication Media	3	
COM 427	Game Studies	3	
ENG 282	Introduction to Film	3	
ENG 288	Fiction Writing	3	
ENG 376	Science Fiction	3	
ENG 377	Fantasy	3	
ENG 492	Special Topics in Film Styles and Genres	3	
MUS 306	Music Composition with Computers	3	

Other Restricted Electives 300+

Code	Title	Hours	Counts towards
CSC Restricted Elective Courses		1-6	
ACC 310	Intermediate Financial Accounting I	3	
ACC 311	Intermediate Financial Accounting II	3	
ACC 330	An Introduction To Income Taxation	3	
ACC 340	Accounting Information Systems	3	
ARS 306	Music Composition with Computers	3	
BUS 320	Financial Management	3	
BUS 340	Information Systems Management	3	
BUS 360	Marketing Methods	3	
BUS 4**			
CHE 435	Process Systems Analysis and Control	3	
CHE 465	Colloidal and Nanoscale Engineering	3	

CSC 427	Introduction to Numerical Analysis I	3	MA 405	Introduction to Linear Algebra	3
CSC 428	Introduction to Numerical Analysis II	3	MA 407	Introduction to Modern Algebra for Mathematics Majors	3
EC 3**			MA 408	Foundations of Euclidean Geometry	3
EC 4**			MA 410	Theory of Numbers	3
EC 5**			MA 412	Long-Term Actuarial Models	3
ECE 3** (except for ECE 309)			MA 413	Short-Term Actuarial Models	3
ECE 4**			MA 425	Mathematical Analysis I	3
ECE 5**			MA 426	Mathematical Analysis II	3
EMS 480	Teaching Mathematics with Technology	3	MA 427	Introduction to Numerical Analysis I	3
GC 320	3D Spatial Relations	3	MA 428	Introduction to Numerical Analysis II	3
GC 350	Applied CAD/D and Geometric Controls	3	MA 430	Mathematical Models in the Physical Sciences	3
GC 420	Visual Thinking	3	MA 432	Mathematical Models in Life Sciences	3
GN 5**			MA 437	Applications of Algebra	3
ISE 311	Engineering Economic Analysis	3	MA 440	Game Theory	3
ISE 361	Deterministic Models in Industrial Engineering	3	MA 5**		
ISE 4**			MAE 3**		
ISE 5**			MAE 4**		
LOG 335	Symbolic Logic	3	MAE 5**		
LOG 435	Advanced Logic & Metamathematics	3	MIE 3**		
LOG 535	Advanced Logic and Metamathematics	3	MIE 4**		
MA 302	Numerical Applications to Differential Equations	1	MSE 3**		
MA 341	Applied Differential Equations I	3	MSE 4**		
MA 351	Introduction to Discrete Mathematical Models	3	MSE 5**		
MA 401	Applied Differential Equations II	3	MUS 306	Music Composition with Computers	3
MA 402	Mathematics of Scientific Computing	3	NE 3**		
MA 403	Introduction to Modern Algebra	3	NE 4**		
			NE 5**		
			OR 5**		
			PHI 425	Introduction to Cognitive Science	3

PSY 307	Industrial and Organizational Psychology	3
PSY 340	Human Factors Psychology	3
PSY 400	Perception	3
PSY 420	Cognitive Processes	3
PSY 425	Introduction to Cognitive Science	3
PY 4**		
PY 5**		
ST 372	Introduction to Statistical Inference and Regression	3
ST 4**		
ST 5**		

CSC Restricted Electives

Code	Title	Hours	Counts towards
CSC 236	Computer Organization and Assembly Language for Computer Scientists	3	
CSC 302	Introduction to Numerical Methods	3	
CSC 342	Applied Web-based Client-Server Computing	3	
CSC 401	Data and Computer Communications Networks	3	
CSC 402	Networking Projects	3	
CSC 405	Computer Security	3	
CSC 406	Architecture Of Parallel Computers	3	
CSC 411	Introduction to Artificial Intelligence	3	
CSC 412	Compiler Construction	3	
CSC 414	Foundations of Cryptography	3	
CSC 415	Software Security	3	
CSC 416	Introduction to Combinatorics	3	

CSC 417	Theory of Programming Languages	3
CSC 419	DevOps: Modern Software Engineering Practices	3
CSC 422	Automated Learning and Data Analysis	3
CSC 431	File Organization and Processing	3
CSC 433	Privacy in the Digital Age	3
CSC 440	Database Management Systems	3
CSC 442	Introduction to Data Science	3
CSC 447	Introduction to Cloud Computing	3
CSC 450	Web Services	3
CSC 453	Introduction to Internet of Things (IoT) Systems	3
CSC 454	Human-Computer Interaction	3
CSC 455	Social Computing and Decentralized Artificial Intelligence	3
CSC 456	Computer Architecture and Multiprocessors	3
CSC 461	Computer Graphics	3
CSC 462	Advanced Computer Graphics Projects	3
CSC 467	Multimedia Technology	3
CSC 471	Modern Topics in Cybersecurity	3
CSC 472	Cybersecurity Projects	3
CSC 474	Network Security	3
CSC 481	Game Engine Foundations	3
CSC 482	Advanced Computer Game Projects	3
CSC 484	Building Game AI	3
CSC 486	Computational Visual Narrative	3

CSC 495	Special Topics in Computer Science	1-6
CSC 498	Independent Study in Computer Science	3
CSC 499	Independent Research in Computer Science	1-6
CSC 5**		
ECE 482	Engineering Entrepreneurship and New Product Development I	3
ECE 483	Engineering Entrepreneurship and New Product Development II	3
MA 414	Foundations of Cryptography	3
MA 416	Introduction to Combinatorics	3
ST 442	Introduction to Data Science	3

Semester Sequence

This is a sample.

Semester Sequence ^{4, 5}

This is a sample.

First Year

Fall Semester		Hours
CH 101 & CH 102	Chemistry - A Molecular Science and General Chemistry Laboratory ^{1, 2}	4
E 101	Introduction to Engineering & Problem Solving ^{1, 3}	1
E 115	Introduction to Computing Environments ¹	1
ENG 101	Academic Writing and Research ^{1, 3}	4
MA 141	Calculus I ^{1, 2}	4
Hours		14
Spring Semester		Hours
CSC 116	Introduction to Computing - Java ²	3
MA 241	Calculus II ^{1, 2}	4
PY 205 & PY 206	Physics for Engineers and Scientists I and Physics for Engineers and Scientists I Laboratory ^{1, 2}	4
E 102	Engineering in the 21st Century ^{1, 2}	2
EC 205 or EC 201 or ARE 201	Fundamentals of Economics or Principles of Microeconomics or Introduction to Agricultural & Resource Economics	3
Hours		16

Second Year

Fall Semester

CSC 216 & CSC 217	Software Development Fundamentals and Software Development Fundamentals Lab ²	4
CSC 226	Discrete Mathematics for Computer Scientists ²	3
MA 242	Calculus III	4
PY 208 & PY 209	Physics for Engineers and Scientists II and Physics for Engineers and Scientists II Laboratory	4
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)		1
Hours		16

Spring Semester

CSC 230	C and Software Tools	3
CSC 316	Data Structures and Algorithms	3
CSC 333	Automata, Grammars, and Computability	3
MA 305	Introductory Linear Algebra and Matrices	3
GEP Requirement (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)		3
Hours		15

Third Year

Fall Semester

CSC 246	Concepts and Facilities of Operating Systems for Computer Scientists	3
CSC 481	Game Engine Foundations ²	3
ST 370	Probability and Statistics for Engineers	3
Games Restricted Elective (p. 3)		3
GEP Requirement (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)		3
Hours		15

Spring Semester

CSC 326	Software Engineering	4
CSC 379	Ethics in Computing	1
CSC Games Core (p. 3) ²		3
ENG 331	Communication for Engineering and Technology	3
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)		1
Other Restricted Electives 300+ (p.)		3
Hours		15

Fourth Year

Fall Semester

CSC 492	Senior Design Project ⁷	3
CSC Games Restricted Elective (p. 3) ²		3
Games Restricted Elective (p. 3)		3
Basic Science Elective (p. 2) ³		3
GEP Requirement (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)		3
Hours		15

Spring Semester

CSC Restricted Elective (p.)	3
CSC Games Restricted Elective (p. 3) ²	3
Games Restricted Elective (p. 3)	3
GEP Requirement (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)	3
GEP Requirement (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)	3
Hours	15
Total Hours	121

¹ Courses required for matriculation (CODA).

² Grade of C or higher required.

³ A grade of C- or higher is required.

⁴ One of the following two conditions regarding the major GPA is required: I) the major GPA, which consists of all CSC courses attempted at NCSU, must be 2.0 or higher or II) a student whose major grade point average is below 2.0 may graduate if no CSC course used to satisfy the major requirements has a grade below a C-.

⁵ Students must complete a departmentally approved Games-focused project as part of CSC 492, CSC 498, or CSC 499.

Career Opportunities

Designing computer systems, and the software that runs on them is the job of computer scientists. Computer scientists find demand for their innovation, design, analysis, testing, and engineering skills across all domains. As a direct consequence of the increasingly critical role of computers in society, the discipline of computer science has enjoyed rapid growth for many years, with the trend likely to continue.

Employment projections indicate a critical nationwide shortfall in the supply of people skilled in computing and information technology, and a resulting steady rise in demand and salaries, for decades to come. Computer Science graduates from NC State are in high demand, including by employers that are extremely selective in their national recruiting.

Anchoring one corner of the world-famous Research Triangle Park, and located in modern state-of-the-art teaching and research facilities on NC State's Centennial Campus, the department and its students and faculty benefit from strong and active industry partnerships. NC State Computer Science is one of the top suppliers in the nation of new graduate hires to a number of high-tech companies, including several Fortune 500 companies, some with a substantial presence in the Research Triangle. Starting salaries for our undergraduates now average over \$75,000 and show a steady increase. Opportunities are also plentiful for graduate study for those who wish to pursue the field in more depth.