

COMPUTER SCIENCE CYBER OPERATIONS MAJOR, BACHELOR OF SCIENCE (BS)

Exam Requirement: All Computer Science majors are required to pass the Advanced Programming Exam prior to taking courses for which it is a prerequisite. Passing the exam is required for graduation and no exam waivers will be granted for degree completion.

Note: no course may be used as both a requirement and an elective in a student's program.

Grade Requirements: As a computer science student, you are expected to maintain an overall university GPA ≥ 2.3 . Each computer science course must be completed with a minimum grade $\geq C+$. All supporting courses required by the department must be completed with a minimum grade $\geq C$.

Required Computer Science Courses

CSCD 202	COMPUTING ETHICS	4
CSCD 210	PROGRAMMING PRINCIPLES I	5
CSCD 211	PROGRAMMING PRINCIPLES II	5
CSCD 212	OBJECT ORIENTED PROGRAMMING WITH DESIGN PATTERNS	5
CSCD 240	C AND UNIX PROGRAMMING	5
CSCD 260	ARCHITECTURE AND ORGANIZATION	4
CSCD 300	DATA STRUCTURES	5
CSCD 303	COMPUTER AND INFORMATION SECURITY	4
CSCD 320	ALGORITHMS	5
CSCD 327	RELATIONAL DATABASE SYSTEMS	4
CSCD 330	COMPUTER NETWORKS	4
CSCD 340	OPERATING SYSTEMS	5
CSCD 350	SOFTWARE DEVELOPMENT PRINCIPLES	4

Required Cybersecurity Courses

CSCD 433	ADVANCED NETWORKING CONCEPTS	4
CSCD 434	NETWORK SECURITY	4
CSCD 437	SECURE CODING	4
CYBR 403	CYBERSECURITY POLICIES, PRIVACY AND LAWS	4
CYBR 410	APPLIED CYBER DEFENSE	4
CYBR 412	APPLIED CYBER OPERATIONS	4
CYBR 455	DIGITAL FORENSICS AND CYBERCRIME	4

Required Supporting Courses

EENG 160	DIGITAL CIRCUITS	5
MATH/HONS 161	CALCULUS I	5
MATH 162	CALCULUS II	5
MATH 231	LINEAR ALGEBRA	5
MATH 301	DISCRETE MATHEMATICS	5
MATH 380	ELEMENTARY PROBABILITY AND STATISTICS	5

Required Laboratory Science Sequence—choose one sequence from 0-13 the following

Biology

BIOL 171	BIOLOGY I	
BIOL 172	BIOLOGY II	
BIOL 270	BIOLOGICAL INVESTIGATION	

Chemistry

CHEM 171 & 171L & CHEM 172 & CHEM 172L	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LABORATORY I and GENERAL CHEMISTRY II and GENERAL CHEMISTRY LABORATORY II	
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Geology

GEOS 111	THE EARTH'S INTERIOR	
GEOS 112	THE EARTH'S SURFACE	

Physics

PHYS 151	GENERAL PHYSICS I	
PHYS 152	GENERAL PHYSICS II	
PHYS 161	MECHANICS LABORATORY	
PHYS 162	HEAT AND OPTICS LABORATORY	

Required Electives—choose two courses from the following 8

Note: many of these elective courses have prerequisites.

Notes: No course may be used for an elective that is used to satisfy another major requirement. Upper division MATH or CSCD 495–499 courses must have prior department approval of topic content.

CSCD 409	SCIENTIFIC PROGRAMMING	
CSCD 420	AUTOMATA AND COMPILERS	
CSCD 423	RANDOMIZED ALGORITHMS AND PROBABILISTIC ANALYSIS	
CSCD 427	ADVANCED DATABASE MANAGEMENT SYSTEMS	
CSCD 429	DATA MINING	
CSCD 430	BIG DATA ANALYTICS	
CSCD 435	PRINCIPLES OF PROGRAMMING LANGUAGE	
CSCD 439	TOPICS IN COMPUTER SCIENCE (prior departmental approval of topic content is required)	
CSCD 443	DISTRIBUTED MULTIPROCESSING	
CSCD 445	GPU COMPUTING	
CSCD 460	ADVANCED ARCHITECTURE AND ORGANIZATION	
CSCD 461	EMBEDDED SYSTEMS	
CSCD 462	EMBEDDED REAL-TIME CONTROL	
CSCD 467	PARALLEL AND CLOUD COMPUTING	
CSCD 470	3D COMPUTER GRAPHICS PRINCIPLES	
CSCD 471	ADVANCED 3D COMPUTER GRAPHICS	
CSCD 477	VIRTUAL REALITY AND DATA VISUALIZATION	
CSCD 480	INTELLIGENT SYSTEMS	
CSCD 483	MODELING AND SIMULATION	
CSCD 487	HUMAN COMPUTER INTERFACE	
CSCD 495	INTERNSHIP (variable credit—up to two 4 credit internships are allowed)	
CSCD 496	EXPERIMENTAL COURSE (variable credit—prior departmental approval of topic content is required)	
CSCD 498	SEMINAR (variable credit—may be repeated)	
CSCD 499	DIRECTED STUDY (variable credit—prior departmental approval of topic content is required)	

Required Senior Capstone Series

CSCD 488	SENIOR PROJECT	5
CSCD 490	SENIOR CAPSTONE	5

Total Credits 145-148

University Competencies and Proficiencies

English (<http://catalog.ewu.edu/undergraduate-degree/#newitemtext>)
 Quantitative and Symbolic Reasoning (<http://catalog.ewu.edu/undergraduate-degree/#mathcompproficiencies>)
 Placement and Clearance Exams (<http://catalog.ewu.edu/undergraduate-degree/#placement>)
 Prior Learning/Sources of Credit AP, CLEP, IB (<http://catalog.ewu.edu/prior-learning/>)

General Education Requirements (<http://catalog.ewu.edu/undergraduate-degree/#generaleducationrequirements>) (GER)

- Minimum Credits—180 cumulative credit hours
 - 60 upper-division credits (300 level or above)
 - 45 credits in residence (attendance) at Eastern, with at least 15 upper-division credits in major in residence at Eastern
- Minimum Cumulative GPA ≥ 2.0

Breadth Area Core Requirements (<http://catalog.ewu.edu/undergraduate-degree/#generaleducationcorerequirements>) (BACR)

Humanities and Arts (<http://catalog.ewu.edu/undergraduate-degree/#humanitiesandfinearts>)
 Natural Sciences (<http://catalog.ewu.edu/undergraduate-degree/#naturalsciences>)
 Social Sciences (<http://catalog.ewu.edu/undergraduate-degree/#socialsciences>)

University Graduation Requirements (<http://catalog.ewu.edu/undergraduate-degree/#universitygraduationrequirements>) (UGR)

Diversity Course List (<http://catalog.ewu.edu/undergraduate-degree/#cultureandgenderdiversity>)
 Foreign Language (<http://catalog.ewu.edu/undergraduate-degree/#foreignlanguage>) (for Bachelor of Arts)
 Global Studies Course List (<http://catalog.ewu.edu/undergraduate-degree/#internationalstudies>)
 Minor or Certificate (<http://catalog.ewu.edu/undergraduate-degree/#majorminororcertificate>)
 Senior Capstone Course List (<http://catalog.ewu.edu/undergraduate-degree/#capstonecourse>)

All admitted students must officially Declare a Major (<https://inside.ewu.edu/center-for-academic-advising-and-retention/academic-planning-tools/declare-your-major/>) by the time they reach 90 credits (junior standing).

Application for Graduation (use EagleNET (<https://inside.ewu.edu/eaglenet/>)) must be made at least two terms in advance of the term you expect to graduate (undergraduate and post-baccalaureate).

Use the Catalog Archives (<https://catalog.ewu.edu/archives/>) to determine two important catalog years (<http://catalog.ewu.edu/undergraduate-degree/#activecatalogrule>).

Degree Works (<https://inside.ewu.edu/records-and-registration/degree-works/>) calculates based on these two catalog years.

2. The catalog *in effect at the time the student declares a major or minor* is used to determine the program requirements.

Students who successfully earn a BS in Computer Science Cyber Operations from EWU should be able to do the following:

- analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify solutions;
- design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline, utilizing techniques, skills, and tools necessary for computing practice;
- communicate effectively in a variety of professional contexts;
- recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles, including local and global impacts of computing solutions on individuals, organizations, and society;
- function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline;
- apply computer science theory and software development fundamentals to produce computing-based solutions;
- apply security principles and practices to maintain operations in the presence of risks and threats.

1. The catalog *in effect at the student's first term* of current matriculation is used to determine **BACR** (Breadth Area Credit Requirements) and **UGR** (Undergraduate Graduation Requirements).