COMPUTER SCIENCE MAJOR (BS)

The BS in Computer Science program supports the mission of the University by providing a curriculum focusing on the most advanced practices of computer science through continued assessment by employers, alumni, faculty and students. The BS in Computer Science is accredited by the Computing Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET), http://www.abet.org. Students may obtain a concentration in Computer Engineering or Software Engineering.

The Program Educational Objectives (PEOs) are broad statements that describe what alumni do within a few years following graduation. The BS in Computer Science program is committed to our alumni who, within a few years of their graduation, are expected to:

1. Apply their in-depth understanding in areas of computer science and engineering to solve problems in a modern technological society as productive computer scientists or engineers and/or enter and succeed in a graduate program.
2. Function effectively, both individually and within multi-disciplinary teams.
3. Continue as lifelong learner to develop their computing and engineering abilities, problem-solving skills, and aptitude for innovation.
4. Practice professional ethics with social and cyber responsibility through service in the framework of a global technical community.

Student Outcomes:

1. Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
3. Communicate effectively in a variety of professional contexts.
4. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
5. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
6. Apply computer science theory and software development fundamentals to produce computing-based solutions.

The program emphasizes the complete process of developing computing-based solutions. Students learn how to gather requirements, design, develop, test, deploy, and maintain software using rigorous computing practices. They are taught how to leverage technology to create flexible and scalable applications and to address the challenges that arise during the development process. Also, the program exposes students to a range of other disciplines, such as the physical sciences, social sciences, economics, and business so they gain an understanding of the real world scenarios that make up the computer science environment. Theoretical courses are supported by rigorous laboratory tasks.

Fairfield's computer science curriculum encompasses a truly unique combination of experiences:

- Experiential Hands-On Learning: A unique curriculum guarantees computer science students the equivalent of 20 months of real-world experience through a sophomore year service-learning initiative, a junior year entrepreneurial experience, and an industry-based senior capstone project.
- Cross-Disciplinary Engineering Exposure: As part of the School of Engineering and Computing, computer science students have access to other engineering disciplines and engineering-heavy industries, which expands career opportunities exponentially.
- Student Mentoring: By volunteering as high school mentors, students learn valuable management skills, they become comfortable explaining highly technical concepts simply and clearly, and they experience the satisfaction of sharing their knowledge to help others.
- Liberal Arts Core: A strong foundation in the liberal arts encourages engineers to think critically, design imaginatively, communicate clearly and collaborate productively.
- Academic/Research Activities and Internship: Companies from a variety of domains, such as The Weather Company (visualization), Federal Aviation Administration (software engineering and data mining), Saugatuck Energy (artificial intelligence) have an on-campus presence and provide computer science students opportunities to interact with industry leaders.

Major Requirements

Bachelor of Science in Computer Science

127 credits

Major Requirements

For a major in Computer Science, students complete the following:

Code	Title	Credits
Foundation Courses		
CPEG 2245 & 2245L	Digital Design I and Digital Design I Lab	4
CPSC 1101	Introduction to Computing (placement based)	3
or ENGR 1031	Fundamentals of Engineering	
CPSC 1131	Fundamentals of Programming	3
CPSC 2231 & 2231L	Programming Workshop and Programming Workshop Lab	4
CPSC 2232 & 2232L	Data Structures and Data Structures Lab	4
MATH 1141	Calculus I for Chemistry, Engineering, and Physics Majors [1]	4
MATH 1142	Calculus II for Chemistry, Engineering, and Physics Majors [1]	4
MATH 2231	Discrete Mathematics	3
Select two natural science electives with labs [1]		8
Select two elective courses in Mathematics [2]		6
Depth Courses		
CPEG 3346	Computer Systems Architecture	3
CPSC 2250L	Computer Science Sophomore Clinic	1
CPSC 2304	Web Development	3
CPSC 3333	Introduction to Cybersecurity	3
CPSC 3343	Design and Analysis of Algorithms	3

CPSC 3351L	Computer Science Junior Clinic I	1
CPSC 3352L	Computer Science Junior Clinic II	1
CPSC 3354	Theory of Programming Languages	3
ENGR 4961	Senior Design Project I	3
ENGR 4962	Senior Design Project II	3
SWEG 3301	Software Engineering Methods	3
SWEG 3302	Software Design Methods	3
CPSC 4331	Operating Systems	3
Select one major elective from the following five courses:		3
CPSC 4322	Visual Analytics	
CPSC 4355	Artificial Intelligence	
CPSC 4357	Database Management Systems	
CPSC 4360	Machine Learning	
CPSC 4521	Information Visualization ( )	
Select a second major elective from the following two courses:		3
CPSC 3349	Cloud Computing	
CPSC 4314	Network Security	
Select two additional major electives in Computer Science [3]		6
Total Credits		**88**

1 Fulfills Magis Core Exploration requirement

2 Math courses may be 3 or 4 credits

3 Major electives are chosen from the department, under advisement of the faculty advisor and department chair

In addition to Magis Core, foundation, and depth courses, students must complete two general electives (6 credits) for the BS in Computer Science Major.

Concentrations

Concentrations in Software Engineering and Computer Engineering are available to students majoring in Computer Science. These concentrations build on required courses in the program and require students to complete additional credits.

Computer Engineering Concentration

Code	Title	Credits
CPEG 2245 & 2245L	Digital Design I and Digital Design I Lab	4
CPEG 3346	Computer Systems Architecture	3
Select two courses from the following:		6-7
CPEG 3246	Digital Electronics Design II	
CPEG 3331	Biomedical Signal Processing	
CPEG 4320	Computer Networks	
or CPSC 4314	Network Security	
CPEG 4332	Biomedical Imaging	
ELEG 3348 & 3348L	Embedded Microcontrollers and Embedded Microcontrollers Lab	
Total Credits		**13-14**

Software Engineering Concentration

Code	Title	Credits
SWEG 3301 & CPSC 3351L	Software Engineering Methods and Computer Science Junior Clinic I	4
SWEG 3302 & CPSC 3352L	Software Design Methods and Computer Science Junior Clinic II	4
SWEG 4320	Software Testing and Maintenance	3
SWEG 4321	Software Project Management	3
or SWEG 4312	Agile Software Engineering	
Total Credits		**14**

Magis Core Requirements

Magis Core Relationship to the Computer Science Major

In addition to the engineering-specific major requirements, students are required to fulfill the University's Magis Core requirements. The following table relates the Magis Core requirements to the BS in Computer Science major.

Tier I: Orientation

Code	Title	Credits
English		
ENGL 1001	Introduction to Rhetoric and Composition	3
History		
Select one HIST 1000-level course		3
or CLST 1115 or CLST 1116		
Mathematics		
MATH 1141	Calculus I for Chemistry, Engineering, and Physics Majors	4
Modern or Classical Language		
Select one language course based on placement [1]		
Philosophy		
PHIL 1101	Introduction to Philosophy	3
Religious Studies		
Select one RLST 1000-level course		3
Modern/Classical Language or Mathematics		
MATH 1142	Calculus II for Chemistry, Engineering, and Physics Majors	4
Total Credits		**20**

1 If starting a new language, a placement exam is not necessary.

Tier II: Exploration

Code	Title	Credits
Behavioral and Social Sciences		
Select two courses from the following fields:		6
Communication		
Economics		
Politics		
Psychology (except PSYC 1610)		
Sociology and Anthropology (except ANTH 1200 and ANTH 1210)		
History, Philosophy, Religious Studies		
Select two 2000- or 3000-level courses from two different disciplines		6
Literature		

Select one course from the following fields:	3
Classics	
English	
Modern Languages and Literatures	
Natural Sciences	
Select two natural science courses with lab [2]	8
Visual and Performing Arts	
Select one 1000-level course from the following fields in Visual and Performing Arts:	3
Art History and Visual Culture	
Film, Television, and Media Arts	
Music	
Studio Art	
Theatre	
Total Credits	**26**

[2] Typical courses that fulfill this requirement may include:
- BIOL 1107 and BIOL 1108 with labs
- CHEM 1171 and CHEM 1172 with labs
- PHYS 1171 and PHYS 1172 with labs

Plan of Study

A typical four-year full-time plan of study appears below. Some variation may be possible. Students should always discuss their individual plan of study with their advisor prior to registering for courses.

Course	Title	Credits
First Year		
Fall		
CPSC 1101 or ENGR 1031	Introduction to Computing (placement based) or Fundamentals of Engineering	3
MATH 1141	Calculus I for Chemistry, Engineering, and Physics Majors	4
Modern/Classical Language Orientation Tier [5]		3
Natural Sciences Exploration Tier [9]		4
History Orientation Tier [1]		3
	Credits	**17**
Spring		
CPSC 1131	Fundamentals of Programming	3
ENGL 1001	Introduction to Rhetoric and Composition	3
MATH 1142	Calculus II for Chemistry, Engineering, and Physics Majors	4
PHIL 1101	Introduction to Philosophy	3
Natural Sciences Exploration Tier [9]		4
	Credits	**17**
Second Year		
Fall		
CPSC 2231	Programming Workshop	3
CPSC 2231L	Programming Workshop Lab	1
CPSC 2250L	Computer Science Sophomore Clinic	1
CPSC 2304	Web Development	3
MATH 2231	Discrete Mathematics	3
Math Elective		3-4
Religious Studies Orientation Tier [1]		3
	Credits	**17-18**
Spring		
CPEG 2245	Digital Design I	3
CPEG 2245L	Digital Design I Lab	1
CPSC 2232	Data Structures	3
CPSC 2232L	Data Structures Lab	1
Literature Exploration Tier [7]		3
Math Elective		3-4
	Credits	**14-15**
Third Year		
Fall		
CPEG 3346	Computer Systems Architecture	3
CPSC 3343	Design and Analysis of Algorithms	3
CPSC 3351L	Computer Science Junior Clinic I	1
SWEG 3301	Software Engineering Methods	3
History or Philosophy or Religious Studies Exploration Tier [2]		3
History or Philosophy or Religious Studies Exploration Tier [2]		3
	Credits	**16**
Spring		
CPSC 4331	Operating Systems	3
CPSC 3352L	Computer Science Junior Clinic II	1
CPSC 3354	Theory of Programming Languages	3
SWEG 3302	Software Design Methods	3
Behavioral and Social Sciences Exploration Tier [3]		3
Visual and Performing Arts Exploration Tier [6]		3
	Credits	**16**
Fourth Year		
Fall		
CPSC 3333	Introduction to Cybersecurity	3
ENGR 4961	Senior Design Project I	3
Behavioral and Social Sciences Exploration Tier [3]		3
Major Elective [4]		3
General Elective [8]		3
	Credits	**15**
Spring		
ENGR 4962	Senior Design Project II	3
Major Elective [4]		3
Major Elective [4]		3
Major Elective [4]		3
General Elective [8]		3
	Credits	**15**
	Total Credits	**127**

[1] Choose an appropriate History or Religious Studies course at the 1000 level.

[2] Choose any appropriate Religious Studies, History, or Philosophy core course.

[3] Core Social Science course may be filled by appropriate courses in Communication, Economics, Psychology, Politics, or Sociology and Anthropology.

[4] Students may choose one elective from any of the following courses in this group:
CPSC 4322 Visual Analytics
CPSC 4355 Artificial Intelligence
CPSC 4357 Database Management Systems
CPSC 4360 Machine Learning
CPSC 4521 Information Visualization
Students may choose a second elective from any of the following courses in this group:
CPSC 3349 Cloud Computing
CPSC 4314 Network Security
The remaining two major electives are chosen from the department under advisement of the faculty advisor and department chair.

[5] Choose any language offered by the Department of Modern Languages and Literatures, based on a placement exam.

[6] Visual and Performing Art History courses may be chosen from Art History, Music, Film, Television, and Media Arts, Studio Art, or Theatre.

[7] Approved English, Modern Languages and Literatures, or Classics courses.

[8] General Electives may be chosen from any courses offered at the university, and are frequently chosen to help fulfill requirements toward a chosen minor

[9] Lab science elective is typically met by any lab course in Biology, Chemistry, or Physics.