Computer Science Major: Artificial Intelligence Emphasis - Bachelor of Science (BS)

Major requirements

(All colleges, excluding teacher certification programs)

53 credits (61 total credits including experiential science requirements)

Courses listed in more than one category may be counted only once.

Computer science major core

Code	Title	Credits
CPE 105	Introduction to the Computing Environment	1
CS 120	Software Design I	4
CS 220	Software Design II	4
CS 225	Discrete Computational Structures [1]	3
CS 270	Introduction to Assembler Programming, C Programming and Computer Organization	3
CS 340	Software Design III: Abstract Data Types	4
CS 364	Introduction to Database Management Systems	3
CS 370	Computer Architecture	3
CS 421	Programming Language Concepts	3
CS 441	Operating System Concepts	3
CS 442	Structures of Compilers	3
MTH 207	Calculus I	4
Total Credits		**38**

[1] May substitute MTH 225 for CS 225.

Artificial intelligence emphasis requirements (15 credits)

Code	Title	Credits
CS 351	Simulation	3
or CS 353	Analysis of Algorithm Complexity	
or CS 453	Introduction to Theory of Computation	
or CS 461	Introduction to Data Science	
CS 440	Software Design IV: Software Engineering	3
CS 452	Artificial Intelligence	3
CS 457	Machine Learning	3
Select three credits of electives (see below)		3
Total Credits		**15**

Computer science major electives

Code	Title	Credits
CS 202	Introduction to Web Design	3
CS 224	Introduction to Programming Language	1-3
CS 227	Competitive Programming	1
CS 342	Software Testing Techniques	3
CS 351	Simulation	3
CS 353	Analysis of Algorithm Complexity	3
CS 356	Software Exploitation	3
CS 372	Hardware/Software Integration	3
CS 395	Independent Study	1-3
CS 402	Web Application Development	3
CS 410	Free and Open Source Software Development	3
CS 418	Mobile Application Development	3
CS 419	Topics in Computer Science	1-3
CS 431	Introduction to Robotics	3
CS 443	Topics in Operating Systems	3
CS 449	Advances in Software Engineering	3
CS 451	User Interface Design	3
CS 452	Artificial Intelligence	3
CS 453	Introduction to Theory of Computation	3
CS 454	Digital Image Processing	3
CS 455	Fundamentals of Information Security	3
CS 456	Secure Software Development	3
CS 457	Machine Learning	3
CS 461	Introduction to Data Science	3
CS 464	Advanced Database Management Systems	3
CS 470	Parallel and Distributed Computing	3
CS 471	Computer Networks	3
CS 472	Internet of Things	3
CS 475	Computer Graphics and Modeling	3
CS 476	Data Visualization	3
CS 499	Research in Computer Science	1-3
CPE 212	Digital Logic	3
CPE 227	Introduction to Prototyping	1
CPE 301	Introduction to Transient Analysis	3
CPE 302	Introduction to Control Systems	3
CPE 309	Systems Development	3
CPE 321	Introduction to Digital Signal Processing	3
CPE 395	Independent Study	1-3
CPE 406	Architecture of Parallel Systems	3
CPE 419	Topics in Computer Engineering	1-3
CPE 420	Digital Design	3
CPE 446	ASIC Design	3
CPE 463	Advanced Computer Architecture	3
CPE 466	Code Generation and Optimization	3
CPE 478	Virtual Machines	3
CPE 483	Engineering Project Management	1
CPE 499	Research in Computer Engineering	1-3
MTH 208	Calculus II	4
MTH 317	Graph Theory	3
MTH 371	Numerical Methods	3
PHY 335	Electronics	4

In addition to the 53 credits, two courses chosen from the General Education: Experiential Science Category (GEN ED 1008) and/or from the courses listed in the College of Science and Health core requirements (http://catalog.uwlax.edu/undergraduate/scienceandhealth/#Core) must be taken.

Every student must complete the computer science major field test. This test is used for program assessment not individual assessment.

Degree requirements

All students must complete the general education, college core, major/minor, and university degree requirements in order to qualify for a degree. The easiest way to track all of these requirements is to refer to the Advisement Report (AR) found in the Student Information System (WINGS) Student Center. All enrolled students have access to the AR.

- General education (https://catalog.uwlax.edu/undergraduate/generaleducation/)
- College core (p. 2)
- Baccalaureate degree requirements (p. 2)

College of Science and Health (CSH) Bachelor of Science core requirements

B.S. and B.A. students graduating from the College of Science & Health are required to take:

- two MTH/STAT courses or one MTH/STAT course and one CS course from the General Education: Quantitative Reasoning Category (GEN ED 1004); and
- two courses selected from the General Education: Experiential Science Category (GEN ED 1008) and/or from BIO 203, BIO 304, BIO 210, CHM 104, GEO 221, GEO 222, PHY 104 or PHY 204. One of the two courses must be from a department outside of the student's major department.

Notes: Mathematics courses can be pairs, i.e. MTH 150 and MTH 151.

For the Bachelor of Science degree, in addition to all other College of Science and Health core requirements, students from non-exempted programs[1] must complete one of the following options. It is recommended that courses are selected in consultation with students' academic advisor.

1. Complete a second major; or
2. Complete a minor outside the major; or
3. Complete two certificates outside the major with at least 12 combined credits at the 300/400 level; or
4. Complete an individualized option, consisting of 18 credits
   a. At least 12 credits must be earned at the 300/400 level outside the major department.
   b. The remaining six credits should come from
      i. 100 level or higher courses outside the major (General education courses may apply provided they are not being used to fulfill minimum general education requirements.); or
      ii. 300/400 level courses inside major not being used to fulfill major requirements.
   c. Internship credits may not count toward the individualized option.

[1] The list of exempted CSH programs is below.

Baccalaureate degree requirements

Candidates for the Bachelor of Arts or the Bachelor of Science degrees must accomplish the following:

1. Fulfill the general education requirements.
2. Complete at least one ethnic studies (diversity) course.
3. Complete the courses prescribed by the Undergraduate Curriculum Committee for the degree desired in the respective school or college.
4. Earn a minimum of 120 semester credits with at least a 2.00 cumulative GPA.[1, 2]
5. At least 40 credits must be earned in 300/400 level courses. Transfer courses earned or transferred at the 300/400 level apply to this requirement.
6. Complete major and minor requirements with at least a 2.00 GPA[1, 2] in each major and minor (and concentration or emphasis, if selected).
7. A minimum of 30 semester credits in residence at UWL is required for graduation. (See undergraduate resident requirement (https://catalog.uwlax.edu/undergraduate/academicpolicies/graduation/#undergraduate-residence-requirement).)
8. Submit an application for graduation via the "Submit Intent to Graduate" link in the WINGS Student Center as soon as the student has registered for his or her final semester or summer term in residence. December and winter intersession graduates should apply by May 1. May and summer graduates should apply by December 1.

[1] Grade point average requirements for some programs will be considerably higher than 2.00. Re-entering students may be required to earn credits in excess of the 120 needed for graduation in any curriculum in order to replace credits earned in courses in which the content has changed substantially in recent years. Each case will be judged on its own merit.

[2] The grade point average recorded at the time the degree is awarded will not be affected by future enrollment.

No degree will be awarded unless all requirements are fulfilled and recorded within 30 days after the official ending date of each term.

Sample degree plan

Below is a sample degree plan that can be used as a guide to identify courses required to fulfill the major and other requirements needed for degree completion. A student's actual degree plan may differ depending on the course of study selected (second major, minor, etc.). Also, this sample plan assumes readiness for each course and/or major plan, and some courses may not be offered every term. Review the course descriptions or the class timetable (http://www.uwlax.edu/records/registration/) for course offering information.

The sample degree plans represented in this catalog are intended for first-year students entering UWL in the fall term. Students should use the Advisement Report (AR) in WINGS (https://wings.uwlax.edu) and work closely with their faculty advisor(s) and college dean's office

to ensure declaration and completion of all requirements in a timely manner.

General Education Program

The general education curriculum (Gen Ed) is the common educational experience for all undergraduates at UWL. Sample degree plans include Gen Ed placeholders to ensure completion of the general education requirements. Courses may be rearranged to fit the needs or recommendations of the student's program of study. Gen Ed courses may be taken during winter term (January between the semesters) and summer to reduce the course load during regular terms (fall and spring). Students should consult with their advisor and/or the college academic services director in their college/school for assistance with course and schedule planning. Refer to the general education requirements (https://catalog.uwlax.edu/undergraduate/generaleducation/) for more specific details.

At least 40 credits of the 120 credits required must be earned at the 300/400-level.

Note: New students and transfer students with less than 12 credits earned are required to take FYS 100 First-Year Seminar (3 cr.) during one of their first two semesters at UWL.

This sample degree plan does not establish a contractual agreement. It identifies the minimum requirements a student must successfully complete, to qualify for a degree, in a format intended to assist the student in planning their academic career. Actual degree plans may differ.

Two sample plans are provided below. The first is for students taking MTH 151 Precalculus in the first semester; the second is for students taking MTH 207 Calculus I in the first semester. Also, discuss the merits of adding a minor with your advisor, as you would likely be advised to spread courses for your minor throughout the plan.

Sample Plan 1 - students taking MTH 151 in first semester

Year 1

Fall	Credits	Spring	Credits
CPE 105	1	CS 220	4
CS 120 (Gen Ed 1004 Quantitative Reasoning)	4	CS 225	3
MTH 151 (CSH Core)	4	CST 110 (Gen Ed 1003 Spoken Literacy)	3
ENG 110 (Gen Ed 1002 Written Literacy)	3	MTH 207	4
FYS 100 (Gen Ed 1001 First-Year Seminar)	3		
	15		**14**

Year 2

Fall	Credits	Spring	Credits
CS 270	3	CS 364	3
CS 340	4	CS 370	3
Gen Ed 1005 Ethnic Diversity	3	Gen Ed 1006 Mind and Body	3
Gen Ed 1007 Arts and Aesthetics	2	Gen Ed 1011 Pasts That Define Us	3
University Elective	1	Gen Ed 1008 Experiential Science	4
	13		**16**

Year 3

Fall	Credits	Spring	Credits
CS 441	3	CS 440	3
CS 457	3	CS 351, 353, 453, or 461	3
CSH Core (300/400 not CS) or Minor[1]	3	Gen Ed 1010 Stories We Tell	3
CSH Core (Gen Ed Experiential Science)	4	Gen Ed 1009 Social and Behavioral Studies	3
Gen Ed 1013 Cultures of Our World	3	CSH Core (300/400 not CS) or Minor[1]	3
	16		**15**

Year 4

Fall	Credits	Spring	Credits
CS 421	3	CS 442	3
CS 452	3	Gen Ed 1012 Planet That Sustains Us	3
CS Elective	3	CSH Core (300/400 not CS) or Minor[1]	3
Gen Ed 1007 Arts and Aesthetics	2	University Elective	2
CSH Core (300/400 not CS) or Minor[1]	3	University Elective (300/400 Level)	3
CSH Core or Minor[1]	3	Complete CS major field test[2]	
	17		**14**

Total Credits: 120

1. See CSH BS Core Requirements (https://catalog.uwlax.edu/undergraduate/scienceandhealth/#Core) for information on completing the individualized option. 300/400 requirements for graduation may be impacted.
2. Every student must complete the computer science major field test during their senior year. This test is used for program assessment, not individual assessment.

Sample Plan 2 - students taking MTH 207 first semester

Year 1

Fall	Credits	Spring	Credits
CPE 105	1	CS 220	4
CS 120 (Gen Ed 1004 Quantitative Reasoning)	4	CS 225	3
MTH 207 (CSH Core)	4	ENG 110 (Gen Ed 1003 Spoken Literacy)	3
ENG 110 (Gen Ed 1002 Written Literacy)	3	Gen Ed 1012 Planet That Sustains Us	3
FYS 100 (Gen Ed 1001 First-Year Seminar)	3	University Elective	1
	15		**14**

Year 2

Fall	Credits	Spring	Credits
CS 270	3	CS 364	3
CS 340	4	CS 370	3
Gen Ed 1013 Cultures of Our World	3	Gen Ed 1006 Mind and Body	3
Gen Ed 1008 Experiential Science	4	Gen Ed 1011 Pasts That Define Us	3
Gen Ed 1007 Arts and Aesthetics	2	Gen Ed 1005 Ethnic Diversity	3
	16		**15**

Year 3

Fall	Credits	Spring	Credits
CS 441	3	CS 440	3
CS 457	3	CS 351, 353, 453, or 461	3
CSH Core (300/400 not CS) or Minor[1]	3	Gen Ed 1010 Stories We Tell	3

CSH Core (Gen Ed Experiential Science)	4	Gen Ed 1009 Social and Behavioral Studies	3
Gen Ed 1011 Pasts That Define Us	3	CSH Core (300/400 not CS) or Minor[1]	3
	16		**15**

Year 4

Fall	**Credits**	**Spring**	**Credits**
CS 421	3	CS 442	3
CS 452	3	CSH Core (300/400 not CS) or Minor[1]	3
CS Elective	3	CSH Core or Minor[1]	3
CSH Core (300/400 not CS) or Minor[1]	3	University Elective	2
University Elective	3	University Elective (300/400 Level)	3
		Complete CS major field test[2]	
	15		**14**

Total Credits: 120

1. See CSH BS Core Requirements (https://catalog.uwlax.edu/undergraduate/scienceandhealth/#Core) for information on completing the individualized option. 300/400 requirements for graduation may be impacted.
2. Every student must complete the computer science major field test during their senior year. This test is used for program assessment, not individual assessment.