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Computer Science: Computational Science And Engineering, BS

← Return to: [College of Science](#)

About the Program

Purdue Computer Science is one of the country's top-ranked programs. Faculty members are shaping the future of information technology through cutting-edge research. Students can take courses that include such topics as graphics and animation, web programming, competitive programming, cryptography and security, networks, software engineering, distributed systems, information systems, artificial intelligence, and bioinformatics.

The flexible curriculum offers students the opportunity to be involved in a dynamic discipline that will continue to grow and to contribute significantly to progress in many other disciplines and ultimately to changes in human society that are nothing short of profound. Students learn communication skills, teamwork, and problem-solving skills and acquire the necessary technical skills for positions in computing throughout society.

[Computer Science Website](#)

[Computer Science Major Change \(CODO\) Requirements](#)

Computer Science students begin by taking six core courses that teach them the fundamentals of computer science. Students then take coursework in a concentration, which allows them to deepen their understanding in a specific area. This concentration is intended to introduce computer science basics in Computational Science and Engineering (CS&E). Students not intending to pursue an advanced degree are advised to choose Option 1 for electives and to take courses in some area of pure or applied science with the objective of learning how to develop software useful for the chosen area. Students intending to pursue an advanced degree are advised to choose Option 2 for electives and also to take the following courses: Physics lab science courses; MA 35100 rather than MA 26500, MA 36200 or MA 44200; MA 36600 rather than MA 26600, MA 34100, or MA 44000.

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Degree Requirements

120 Credits
Required

Curriculum and Degree Requirements

for College of Science

A College of Science degree is conferred when a student successfully completes all requirements in their degree program. Students will complete coursework or approved experiential learning activities to meet the following three degree components:

1. Major
2. Science Core Curriculum
3. Electives

Students may use any of the following options to meet College of Science degree requirements:

- Purdue Coursework
- AP, IB, and CLEP credit. The use of AP and IB coursework varies between College of Science degree plans.
- [Transfer Credit](#). Students should consult the Admissions Transfer Credit Resource page for all available transfer options.

College of Science degree programs vary widely in their approval and use of the proceeding options and thus students are strongly encouraged to work closely with their academic advisors and to regularly consult their MyPurduePlan to view the use of each option in their degree plan.

Most College of Science degree programs contain elective credits students may use to pursue courses that relate to their interests or which support their major area of study. The elective area of a degree plan may also be used to complete [minors](#), second majors and certificates such as the Entrepreneurial Certificate. With the exception of courses on the No Count List, any Purdue

course may be used to meet the elective area of a student's degree plan.

College of Science Core Requirements

All Students starting Purdue University Fall semester, 2007 or later are required to pursue the 2007 Science Core curriculum.

The College of Science Core Curriculum requires the completion of approved coursework and/or experiential learning opportunities in the following academic areas:

- [Composition and Presentation](#)
- [Computing](#)
- [Cultural Diversity \(Language and Culture\)](#)
- [General Education](#)
- [Great Issues in Science](#)
- [Laboratory Science](#)
- [Mathematics](#)
- [Science Technology and Society](#)
- [Statistics](#)
- [Teambuilding and Collaboration](#)
- [No Count List](#)

Earning Core Curricular Requirements through Experience

Students may meet selected core curriculum requirements through approved experiential learning opportunities. Interested students should contact their academic advisor for more information on this option and incorporating experiential learning into their four-year program of study. For more information on earning requirements through experience, please [click here](#).

Computer Science Major Courses (46-50 credits)

Required CS Major Math Courses (7-8 credits)

Must have C or better to meet prerequisite for certain upper level CS courses

- [MA 26100 - Multivariate Calculus](#)
or
- [MA 27101 - Honors Multivariate Calculus](#)

- [MA 26500 - Linear Algebra](#) or
- [MA 35100 - Elementary Linear Algebra](#)

Required CS Major Core Courses (21 credits)

Must have C or better in all courses.

- [CS 18000 - Problem Solving And Object-Oriented Programming](#) ♦
(satisfies Computing and Teambuilding requirements for College of Science core)
- [CS 18200 - Foundations Of Computer Science](#) ♦
- [CS 24000 - Programming In C](#) ♦
- [CS 25000 - Computer Architecture](#)
- [CS 25100 - Data Structures And Algorithms](#)
- [CS 25200 - Systems Programming](#)

Computational Science and Engineering Concentration (21 credits)

Required Courses

- [CS 31400 - Numerical Methods](#)
- [CS 38100 - Introduction To The Analysis Of Algorithms](#)
- [MA 26600 - Ordinary Differential Equations](#) or
- [MA 36600 - Ordinary Differential Equations](#)

Applications - Choose one.

- [CS 37300 - Data Mining And Machine Learning](#)
- [CS 47300 - Web Information Search And Management](#)
- [CS 47800 - Introduction to Bioinformatics](#)
- [ECE 30100 - Signals And Systems](#)
- [IE 33600 - Operations Research - Stochastic Models](#)

Systems - Choose one.

- [CS 35200 - Compilers: Principles And Practice](#)
- [CS 35300 - Principles Of Concurrency And Parallelism](#)
- [CS 35400 - Operating Systems](#)

Selectives

Choose 2 courses.

- [CS 30700 - Software Engineering I](#)
- [CS 42200 - Computer Networks](#)
- [CS 45600 - Programming Languages](#)
- [CS 47100 - Introduction to Artificial Intelligence](#)
- [CS 48300 - Introduction To The Theory Of Computation](#)
- [CS 51400 - Numerical Analysis](#)
- [CS 51500 - Numerical Linear Algebra](#)
- [CS 52000 - Computational Methods In Optimization](#)
- [CS 52500 - Parallel Computing](#)
- [IE 33500 - Operations Research - Optimization](#)
- [MA 34100 - Foundations Of Analysis](#)
- [MA 44000 - Honors Real Analysis I](#)

Other Departmental/P rogram Course Requirements (32-54 credits)

COLLEGE OF SCIENCE CORE REQUIREMENTS

^ - Labeled as a Science Core Selection in the four year plan of study

* - Requirement may be met with a zero credit experiential learning option. See your advisor

for more information.

Composition & Presentation

Written Communication (3-4 credits)

Choose one course from the Written Communication list [here](#). (satisfies Written Communication and Information Literacy for core)

Technical Writing And Presentation* (0 or 3 credits)

Students may elect to take one course (COM 21700), a combination of courses, or experiences to meet the TWTP requirement. The list of approved courses and experiences can be found **here** (ADD LINK IN ACATALOG). (satisfies OC for core)

Special Note:

Students completing both COM 11400 (elective) and COM 21700 (Technical Writing and Presentation requirement) may use both courses to meet degree requirements.

*Students wishing to meet the Technical Presentation and/or Technical Writing requirement through experience are required to complete the [Experiential Learning Contract process](#).

International Students Only: International students whose primary high school/equivalent instruction was not in English may meet this requirement with a course option only.

Computing

Met with required major coursework.

Cultural Diversity (Language & Culture)^* (0-9 credits)

Choose courses from this [list](#) to fulfill each Option below (select courses COULD satisfy Humanities for core).

- Language & Culture Option I
- Language & Culture Option II
- Language & Culture Option III

General Education^ (9 credits)

Choose courses from this [list](#) to fulfill each Option below (select courses COULD satisfy Behavioral/Social Science for core).

- General Education Option I
- General Education Option II
- General Education Option III

Great Issues In Science (3 credits)

Choose one from this [list](#).

Laboratory

Science (6-8 credits)

Choose courses from this [list](#) to fulfill each Option below (satisfies Science for core).

- Laboratory Science Option I
- Laboratory Science Option II

Mathematics (8-10 credits)

(satisfies Quantitative Reasoning for core)

- [MA 16100 - Plane Analytic Geometry And Calculus I](#)
(must have C or better to meet prerequisite for [CS 18200](#)) or
- [MA 16500 - Analytic Geometry And Calculus I](#)
(must have C or better to meet prerequisite for [CS 18200](#))
- [MA 16200 - Plane Analytic Geometry And Calculus II](#) or
- [MA 16600 - Analytic Geometry And Calculus II](#)

Science Technology and Society^{^*} (0-3 credits)

Choose one from the Science Technology and Society [list here](#), excluding those on the College of Science No Count list (satisfies STS for core).

Statistics (3 credits)

- [STAT 35000 - Introduction To Statistics](#) ♦ or
- [STAT 51100 - Statistical](#)

Team-Building and Collaboration

*Met with required
major coursework.*

Electives (16- 42 credits)

CS 19300 - Tools is a required freshman seminar course; corequisites with CS 18000. This is not a degree requirement. CS 29100 - Sophomore Development Seminar and CS 39100 - Junior Resources Seminar are optional but recommended.

Grade Requirements

- ***All CS core courses and all track requirements, regardless of department, must be completed with a grade of “C” or higher.
- All prerequisites to CS core courses and track requirements, regardless of department, must be completed with a grade of C or higher.
- All track requirements, regardless of department, must be completed with a grade of C or higher.
- Minimum grade requirements for prerequisites is C unless alternative minimum grade requirement is listed.

GPA Requirements

- 2.0 Major and Graduation GPA required for Bachelor of Science degree.

Course

Requirements & Notes

- Enrollment in freshman seminar courses [CS 19100](#) and [CS 19300](#) is required with [CS 18000](#). They are not degree requirements. [CS 29100 - Sophomore Development Seminar](#) and [CS 39100 - Junior Resources Seminar](#) are optional but recommended.
- At least four (4) of the seven (7) courses for Computation Science and Engineering concentration must be CS courses.
- Any course beyond the one required class from the list of Applications/Systems courses may count as electives.
- Non-CS courses and graduate level courses may have additional prerequisites that must be met in order to be eligible to take the course.
- No course can be counted both for a required and selective course within the same track.

College of Science Pass/No Pass Option Policy

- Only free electives and courses at the 50000-level general education requirement may be taken under the pass/not-pass option.
- The pass/not-pass grade mode may be entered for courses which are not required by a student's major(s), minor(s) or science core curriculum.
- Grade mode Passing is

equivalent to at a minimum grade of C- had a letter grade been awarded.

- Students may elect to use the pass/not-pass option for no more than 20% of the 124/120 credit requirement for graduation and for no more than two courses per academic year (Fall-Summer).
- The pass/not-pass option cannot be elected for a course that has already been completed with a letter grade. University Regulation.
- Students may take elective credit while abroad using the P/NP mode. In the case of universities which only post P/NP, the University will apply a calculation process to determine a letter grade.
- Department of Languages and Cultures P/NP policy and Language Placement results. Students must take advanced coursework for a letter grade to receive credit for lower-level language courses.

College of Science Transfer Credit Policy

College of Science degree programs vary widely in their approval and use of non-Purdue originated credit (AP, IB, CLEP, and transfer credit). Students work closely with their academic advisors and degree plan audits to review the use and approval of each non-Purdue credit option.

University Requirements

University Core Requirements

For a complete listing of University Core Course Selectives, visit the [Provost's Website](#).

- Human Cultures: Behavioral/Social Science (BSS)
- Human Cultures: Humanities (HUM)
- Information Literacy (IL)
- Oral Communication (OC)
- Quantitative Reasoning (QR)
- Science #1 (SCI)
- Science #2 (SCI)
- Science, Technology, and Society (STS)
- Written Communication (WC)

Civics Literacy Proficiency Requirement

The Civics Literacy Proficiency activities are designed to develop civic knowledge of Purdue students in an effort to graduate a more informed citizenry. For more information visit the [Civics Literacy Proficiency website](#).

Students will complete the Proficiency by passing a test of civic knowledge, and completing one of three paths:

- Attending six approved civics-related events and completing an assessment for each;
or
- Completing 12 podcasts created by the Purdue Center for C-SPAN Scholarship and Engagement that use C-SPAN material and completing an assessment for each;
or

- Earning a passing grade for one of [these approved courses](#) (or transferring in approved AP or departmental credit in lieu of taking a course).

Upper Level Requirement

- Resident study at Purdue University for at least two semesters and the enrollment in and completion of at least 32 semester hours of coursework required and approved for the completion of the degree. These courses are expected to be at least junior-level (30000+) courses.
- Students should be able to fulfill *most, if not all*, of these credits within their major requirements; there should be a clear pathway for students to complete any credits not completed within their major.

Sample 4-Year Plan

Fall 1st Year

- [CS 18000 - Problem Solving And Object-Oriented Programming](#) ♦ ***
- [MA 16100 - Plane Analytic Geometry And Calculus I](#) or
- [MA 16500 - Analytic Geometry And Calculus I](#)
- Science Core Selection - Credit Hours: 3.00-4.00

(English Composition suggested.)

- Elective - Credit
Hours: 3.00
- Elective - Credit
Hours: 1.00 (CS
19300 suggested.)

15-17 Credits

Spring 1st Year

- [CS 18200 - Foundations Of Computer Science](#) ♦

- [CS 24000 - Programming In C](#) ♦

- [MA 16200 - Plane Analytic Geometry And Calculus II](#) or
- [MA 16600 - Analytic Geometry And Calculus II](#)
- Science Core First-Year Composition Selection - Credit
Hours: 3.00-4.00
- Electives - Credit
Hours: 1.00 - 3.00

14-18 Credits

Fall 2nd Year

- [CS 25000 - Computer Architecture](#) ***
- [CS 25100 - Data Structures And Algorithms](#) ***
- [MA 26100 - Multivariate Calculus](#)
or
- [MA 27101 - Honors Multivariate Calculus](#)
- Science Core Selection - Credit
Hours: 3.00 - 4.00
- Elective - Credit
Hours: 1.00 ([CS 29100](#) recommended)

15-17 Credits

Spring 2nd Year

- [CS 25200 - Systems Programming](#) ***
- [MA 26500 - Linear Algebra](#) or
- [MA 35100 - Elementary Linear Algebra](#)
- Science Core
Selection - Credit
Hours: 3.00 - 4.00
(COM
21700 suggested.)
- Science Core
Selection - Credit
Hours: 3.00 - 4.00
- Elective - Credit
Hours: 3.00

16-17 Credits

Fall 3rd Year

- [STAT 35000 - Introduction To Statistics](#) ♦ or
- [STAT 51100 - Statistical Methods](#) ♦
- Computational
Science and
Engineering
Concentration course
- Credit Hours: 3.00

- Computational
Science and
Engineering
Concentration course
- Credit Hours: 3.00

- Science Core
Selection - Credit
Hours: 3.00 - 4.00
- Elective - Credit
Hours: 1.00 ([CS 39100](#) recommended)
- Elective - Credit
Hours: 3.00

16-17 Credits

Spring 3rd Year

- Computational

Science and
Engineering
Concentration course
- Credit Hours: 3.00

- Computational
Science and
Engineering
Concentration course
- Credit Hours: 3.00

- Great Issues In
Science Selection -
Credit Hours: 3.00
- Science Core
Selection - Credit
Hours: 3.00 - 4.00
- Elective - Credit
Hours: 3.00

15-17 Credits

Fall 4th Year

- Computational
Science and
Engineering
Concentration course
- Credit Hours: 3.00

- Computational
Science and
Engineering
Concentration course
- Credit Hours: 3.00

- Science Core
Selection - Credit
Hours: 3.00 - 4.00
- Science Core
Selection - Credit
Hours: 3.00 - 4.00
- Elective - Credit
Hours: 3.00
- Elective - Credit
Hours: 1.00

16-18 Credits

Spring 4th Year

- Computational
Science and
Engineering
Concentration course
- Credit Hours: 3.00

- Science Core
Selection - Credit

Hours: 3.00 - 4.00

- Science Core
Selection - Credit
Hours: 3.00 - 4.00
- Elective - Credit
Hours: 3.00
- Elective - Credit
Hours: 3.00

15-17 Credits

World Language Courses

World Language proficiency requirements vary by program. The following list is inclusive of all world languages PWL offers for credit; for acceptable languages and proficiency levels, see your advisor. (ASL-American Sign Language; ARAB-Arabic; CHNS-Chinese; FR-French; GER-German; GREK-Greek(Ancient); HEBR-Hebrew(Biblical); HEBR-Hebrew(Modern); ITAL-Italian; JPNS-Japanese; KOR-Korean; LATN-Latin; PTGS=Portuguese; RUSS-Russian; SPAN-Spanish)

Critical Course

The ♦ course is considered critical.

In alignment with the Degree Map Guidance for Indiana's Public Colleges and Universities, published by the Commission for Higher Education (pursuant to HEA 1348-2013), a Critical Course is identified as "one that a student must be able to pass to persist and succeed in a particular major. Students who

want to be nurses, for example, should know that they are expected to be proficient in courses like biology in order to be successful. These would be identified by the institutions for each degree program”.

Disclaimer

The student is ultimately responsible for knowing and completing all degree requirements.

Consultation with an advisor may result in an altered plan customized for an individual student.

The myPurduePlan powered by DegreeWorks is the knowledge source for specific requirements and completion

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