Computer Science: Computer Graphics and Visualization, 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. The Computer Graphics and Visualization concentration is designed to prepare students for work and/or for graduate school in computer graphics, visualization, and related areas. Computer graphics refers to modeling (including 3D acquisition) and rendering 3D objects and scenes. Visualization refers to using imagery to convey digital information and facilitate its interpretation and analysis. Jobs and activities for students graduating from this track may include:

Graphics-related Indstury jobs (e.g., Intel, NVIDIA, Microsoft, Adobe, IBM, Google) - working on graphics software, hardware, and applications.

CAD and Architectural Applications - developing CAD/Engineering/Architecture related appliactions.

Movie Industry (e.g., Pixar, Dreamworks, Disney, Sony) - working on creating movies and related tools.

Gaming Industry (e.g., Electronic Arts, Midway Games, Disney, Sony) - working on game programming and related tools.

Laboratories - working in one of several scientific visualization laboratories (though often a graduate degree is preferred).

Graduate school - continuing studies towards a MS or PhD which opens up other job opportunities including research labs and academic positions.

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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

Computer Graphics and Visualization Concentration (18 credits)

Required Courses

- CS 31400 - Numerical Methods
- CS 33400 - Fundamentals Of Computer Graphics

- CS 37300 - Data Mining And Machine Learning or
- CS 43400 - Advanced Computer Graphics or
- CS 47100 - Introduction to Artificial Intelligence

Selectives

Choose 3 courses.

- CS 35200 - Compilers: Principles And Practice
- CS 35400 - Operating Systems
- CS 37300 - Data Mining And Machine Learning
- CS 38100 - Introduction To The Analysis Of Algorithms
- CS 42200 - Computer Networks
- CS 43400 - Advanced Computer Graphics
- CS 45600 - Programming Languages
- CS 47100 - Introduction to Artificial Intelligence
- CS 43900 - Introduction To Data Visualization

Project Option

Electives could include 1 semester of CS 49000 project course with CGVLAB.

This option is very useful to undergraduate students involved in research, and such is beneficial to both job-seeking and graduate

school-seeking students.

Track Notes

- All major required courses, all track requirements and track selectives, and their pre-requisites, regardless of department, must be completed with a grade of C or better.
- No course can be counted both for a required and selective course within the same track.
- Electives could include one semester of CS 49000 project with CGVLAB with Track Chair approval.

Other Departmental/Program 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 ACALOG). (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 Methods ♦

Team-Building and Collaboration

Met with required major coursework.

Electives (16-42 credits)

*CS 19100 - Freshman Resources Seminar*CS 19300 - Tools is a required freshman seminar course; corequisite with CS 18000. This not a degree requirement. CS 29100 - Sophomore Development Seminar *and* CS 39100 - Junior Resources Seminar *are optional but recommended.*

Grade Requirements

- All major required courses, all track requirements and track selectives, and their pre-requisites, regardless of department, must be completed with a grade of C or better.

GPA Requirements

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

Course Requirements & Notes

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

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 ♦

- Computer Graphics and Visualization Concentration course - Credit Hours: 3.00 ***
- Computer Graphics and Visualization 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

- Computer Graphics and Visualization Concentration course - Credit Hours: 3.00 ***
- Computer Graphics and Visualization 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

- Computer Graphics and Visualization 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
- Elective - Credit Hours: 1.00

16-18 Credits

Spring 4th Year

- Computer Graphics and Visualization 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-Japenese; 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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