COMPUTER SCIENCE

at Arcadia University

Global Perspectives…Personal Attention…Real-World Integrative Learning Experiences

Faculty

Professors
Dr. Louis M. Friedler (Chair)
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Adjunct Professors
Michael Engel
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Degrees and Certificate

Bachelor of Arts in Computer Science

Bachelor of Science in Computer Science

Post-Baccalaureate Certificate in Computer Science

Minor
Computer Science

Related Fields of Study
Management Information Systems
Computing Technology

Pathways to Study Abroad in Computer Science

Majors in the Computer Science and Mathematics Department are strongly encouraged to take full advantage of the study abroad opportunities that Arcadia University offers. In recent years, students have studied at universities in England, Ireland, Scotland, Australia, and Italy. All benefited greatly from their experiences.

Students who plan to study abroad should meet with their advisers as soon as possible to discuss their options. This is especially true given that several of the Department's upper-level courses are taught on an alternating-year basis. Therefore, the best semesters to study abroad might differ from year to year. Several courses are part of sequences, and students are advised to take those entire sequences at Arcadia.

Many majors elect not to take any math or computing courses during their semester abroad, instead choosing courses that fulfill other Undergraduate Curriculum requirements. These latter courses are more apt to help students to gain a rich knowledge and appreciation of the culture of the country in which they are studying.

Visit the University's Web site for Pathways to Study Abroad (www.arcadia.edu/pathways) and suggested course sequences. Since it is important that students plan ahead for study abroad, they should consult with their advisers as soon as possible and make their intentions known to the Department Chair and the Associate Dean of International Affairs.

About the B.A. and B.S. in Computer Science

- Internships that provide real-world experience
- Senior Capstone project for a real client
- Preparation for careers in business, industry or government
- Preparation for graduate school
- Opportunities to study abroad at some of the top universities around the world
- Opportunities for research in wireless networks

Arcadia University's programs in Computer Science provide a broadly based liberal arts background combined with specific computer science skills to equip students with the fundamental education needed to follow new trends in the computing profession. Throughout the courses, habits of systematic and accurate thinking are cultivated, and the

flexibility needed to enter the constantly changing field of computing is emphasized.

Internships: The Department encourages students to participate in internships in order to integrate their classroom work with real-world experience.

Senior Capstone Project: A highlight of the curriculum is the Capstone course sequence. In it, students design and implement a real project for an actual client.

The primary programming language used is currently Java. The Department also offers SAS, Python and C++ as electives.

Bachelor of Arts in Computer Science

The Bachelor of Arts (B.A.) degree program provides students with the specific skills necessary to qualify for entry-level computing positions in business, private industry, or government.

Bachelor of Science in Computer Science

The Bachelor of Science (B.S.) degree program provides a more in-depth study of computer science through additional courses in Mathematics and Computer Science beyond the Bachelor of Arts requirements.

Post-Baccalaureate Certificate in Computer Science

The Post-Baccalaureate Certificate is designed for students who already have a bachelor's degree in another field and now want to acquire a background in computer science. Students can use this program to enter the computer employment market, to learn computing skills for use in their present field, or to satisfy prerequisites for graduate study in computer science. The following two levels of certification are offered:

Minor Certificate: Includes 6 courses in Computer Science.

Major Certificate: Includes 13 courses in Computer Science (the same 13 Computer Science courses required for the Bachelor of Science degree).

Arcadia offers a Master of Arts in Education with a concentration in the teaching of Computer Science, part of which includes the Post-Baccalaureate Certificate. Students who might be interested in this Master of Arts program should be alerted that the Post-Baccalaureate courses carry only undergraduate credit, which is not transferable into the graduate program. Contact the College of Graduate Studies for more information.

Minor in Computer Science

The minor in Computer Science is designed to give students the computing background needed to use computer science as a tool in their primary fields of specialization.

Requirements for the B.A. and B.S. in Computer Science

The requirements set forth below are for both the day and evening programs in Computer Science. Note that some required courses are offered evenings only. Department policy does not allow 100-level courses to be challenged for credit. At least half of required courses must be completed at Arcadia.

Common Curriculum for Both Degree Programs

(30–33 credits as listed below, with Undergraduate Curriculum requirements)

1. Nine courses in Computer Science

CS	201	Problem-Solving with Algorithms and Programming I
CS	202	Problem-Solving with Algorithms and Programming II
CS	203	Data Structures
CS	341	Computer Ethics
	or US 230	International Computer Ethics
CS	354	Database Management Systems Design
CS	358	Operating Systems
CS	362	Computer Organization and Architecture
CS	490, 491	Capstone I, II

2. One course in Mathematics

MA	230	Discrete Structures

3. Recommended

EN	315	Technical Writing

Additional Requirements for the Bachelor of Arts (B.A.)

(9 additional credits)

1. Two Computer Science electives, one of which must be at the 300 level and the other at the 200 or 300 level.

Additional Requirements for the Bachelor of Science (B.S.)

(18–20 additional credits)

1. One of the following two courses

CS/MA	315	Theory of Computation
CS	317	Design and Analysis of Algorithms

2. Three Computer Science electives, one of which must be at the 300 level and the other two at the 200 or 300 level.

3. Two courses in Mathematics

MA	201/207	Calculus I/Applied Calculus I
MA	202/208	Calculus II/Applied Calculus II

Requirements for the Minor in Computer Science

(18–21 credits. Students who want to complete a minor in Computer Science should consult the Department Chair.)

1. Three courses in Computer Science

CS	201	Problem-Solving with Algorithms and Programming I
CS	202	Problem-Solving with Algorithms and Programming II
CS	203	Data Structures and Algorithm Analysis

2. Three Computer Science electives, including at least one at the 300 level

Requirements for the Post-Baccalaureate Certificate in Computer Science

(18–43 credits as listed below)

Adviser
Associate Professor Dr. Carlos E. Ortiz

The Post-Baccalaureate Certificate is designed for students who already have a degree in another field and want to acquire a background in computer science. Students can use this program to enter the computer employment market, to learn computing skills for use in their present field, or to satisfy prerequisites for graduate study in computer science. Candidates for the Post-Baccalaureate Certificate must complete at least four of the courses needed for the minor certificate and at least seven of the courses needed for the major certificate at Arcadia University.

Minor Certificate
(18–21 credits. Substitutions can be made with the permission of the Department Chair.)

1. Three courses in Computer Science

CS	201	Problem-Solving with Algorithms and Programming I
CS	202	Problem-Solving with Algorithms and Programming II
CS	203	Data Structures and Algorithm Analysis

2. Three Computer Science electives at the 200 or 300 level, at least one of which must be at the 300 level.

Major Certificate
(39–42 credits. Substitutions can be made with the permission of the Department Chair.)

1. Six courses in Computer Science required for the minor certificate as listed above.

2. Six additional courses in Computer Science

CS	341	Computer Ethics
CS	354	Database Management Systems Design
CS	358	Operating Systems
CS	362	Computer Organization and Architecture

CS 490, 491 Capstone I, II

3. One course in Mathematics
MA 230 Discrete Structures

University Seminar Course (US)

230
International Computer Ethics
(4 credits)

This University Seminar examines the ethical consequences of the expansion of computer usage in our society and internationally. The course aims to give students a solid grounding in ethics in general and the ethical dilemmas that are unique to computer applications.
Note: US 230 can count toward the Computer Science or Computing Technology majors and minors or the Philosophy major and minor.

Computer Science Courses (CS)

104
The Computer as a Tool
(4 credits, day; Fall, Spring)
(3 credits, evening; Fall, Spring, Summer)

This course is an introduction to the computer as an information processing tool. It surveys general purpose programs: word processing, spreadsheets, database management and presentation graphics. It presents fundamental computer concepts: hardware, software and introduction to programming. It analyzes specialized uses of the computer in the arts, education, humanities and sciences and considers the role of the computer in society.
Prerequisite: Completion of MA 095; or placement into MA 100 or higher.

105
Computers and Technology in Education
(4 credits; Fall, Spring)

This course provides an opportunity for those students who will be using computers and technology in instruction to develop computer and multimedia technology skills, enabling them to develop, interpret and evaluate computer applications in an instructional environment.
Prerequisites: Education majors.

107
Website Development
(4 credits, day; Fall, Spring)
(3 credits, evening; Fall, Spring)

This course examines the principles of Web page development from a technical standpoint. It is not a course in design, although it does touch on that area. After considering the relationship between design and function, students begin to write and demonstrate Web pages. Web pages will be implemented using both raw HTML and a code generator such as Dreamweaver. If time permits, Java Script will be introduced.
Prerequisite: CS 104 or the equivalent.

201
Problem-Solving with Algorithms and Programming I
(4 credits, day; Fall)
(3 credits, evening; Fall, Spring)

This course is an introduction to the understanding of computer systems, the use of structured programming concepts, algorithm development, debugging and data analysis. It is taught with a high-level programming language. Currently the language is Java.

202
Problem-Solving with Algorithms and Programming II
(4 credits, day; Spring)
(3 credits, evening; Fall, Spring)

A continuation of CS201. Topics considered in this course include recursion, dynamic memory allocation (linked lists) and an introduction to professional programming techniques.
Prerequisite: CS201.

203
Data Structures and Algorithm Analysis
(3 credits, evening; Fall)

This is an advanced course in the application of analysis and design techniques to algorithms that act on data structures.
Prerequisite: CS 202
Co-requisite: MA 230; or permission from the Department.

227
Computer Networking Fundamentals
(3 credits; Fall)

This course is an introductory study of current computing networking technologies, systems, equipment, and management/configuration software. It includes hands-on lab sessions and course projects.

228
Modern Programming Languages
This course is an introduction to contemporary computer languages such as 228A: Python; 228C PROLOG; 228D LISP; 228E Visual Basic; 228G SAS; 228H C++; 228K SASII. Content and credit hours vary depending on the interests of students and instructor. It may be repeated for credit with permission of the adviser.
Prerequisites: CS 202.

228A
Modern Programming Languages: Python
(3 credits)

228G
Modern Programming Languages: SAS
(3 credits; Fall)

228H
Modern Programming Languages: C++
(3 credits)

228K
Modern Programming Languages: SAS II
(3 credits; Spring)

US 230
International Computer Ethics—See listing above under University Seminar Course.

306
Building Web Applications
(3 credits; Spring, odd years)

This course is an intensive study of client/server technology and the methods, languages and tools for developing multi-tier distributed applications on the Internet. It includes Web-based programming projects.
Prerequisite: CS 107 and CS 202 or permission of the instructor.

308
Introduction to Computer Gaming
(3 credits; Spring, even years)

This introduction to computer game development is designed for students with a background in programming. The focus of the course is on game play, design process, and programming for a two-dimensional environment.
Prerequisite: CS 202 or permission of the instructor.

315
Theory of Computation
In this introduction to the theoretical basis of computing, topics include a review of graph theory; network models; grammar, languages and automata; Turing machines; computability. Offered on request.
Prerequisites: CS 201 and either MA 230, MA 322, or MA 302.

317
Design and Analysis of Algorithms
(3 credits; Spring)

The course is the study of the design and analysis of algorithms, with emphasis on efficiency.
Prerequisites: CS 203 and either MA 230 or MA 330.

341
Computer Ethics
(3 credits, Spring)

This course examines the ethical consequences of the expansion of computer usage in our society and aims to give Computer Science majors a solid grounding in ethics in general and the ethical dilemmas that are unique to computer applications. As computer applications expand into nearly every aspect of our daily lives, it has become vital that computer professionals are well-acquainted with the ethical problems unique to computers.

354
Database Management Systems Design
(3 credits; Fall)

This detailed study of design and implementation of a database management system includes file security and some form of query into the system.
Prerequisite: CS 202.

358
Operating Systems
(3 credits; Spring odd years

This course is a study of the major concept areas of computer operating systems principles; the architecture of computer systems at the register; transfer and programming levels of system description; and the inter-relationships between the operating system and the architecture of computer systems.
Prerequisites: CS 202, 203.

362
Computer Organization and Architecture
(3 credits; Fall odd years)

This advanced course in computer system organization includes logic design, data representation and transfer, digital arithmetic, digital storage and accessing, control and input/output reliability.
Prerequisites: CS 202, 203.

370
Computer Graphics
This introduction to the theory and methodology of computer graphics develops underlying principles for the representation of objects and surfaces with computers, including translation, rotation, scaling motion, parallel and perspective projection, and hidden lines and surfaces. Class usage of the computer is an integral part of the course. Not regularly offered.
Prerequisite: CS 201.

372
Data Communications I
(3 credits; Fall, odd years)

This study of the aspects of developing and designing data communication networks includes

identifying and defining the design of the proposed system, analyzing the type of message, determining the total traffic, developing alternative configurations, calculating the network cost, implementation, and follow-up evaluation.
Prerequisite: CS 202, MA 230, CS 227 or permission of the instructor.

373
Data Communications II
This is the second course in data communications. It concentrates on both theoretical and practical aspects of the TCP/IP and ATM network protocols. Students design, build and troubleshoot networks.
Prerequisite: CS 372.

376
Organization of Programming Languages
(3 credits)

This course is a study of programming languages specification and analysis, comparing their features and limitations. Not regularly offered.
Prerequisites: CS 202, 203.

378
Artificial Intelligence
(3 credits)

This introduction to basic concepts and techniques of intelligent systems includes insights into active research areas and applications, strategies for choosing representations, notational systems and structures, natural languages, vision systems, search strategies and control. Not regularly offered.
Prerequisites: CS 202.

387
Special Topics in Computer Science
(1-4 credits)

In this seminar in advanced topics of computer science, content and credit hours vary depending on interests of instructor and students. May be repeated for credit.
Prerequisites: CS 202, 203.

389
Independent Study
Independent study is directed research or a project in an advanced area of computer science. Credit may vary.
Prerequisites: Junior standing and permission of the Chair and the instructor concerned.

490
Capstone Course I
(3 credits; Fall)

Study of system analysis and design leads to a significant computer project to be implemented in CS 491.
Prerequisite: CS 354; or permission of the Chair.

491
Capstone Course II
(3 credits; Spring)

Continuation of CS 490. Focuses on application of state-of-the-art techniques in software design and development. Includes implementation of senior project designed in CS 490.
Prerequisite: CS 490.