

Computer Programming

Free Program Overview

Software Development (including Computer Programming)

This free event is an informal information session for new or returning students who are interested in our software development programs, including Computer Programming, Internet Programming and Development, Software Engineering and Quality, Linux Programming and Administration, and Database Systems. During this interactive session, instructors and staff will highlight new content developments in each area. They will also explain the curriculum, requirements, recommended course sequences, and certificate completion timeframes. You will learn how these programs can help you advance your current career or break into a new field.

Course 3085
and 22404



ENGINEERING AND TECHNOLOGY



Programmers Remain In High Demand

Software development continues to evolve with hardware capability and increasing requirements for more information and higher performance. As a result, there's an ongoing need for technical professionals who can create, maintain and troubleshoot these applications, which explains why programmers—especially those with cutting edge skills in the newest technologies—remain in such high demand.

Silicon Valley's Richest Course Offerings

Our certificate in Computer Programming provides a solid working knowledge of the field—but goes beyond the fundamentals to teach practical skills on platforms and applications across the industry: from Windows-based X86 to Internet-based programs and small mobile device platforms. In addition to a comprehensive list of programming languages, we also emphasize programming applications and methodologies. Courses explain basic models and emphasize software practices that reduce maintenance costs, optimize the code, and enable the creation of reusable software components.

Curriculum Keeps Pace with Industry Trends

Because all our instructors have years of experience working in their fields, we are able to constantly update our curriculum with industry developments. Nearly all major platforms are covered in our curriculum. Many courses use open source tools or lab-based commercial software to give students hands-on experience in programming projects.

Benefits of Studying at UCSC Extension

- Knowledge gained here can be applied immediately on the job
- Richest software course offering in Silicon Valley
- University of California quality reputation
- Unique and practical courses to enhance job skills
- Wide variety of advanced topics suited to those seeking specializations
- Courses taught by expert working professionals
- Instructor-led learning with interactive Q & A
- Networking with fellow students
- Convenient schedule and Silicon Valley location
- More than 20 courses available online, anywhere, anytime

Who Should Attend This Program

- Software developers who want to enhance their programming knowledge
- Professionals in the field who want to keep up with rapid industry change
- Graduating students or career changers looking to enter the software field
- Engineers that need programming training for specific projects
- Individuals learning programming for personal applications
- Project managers who interface with programmers or manage software projects.



About UCSC Extension Silicon Valley

The vital learning community at UCSC Extension Silicon Valley is well known for its collegial atmosphere and rigorous preparation. Our faculty of expert practitioners teaches state-of-the-art solutions to the everyday problems confronting technology professionals working in Silicon Valley. The professional education programs we offer build expertise, open doors to new opportunity, and deliver tangible value. Our broad portfolio of open-enrollment courses and certificates, affordable pricing, experience-based instruction, and central location in Silicon Valley help turn jobs into careers.

Computer Programming Certificate

Certificate Requirements

To obtain the Certificate in Computer Programming, you must complete **14 units**, representing 140 hours of instruction.

Prerequisites

Please read the course description carefully to ensure you meet the requirements, whether through job experience or education. For details see full course descriptions at ucsc-extension.edu/engineering.

The Longest-Running Certificate Program in Engineering

This certificate program was developed more than twenty years ago. With constant updates, it has remained one of the most popular offerings at UCSC Extension Silicon Valley.

The curriculum includes courses on every major programming language used in the industry, including C, C++, C#, Java, Perl, Python, PHP, Ruby and Groovy. Classroom instruction is supplemented with hands-on training in our labs. Recent updates to our curriculum include courses on mobile device applications and multicore, multithreaded programming. Engineering professionals can count on us to meet their continuing educational needs, wherever their careers may take them.

Our companion certificate program, "Internet Programming and Development," focuses on development platforms such as Java EE, .NET, and Linux. Courses cover both server and client side technologies. In some cases, electives may be shared between these programs.

Recommended Course Sequence

We recommend you take courses in the order presented on the course chart. However, the sequence may vary based on student background and professional interest.

Note: Some courses may be listed in more than one program, however, only one course may be shared between two Engineering and Technology certificate programs unless otherwise noted.

Program Contact

Engineering and Technology Department,
(408) 861-3860 or e-mail
program@ucsc-extension.edu

Curriculum

14 unit minimum **Units** **Course**

C Programming

C Programming for Beginners3.05208
C Programming, Advanced3.03948

C++ Programming

C++ Programming, Comprehensive3.018344
Data Structures and Algorithms Using C++3.04732

.NET Programming

C# .NET Programming, Comprehensive3.05408
C# .NET Programming, Advanced3.019026
Visual Basic Programming, Comprehensive3.02874
Developing UI for Windows and the Web
with WPF and Silverlight2.020027

Java Programming

Programming with Java for Beginners1.55185
Java Programming, Comprehensive3.06634
XML Essentials2.03279
JUnit Test Framework1.56198

Scripting Languages

Perl Programming I2.02856
Perl Programming II2.02110
Python Programming for Beginners1.520776
Python for Programmers3.03064
PHP (Hypertext Preprocessor)2.021343

Mobile Device Programming

Developing Applications for
iPhone, iPad and iPod Touch3.021938
Developing Applications for
Android Mobile Devices3.021956

Advanced Programming

Multicore Programming2.022180
Object-Oriented Analysis and Design3.00774
Object-Oriented Development:
Architectures and Design
Patterns, Advanced3.06633
Machine Learning and Data Mining,
Introduction3.02612
Computational Intelligence1.519951

Programming Applications

Game Design and
Production Overview2.522411

C Programming for Beginners

This course is for individuals who want to learn C programming language but have little or no programming background. The course begins with an overview of programming and tools. It introduces functions, data types, input/output, strings, operators, precedence, and expressions. It also demonstrates the use of control statements, arrays, and pointers for problem solving. You will receive assignments to write non-trivial programs and learn to create modular programs with efficiency and readability.

Course 5208

C Programming, Advanced

This course will broaden your skills as a C language programmer by introducing sophisticated problem-solving techniques, including the advanced use of pointers, abstract data types, data structure concepts and optimization techniques. This course delves into the design, implementation, and use of advanced data structures, based on primitive data types. Students will solidify their understanding of strings, arrays, structures, Unions and Bit manipulation. Emphasis will be on programming that employs and improves upon a variety of data structures. Through this course, you will learn to write efficient programs by understanding the complexities of various algorithms.

Course 3948

C# .NET Programming, Advanced

For students who have learned the basic C# language and the C#.NET integrated development environment, this course provides an opportunity to extend their C# and .NET skills by learning advanced C# features and programming techniques. The course introduces the components of the .NET framework, database connectivity and Web application development.

Course 19026

C# .NET Programming, Comprehensive

This course introduces beginning and intermediate programmers to .NET programming using Microsoft's C# programming language. The instructor explains the Visual Studio development environment and reviews the basic constructs of C# language with detailed explanations of the C# regular expressions, delegates, events, generics and collections. The course also covers exception handling, threading and synchronization. Sample applications will be used to illustrate core concepts and the instructor will present real-world code examples in class.

Course 5408

Course Descriptions

C++ Programming, Comprehensive

C++ is a general-purpose object-oriented programming language that offers portability, speed, and modularity, as well as compatibility with C and other languages. An excellent foundation in developing optimized C++ applications, this course offers participants the opportunity to write faster code, to learn debugging techniques, and to deliver modular code for real-world applications. Topics include object-oriented concepts; structure and input/output streams; declarations, identifiers, pointers, and arguments; memory management, constructors, and destructors; enumeration type, as constructor parameter; character strings, file I/O, functions; inheritance, interaction diagrams; and exception handling, pointers, and functions.

Course 18344

Computational Intelligence

Computer professionals are required to solve increasingly complex problems. "Black-box" computational-intelligence tools can be configured to allow their application to problems, without the user's intimate knowledge of the low-level details. You will learn the strengths and weaknesses of various computational and artificial intelligence techniques, with emphasis on their application to actual problems. This course is well suited to computer professionals who want to explore new techniques for solving problems that are ill-defined, have conflicting constraints, or contain data with high noise levels. Topics include neural networks, genetic algorithms, genetic programming, swarm intelligence, and fuzzy systems.

Course 19951

Data Structures and Algorithms Using C++

In this course, students learn to implement efficient algorithms with powerful data structure in object oriented code using C++. After a quick review of C++, the course delves into complex algorithms using examples. Students learn and implement industry standard container objects such as dynamic array, linked list, stack, heap, hash tables, heap and binary tree, search and sort, as well as graph algorithms using C++ templates. Emphasis is placed on common problems, implementation details, examples, and testing.

Course 4732

Developing Applications for Android Mobile Devices

Android is an open source mobile platform supported by Google and OHA. This course begins with an overview of the Android development platform. An example will be used to demonstrate how to build applications for the platform. The course explains in detail the platform architecture, the basic mobile building blocks, how to program it with Java code, debugging, implementing the UI, and using the optional APIs and Google libraries to enrich the application. Students learn through programming assignments.

Course 21956

Developing Applications for iPhone, iPad and iPod Touch

The course provides an overview of using the iOS SDK to develop iPhone, iPad, and iPod Touch applications. It begins with a discussion of Xcode and Objective-C. Students learn various iOS programming frameworks, user interface development, memory management and program design. The App Store submission process and guidelines are covered. Discussions also delve into advanced functionality, multitasking, and special considerations for the iPad and iPod Touch. Upon completing this course, students have a solid understanding of the iOS SDK and the ability to successfully create and publish apps.

Course 21938

Developing UI for Windows and the Web with WPF and Silverlight

The Windows Presentation Foundation (WPF) provides programmers with a set of tools and APIs within Visual Studio.NET that support the development of exciting user interfaces. Silverlight is Microsoft's platform for the development of Rich Internet Applications (RIAs). The Silverlight runtime supports many different browsers and operating systems. This course introduces WPF and the Silverlight development environment, tools, concepts, techniques, and the Extensible Application Markup Language (XAML). Through hands-on projects, you will learn the fundamentals needed to build UI pages, and access databases and the network using both Silverlight and WPF.

Course 20027

Java Programming, Comprehensive

Java is the premier language for Web servers, enterprise servers, network applications, embedded devices, appliances and wireless applications. This course covers the Java fundamentals, including language syntax, constructs, and the development environment. It also extends to the Java platform, including client/server communication and managing XML data. The course begins with Java's implementation of object-oriented concepts such as classes, data and function access controls and inheritance. Students build graphical user interfaces and program in the Java event-handling model. Additional topics include the Java class library, collection frameworks, Internet communication, and multithreaded programming.

Course 6634

JUnit Test Framework

JUnit is one of the most popular open source testing frameworks for all types of Java software applications at the unit, integration, functional, and acceptance testing stages of the software life cycle. This course begins with the fundamentals of JUnit, including installation, setup and integration with Eclipse and Apache Ant, two of the major Integrated Development Environments (IDE) that support JUnit. Then the features of JUnit are covered, along with how different versions compare to each other, and how to customize JUnit and create automated tests. Students will learn the real-world uses of JUnit, including test strategies and the concept of Test Driven Development (TDD), also known as "test first, code later." Other advanced topics include testing presentation layer, server side, JPA and database access. By the end of this course, you will have learned to use JUnit to test Java applications in all life cycle stages and will be able to apply this framework to build automation testing.

Course 6198

Machine Learning and Data Mining, Introduction

Machine Learning automatically recognizes complex patterns in all types of data. This survey course covers the concepts and principles of a large variety of data mining methods. The course covers both supervised and unsupervised learning concepts. The supervised techniques include various types of linear regression, decision trees, k- nearest neighbors, Naive Bayes, Support Vector Machines, and ensemble methods. The course also addresses unsupervised techniques such as: k-means, expectation maximization, and density based clustering.

Course 2612

Multicore Programming

Understanding how your multi-threaded application executes on multicore/multi-processors is the key to getting maximum performance benefits on these computing platforms. This course gives you a basic understanding of the multicore architecture and operating system factors when designing multi-threaded applications. It discusses the patterns to identify parallelism in your applications targeting a specific platform and the step-by-step process in identifying the parallel solution that best fits the need of the problem. You will gain a practical knowledge of Intel software tools to write applications, debug, analyze and profile them on multicore platforms.

Course 22180

Object-Oriented Analysis and Design

Object-oriented design involves transforming the descriptive analysis models into computational models for coding. During an object-oriented analysis, a descriptive model of the problem domain is developed. Instruction uses the notation specified by the Unified Modeling Language (UML). Students will learn Agile and Iterative Development methodologies and use case design and requirements driven design. The course covers the principles of object-oriented design as well as practical considerations for applying these principles. Methods for evaluating and fixing poor designs are also addressed, as well as tools and library issues.

Course 0774

Object-Oriented Development: Architectures and Design Patterns, Advanced

This course begins with a discussion of best practices in software architecture and detailed design. Covered next are a wide range of design patterns used to construct modern software systems-patterns which are an integral part of a designer's engineering toolkit. The course illustrates the reuse of design patterns with an overview of patterns from the gang of four and several domains including refactoring, performance, distribution, lifecycle management, system integration, and message routing. The course concludes with lectures on object-oriented framework design, software product lines, software components, and an overview of aspect-oriented programming.

Course 6633

Perl Programming I

This course introduces users, programmers and system administrators to the popular interpreted language called Perl, the Practical Extraction and Report Language. Perl is hailed as the system administrator's language and is the de facto standard for writing dynamic Web pages. This practical course is also useful for anyone working with UNIX text files, databases and processes. Although the course is taught on a UNIX system, Perl is very portable. The fundamental topics covered in this course are data types, operators, regular expressions and pattern handling, conditional and looping constructs, file handles and filters, file testing, command-line arguments, subroutines and packages, the UNIX system interface, formatting and database management files.

Course 2856

Perl Programming II

This hands-on course is designed for those interested in advanced applications for Perl. It is a highly beneficial continuation of the "Perl Programming I" course. Students learn to read and write Perl modules, both procedural and object oriented. Topics include Perl subroutines and packages, references (pointers), objects, modules, pragmas and the standard Perl library. Students learn how to document their programs using Perl's Plain Old Documentation format and store them in a library. There will be an overview of the Perl DBI for connecting to any database and performing SQL queries, retrieving result sets, and displaying the results in a browser using the CGI.pm module.

Course 2110

PHP (Hypertext Preprocessor)

PHP is one of the best server-side technologies for handling Web content. It is used by millions of sites worldwide. The course starts by covering the development environment, language syntax and programming constructs. It introduces the concepts of OOP in PHP at different levels, including the PHP library and unit tests. It also covers interactions with databases and working with HTML forms and tables. Other topics include advanced Web programming tasks using PHP such as user authentication, sessions, encryption, and handling Web services and XML.

Course 21343

Programming with Java for Beginners

This course is intended for those who are new to programming or need a refresher. Java, a widely popular programming language, will be used to generate solutions to real, practical problems. The course begins with the concepts of programming, computer science, and software engineering. It introduces the basic Java syntax, and then delves into abstraction, object-oriented paradigm, procedural programming, elementary data structures, recursion, and more. Students will gain a strong foundation and learn to write programs for real applications. The course includes lab exercises.

Course 5185

Python Programming for Beginners

This course is intended for newcomers to programming. The course covers the important concepts and programming mechanisms that exist in all programming languages: reading and writing to standard I/O, using operators, controlling the flow of execution, using functions, reading and writing files, and object-oriented programming concepts. It also includes Python specific facilities such as code re-use, built-in sequence types, and iteration. This is a hands-on lab-based course.

Course 20776

Python for Programmers

Because of its clear and elegant syntax, dynamic typing, automatic memory management, and straightforward module architecture, Python enhances program correctness and increases efficiency. Its code is easy to read, write, extend, and modify. This lab-based course offers proficiency in Python, and the skills and knowledge for building applications using task-specific Python libraries. Topics include the Python environment and code introspection; syntax, flow control, function protocols, exception handling and functional programming. Also covered are object-oriented features, classes, inheritance and overriding; and building applications, packages, and libraries.

Course 3064

Visual Basic Programming, Comprehensive

This course introduces object oriented programming techniques in a Windows environment. The fundamentals of event driven programming are covered using the Rapid Application Development tool Visual Basic (VB). Planning, programming and debugging VB applications using modern programming techniques and practicing good graphical user interface design are emphasized.

Course 2874

XML Essentials

Extensible Markup Language (XML) is used for creating Web pages. It is a new way of thinking about online documentation. Discover the history of XML and the various reasons for moving from standard HTML toward XML at your workplace. Explore the advantages and disadvantages of using XML, and obtain hands-on experience in working with XML, cascading style sheets and document-type definitions. You will get a solid understanding of XML, where to apply it and also what associated technologies will impact the Web in the near future.

Course 3279

Program Updates and Enrollment Information

Visit ucsc-extension.edu/engineering, for the most up-to-date information about our courses and programs, including textbooks, instructors, schedules and locations.

Enroll online at ucsc-extension.edu.

Send questions to program@ucsc-extension.edu