

SOFTWARE ENGINEERING & QUALITY

Post-Graduate Certificate Program

UC SANTA CRUZ SILICON VALLEY CAMPUS
UCSC Silicon Valley
Extension

in partnership with  Higher Education

UCSC Silicon Valley Extension's Software Engineering and Quality certificate program blends foundation-level course work in software engineering with the latest developments in software quality, testing, and user experience design. Established and aspiring engineers will develop new skills, gain insight into the emerging technologies, and learn from our expert faculty. This certificate program provides the next level training you need for career growth.

Who Should Attend?

This program is geared to professional engineers seeking to expand their expertise and career prospects. Recent engineering graduates who want a leg up as they enter the job market also benefit from the practical training this program provides, which is not typically part of academic engineering curricula. Software developers, architects, and project leaders often find that this certificate program offers the next-level training they need to grow professionally.

Prerequisites

A degree in computer science or engineering or equivalent experience in software development, testing, QA or project management is required.

Curriculum

Certificate & OPT | 3 Quarters | 28 Units

Object-Oriented Analysis and Design | 3 Units

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). You 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. The course includes a comprehensive final project for you to practice documenting design using different UML diagrams.

User Experience Design Fundamentals | 3 Units

User experience design is a major factor in creating winning industry products. This course focuses on using user-centered design strategies and methods to create effective websites and Web applications that provide an excellent user experience.

The course will also expose you to the multidisciplinary nature of the user experience design process, design thinking, and the steps you can take to succeed. The course covers methods and strategies of six overlapping phases: problem identification, information collection, idea generation, prototyping, evaluation/testing, and implementation.

Data Structures and Algorithms Using Java | 3 Units

This course covers data structures such as dynamic array, dynamic string, long numbers, lists, heap, hash, trees and graphs. You will learn to create objects from scratch using object-oriented Java programming concepts, and then build bigger objects using the objects that have already been built and tested. You will write algorithms on these objects using techniques such as recursion, greedy, divide and conquer, back tracking and dynamic programming.

JUnit Test Framework | 1.5 Units

JUnit is a testing framework for Java 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, and how to customize JUnit and create automated tests. You will learn the real-world uses of JUnit, including test strategies and the concept of Test Driven Development (TDD).

Mobile Interface Design | 3 Units

There are many mobile apps in the App Store, but only a limited number of them have innovative design principles, friendly user interfaces, and widespread adoption by users. In this hands-on lab and lecture course, you will learn the core principles for creating effective user interfaces for mobile devices incorporating iOS, Android, Windows, responsive/parallax design and more. You will discover useful patterns for developing mobile products and design a mobile user experience using an iterative and user-centered design process.



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Curriculum continued

Software Quality Assurance and Testing | 2 Units

As the software industry evolves, the need for qualified engineers trained in the principles, methodologies, techniques, and tools of software quality assurance has grown. This course presents the specifics of software quality assurance and software testing. The course also describes how these processes fit into the software development process. Topics include process and product quality; building an effective SQA organization; techniques and content of an SQA plan; software quality standards; overview of test cycles; test planning; software inspections; basic concepts of measurement; software development, Total Quality Management, and risk management.

Object-Oriented Development: Architectures and Design Patterns, Advanced | 3 Units

This course will equip you with an arsenal of software design and architecture skills. It focuses on the architectures most widely used in enterprises for development and integration such as MVC, EDA, SOA, and Messaging. The course includes a design component and an architecture component. The design component explores the classic design patterns set forth by the gang of four, and covers their practical use and modeling in everyday application and framework design. The architecture component covers the fundamental best practices in software architecture and design.

Software Testing: Techniques, Tools and Practices | 3 Units

This course provides an overview of software testing. You will learn the essential testing methodologies, including black box and white box testing in the evolving Agile/Scrum model. The course covers test practices for unit and functional tests using JUnit and NUnit. Test and code coverage strategy and tools are addressed. Course topics include defect tracking, reporting and test case management using Bugzilla and TestLink. The instructor will introduce test automation of Web-based applications using Selenium. Open source tools will be used for hands-on exercises.

Java Programming for Beginners | 2 Units

This course is an introduction to Java programming, starting with programming concepts and Eclipse IDE. The instructor introduces basic and intermediate Java syntax, and then addresses abstraction, object-oriented paradigm, procedural programming, elementary data structures, and more. Other useful topics include graphics user interface, collections and generics. You will gain a strong conceptual foundation in these areas while starting to write programs for real applications. The course includes programming exercises.

Machine Learning & Data Mining, Introduction | 3 Units

Machine learning automatically recognizes complex patterns in all types of data. This hands-on course covers the concepts and principles of a variety of data mining methods and includes

examples written in the statistical language R. The course presents supervised learning concepts, which require labeled training data and include various types of linear regression, decision trees, k-nearest neighbors, Naive Bayes, Support Vector Machines and ensemble methods. Though you may use any language for your final project, homework must be written in R.

Adobe Illustrator, Introduction | 1.5 Units

Illustrator's vector-based, small graphic format makes it a must for print and Web graphics. This hands-on course introduces the essential features and tools of Adobe Illustrator. Students develop basic competency in the use of this complex software, with emphasis on the Pen tool. **Skills Needed:** Working familiarity with the Mac and/or Windows operating system including the fundamentals of file management and navigation.

Internships (unpaid) | 3 Units Minimum 90 Hours Per Quarter

Enrolling in a certificate program allows you to participate in multiple unpaid internships at local companies in your field of study. Internships are available across a variety of sectors, generally at mid-sized companies, such as Agylytyx, Crowdera Inc, Innowest, and YMedia Labs. Good internships are much sought after and highly competitive. To stand the best chance of securing your preferred placement, our Internship Coordinators are on hand with expert support and guidance.

Courses in the certificate programs are subject to change based on schedule availability and/or student aptitude. Equivalent course substitutions will be made to accommodate.