CS - Software Engineering Graduate Program

Master of Software Engineering (MSE) Program  
Director: Kasilingam Periyasamy  
222 Wing Technology Center; 608.785.6823  
Email: kperiyasamy@uw.lax.edu  
www.cs.uwlax.edu/index.php/graduate-program

The focus of the Master of Software Engineering (MSE) Program is to teach the advanced state-of-the-art technologies in software development with hands-on experience, and to apply the knowledge to some challenging real-world problems. The program will guide the students to acquire both technical skills and software project management skills that are required to lead and to carry out software development projects.

2018-19 Faculty/Staff

The following is the graduate faculty and staff as of the publication date of this catalog. This list will not be updated again until the next catalog is published in June.

Professor

Kenny Hunt  
Kasilingam Periyasamy  
Steven Senger  
Mao Zheng

Associate Professor

Martin Allen  
Thomas Gendreau

Assistant Professor

Samantha Foley  
Elliott Forbes  
John Maraist  
David Mathias  
Allison Sauppé  
Jason Sauppe

Administrative Support

Becky Yoshizumi

Graduate degree

- Master of Software Engineering - MSE (http://catalog.uwlax.edu/graduate/programrequirements/softwareengineering/mse)

Courses

CS 402/502 Cr.3  
**Web Application Development**  
This course will give a detailed description of the core concepts and general principles of web application development. The course will cover various protocols, programming languages, scripting languages, data storage and security, layered software architectures, and graphical interface design as they relate to web development. Students will apply these techniques to the development of medium scale web application. Prerequisites: CS 340. Offered Fall - Odd Numbered Years.

CS 503 Cr.1-3  
**Special Topics in Computer Science for Teachers**  
a special topics course used to introduce K-12 teachers to computer science content and to curricula and pedagogy designed for K-12 students. Not applicable to the Computer Science Program or Master of Software Engineering degree. Prerequisite: current K-12 teacher certification (any discipline). Consent of instructor. Offered Occasionally.

CS 410/510 Cr.3  
**Free and Open Source Software Development**  
This course examines all aspects of the Free and Open Source Software movement. The course surveys the various definitions of open source licenses and examples of major free and open source development projects (e.g. the GNU Project, Apache Foundation, Linux). The course also examines the development tools that support developer communities as well as how web-based applications have created the possibility of international development teams. Students will select and contribute to the software development of an existing open source project. Prerequisite: CS 340. Offered Spring - Odd Numbered Years.

CS 418/518 Cr.3  
**Mobile Application Development**  
an introduction to the concepts and techniques of application development for mobile devices. The course will examine the design constraints of mobile devices, how mobile applications can leverage external data resources, integration of sensor data and the development environments of the chosen platform (e.g. iOS, Android and others). Repeatable for credit with different topic - maximum six. Offered Occasionally.

CS 419/519 Cr.1-3  
**Topics in Computer Science**  
a special topics course in computer science which will function as a forum for new ideas and testing ground for new courses. Repeatable for credit - maximum six. Consent of instructor. Offered Fall, Spring, Summer.

CS 421/521 Cr.3  
**Programming Language Concepts**  
a comparative study of the concepts underlying the design of contemporary high-level programming languages, including imperative, functional, logic and object-oriented paradigms; formal representation of syntax and semantics; control structures; data and procedural abstraction; scope and extent; parallelism and exception handling. This course cannot be taken both at the undergraduate level and at the graduate level. Prerequisite: CS 340; CS 225 or MTH 225. Offered Fall, Spring.

CS 431/531 Cr.3  
**Introduction to Robotics**  
This course is a hands-on introduction to the algorithms and techniques required to write robot control software. Topics include the components of mobile robots and robot manipulators, manipulator kinematics, robot task planning, sensing, sensor fusion, visual servoing and robot control concepts. Offered Spring - Odd Numbered Years.
and unsolvable problems such as the halting problem are discussed. Including: partial recursive functions, Turing machines, finite state capabilities and limits of several computation models are considered.

An introduction to the theoretical aspects of computation. The Introduction to Theory of Computation program. Prerequisite: CS 340. Offered Fall - Odd Numbered Years.

Programming for artificial intelligence and knowledge-based systems. Topics include game trees, natural language processing, automatic theorem proving, and user interface development, evolution of user interfaces, evaluation of user interfaces, and case studies. Prerequisite: CS 340. Offered Fall - Even Numbered Years.

This course focuses on the design and implementation of user interfaces. The topics include characteristics of user interfaces, user profiles, user interface design principles, methods and tools for user interface development, evolution of user interfaces, evaluation of user interfaces, and case studies. Prerequisite: CS 411. Offered Fall - Even Numbered Years.

This course introduces advanced topics in Software Engineering. Topics include prototyping models, risk analysis, component-oriented software development, software architectures, software reuse, software metrics and quality analysis. Prerequisite: CS 411. Offered Fall - Even Numbered Years.

This course introduces the fundamentals of digital image processing techniques with an emphasis on the design and implementation of image processing algorithms. Topics include: color models, point-processing techniques, convolution, fourier domain processing, the discrete cosine transform, image compression methodologies, image restoration and enhancement, sampling and image display. Prerequisite: CS 340. This course cannot be taken both at the undergraduate level and at the graduate level. Offered Fall - Even Numbered Years.

This course presents the fundamental concepts of information security. Basic policies, techniques and tools for maintaining the security of host computers, information networks and computer software are presented. Topics include encryption, authentication, access control, types of attacks and mitigations, software security, network security protocols, and the concepts of trust, privacy and ethics. Students are expected to compare security policies and techniques, apply concepts using modern tools and techniques, and explore recent security events. This course is taught largely at an undergraduate level. Graduate students will use additional course requirements/expectations. Prerequisite: CS 340. Offered Fall.

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CS 472/572 Cr.3

Internet of Things
This course explores the possibilities which are created when everyday things become connected to the internet and how this can create new ways for humans to interact with computation and for computation to enable human activities. This course involves building small, sensor equipped hardware devices and cloud based software systems using various technologies. Prerequisite: CS 340, CS 372. Offered Annually.

CS 475/575 Cr.3

Computer Graphics and Modeling
An introduction to computer graphics in modern computing environments. Topics include geometric transformations, fundamental drawing algorithms, scalable vector graphics (SVG), OpenGL, WebGL, surface mesh shaders, scene graphics, photorealistic rendering, surface mesh data structures, animation and modeling and GPGPU computing. Prerequisite: CS 340, MTH 207. Offered Fall - Odd Numbered Years.

CS 476/576 Cr.3

Data Visualization
An introduction to visualizing various forms of data (abstract and concrete) using computer graphics. The course will consider both scientific visualization where the data itself determines the spatial representation and information visualization where appropriate spatial representations are imposed on the data. Prerequisite: CS 575. Offered Spring - Even Numbered Years.

CS 741 Cr.3

Software Engineering Principles
This course introduces fundamentals of software engineering and various life cycle models for software development. It focuses on software processes addressing various life cycle activities such as requirements engineering, design, implementation, testing, and maintenance. Object-oriented design using the Unified Modeling Language (UML) will be introduced. Application of software engineering methods to different application domains will be briefly discussed. Prerequisite: CS 340. Offered Fall.

CS 742 Cr.3

Formal Methods in Software Development
Introduces various formal notations that are used in software development, the mathematical preliminaries that are required to understand and to use the formal notations, provides hands-on experience with one or two formal notations along with some case studies. Prerequisite: CS 340. Offered Spring.

CS 743 Cr.3

Software Verification and Validation
This course explains the need for verification and validation, discusses the methods (formal, informal and diagrammatic) and techniques (prototyping and theoretical proof techniques) that implement verification and validation, and provides hands-on experience to apply these methods and techniques to some simple case studies. Automation of verification and validation methods will also be briefly discussed. Prerequisite: CS 741 or concurrent enrollment. Offered Fall.

CS 744 Cr.3

Software Project Management
This course addresses principles, standards, guidelines and techniques for software project management. Emphasis will be given to modern software development approaches. Topics covered in this courses include people management, work allocation, schedule, project planning, cost estimation, risk management, project deployment, licenses, and ethical and legal issues. Prerequisite: CS 741. Offered Spring.

CS 746 Cr.3

Software Modeling and Analysis
This course introduces various software models, and techniques to analyze software designs using these models. Both diagrammatic and mathematical models will be included. Informal, rigorous, and formal analysis will be covered. Prerequisite: CS 225, CS 340. Offered Spring.

CS 750 Cr.1-3

Topics in Software Engineering
This is a topics course in Software Engineering. New topics will be introduced based on the evolution of Software Engineering research. Some such topics are real-time systems, embedded systems, software for safety-critical applications, software architectures, component-oriented programming, CORBA, COM/DCOM, and CASE (Computer-Aided Software Engineering). Topics may vary each semester. Repeatable for credit - maximum six. Prerequisite: CS 741. Consent of instructor. Offered Occasionally.

CS 751 Cr.1-3

Seminar in Software Engineering
This course is meant for those who want to specialize in one or more areas in Software Engineering such as software reuse, software architectures, software testing, software verification, etc. The workload for the course will include a number of presentations in the class and one or more written reports. Topics of specialization may vary for each semester. Repeatable for credit - maximum six. Prerequisite: CS 741. Consent of instructor. Offered Occasionally.

CS 752 Cr.1-3

Independent Study
This course is meant for those who want to acquire an in-depth knowledge on any Software Engineering topic. Typically, the student may be required to focus on one particular topic and conduct some research on this topic, or to do some software development activities such as analysis, design, implementation or testing. If registered for more than once, a different topic must be chosen each time. Each student is required to submit a report at the end of the term. Repeatable for credit - maximum six. Prerequisite: CS 741. Consent of instructor. Offered Fall, Spring, Summer.

CS 795 Cr.1

Software Development Internship
An academically relevant field experience in government, industry, business, or community agencies. Students must have their internships approved and be advised by the computer science department. Determination of relevancy shall be made by the Career Services Office with the advice and consent of the computer science department. The experience will be supervised closely by the intern's on-site supervisor, by the Career Services Staff, and by the student's faculty internship adviser. Students should contact the Career Services Office. Internship does not count for credit towards the MSE program. Repeatable for credit - maximum two. Prerequisite: Master of Software Engineering graduate student status; nine MSE credits earned; 3.5 or higher GPA. Student must be on their internship work site during the semester for which they are registered for academic credit. Consent of instructor. Pass/Fail grading. Offered Fall, Spring, Summer.

CS 798 Cr.1-6

Software Development Project
A major project that requires a detailed analysis of the problem domain, detailed design, implementation and demonstration. The project will be guided by a graduate CS faculty member. Submission of a written project report is required, followed by an oral examination by the Project Evaluation Committee in the CS department. Repeatable for credit - maximum 12. Maximum of six credits per semester. Prerequisite: project proposal must be approved by the Project Evaluation Committee in the CS department. Pass/Fail grading. Offered Fall, Spring, Summer.