UCLA Extension

Engineering & Technology

Construction Management Certificate

This 32-unit certificate provides a current overview of construction through a broad survey of the management and technological issues within the field.

Approved for International Students

This certificate is approved for international students and meets the I-20/F1 visa requirements. A minimum of 12 units per quarter is required. Attend class on or near the UCLA campus and study alongside American students—including working professionals in the field. For more information visit UCLA Extension's International Student Office website at *uclaextension.edu/iso*.

Construction Management Certificate

Required Core Courses

X 407.1	Construction Management
X 407.2	Construction Technology
X 407.3	Construction Planning and Management Systems using Primavera
X 412.1	Fundamentals of Construction Costs and Estimating

Electives (16 Units)

In addition, any course from the Advanced Plumbing Systems Design Certificate qualifies as an elective.

X 407.6	Construction Changes and Claims Documentation
X 409.1	Construction Documentation
X 400.13	Solar Thermal Energy Solutions
X 408.75	Legal Aspects of Construction Projects and Contracts
X 412. 16	Principles of Structural Analysis
X 412.2	Advanced Construction Costs & Estimating
X 412.4	Construction Budget and Cost Control
X 412.5	Construction Job Site Management
X 412.8	Construction Project Management with Microsoft Project
X 412.9	Reading Construction Blueprints
X 425.10	The Solar Energy Solution
X 438.8	Leadership in Energy and Environmental Design
X 438.9	Sustainable Energy Management
X 478.1	Land Development Procedures
X 489.14	Electrical Design and Construction
X 489.16	Intro to Building Information Modeling
X 489.19	Construction Estimating and Design Analysis Using BIM
X 490.05	Construction Safety and Health Management
X 490.1	Introduction to Civil Engineering for Horizontal Infrastructure

For a complete list of electives, visit our website *uclaextension.edu/construct*

Program Requirements

An Application for Candidacy must be submitted upon completing the third course in the program (Those who do not establish candidacy by this date may be subject to subsequent changes in program requirements and/or fees). The program must be completed in 5 years. To apply for candidacy, visit *uclaextension.edu/CF030*.

Further Information

Program Representative: Philip Walstrom
Telephone: (310) 825-7942
Email: *pwalstrom@unex.ucla.edu*
Address: UCLA Extension, Department of Engineering and Technology, 10995 Le Conte Avenue, Room 540, Los Angeles, CA 90024-1333

Course Descriptions

Visit *uclaextension.edu/engineering* for scheduling and fees.

Core Courses

Construction Management
Engineering X 407.1 • 4 units
This course covers the basic principles and responsibilities in construction management, including interface requirements between real estate, leasing, legal, feasibility, finance, lending, marketing, accounting, and public agencies; defining and controlling the scope of a project; and functions of the construction manager: planning, organizing, staffing, directing, and managing the other team members. Other topics include management principles, estimating, scheduling, budgeting, purchasing, design, safety, insurance, construction techniques, labor, and public relations. The course includes one "construction forum" with senior management representatives from several different disciplines related to building construction.

Construction Technology
Engineering X 407.2 • 4 units
This course studies construction materials, equipment, methods, and regulatory influences. Topics include construction for seismic resistance, technology of basic building materials, interior and exterior finishes, and electrical and mechanical systems. Current developments in materials, systems, and construction techniques are discussed in light of changing factors of production, regulatory constraints, and market demands. *Prerequisite: X 407.1 Construction Management or consent of instructor.*

Construction Planning and Management Systems using Primavera
Engineering X 407.3 • 4 units
This course presents an in-depth study of the current systems and techniques applied in construction planning, scheduling, control, and delay impact analysis. Instruction emphasizes the Critical Path Method approach to developing baseline schedules, progress measurement, earned value, integrated management systems, and as-planned vs. as-built analysis. The course also includes hands-on computerized scheduling using Primavera Systems software. *Prerequisite:* X 407.1 Construction Management or equivalent experience or consent of instructor.

Fundamentals of Construction Costs and Estimating
Engineering X 412.1 • 4 units
This course provides an overview of the basic procedures for estimating general construction costs. Topics include the preparation of quantity surveys (take-offs) and the development of material, labor, and equipment costs, including pricing of contractor and subcontractor work from actual working drawings and specifications.

Electives

Solar Thermal Energy Solutions
Engineering X 400.13 • 4 units
This course focuses on solar heating applications in buildings with an emphasis on solar hydronic plumbing systems. This includes solar domestic hot water as well as more complex solar combisystems where solar heat collectors can be combined with space heating, domestic hot water, and other heat sources and heat loads. Students learn "things that work," especially solar heating components and system configurations that have proven to perform well over the long

term. The course explores proven solar heating methods that lead to better modular components and faster standardized designs. Topics include design, sizing, and configurations of solar collectors and their integration into hydronic heating systems that include hot-water boilers and heat storage tanks. Instruction also covers the differences between the most popular types of solar heat collectors and the most common types of solar heating systems, their components, and control strategies.

Legal Aspects of Construction Projects and Contracts
Engineering X 408.75 • 4 units
33 hours MCLE credit available
This course covers common construction law errors, basic contract and real estate principles in the construction context, contractor licensing, and bidding. "Standard" construction industry documents also are examined, including AIA 201 general conditions, breach by owner, breach by contractor, construction claims and damages, warranties and insurance, construction lending and deeds of trust, mechanics' liens, bonds, stop notices, and litigation and arbitration. This activity has been approved for Minimum Continuing Legal Education (MCLE) credit by the State Bar of California in the hours stated. UCLA Extension is a State Bar of California approved MCLE provider.

Construction Changes and Claims Documentation
Engineering X 407.6 • 4 units
This course provides an overview of the change, order, and claims procedures for private and public work contracts. Identification, notification, documentation, preparation, presentation, and negotiation of change orders and claims are covered, as well as avoiding changes, risk control, claims management, inefficiency, and consequential damages. These topics are explained from the perspective of both the contractor and owner. The course also includes using Primavera System software to analyze the impact of change orders. Guest lecturers discuss their expertise.

Construction Documentation
Engineering X 409.1 • 4 units
A class designed to introduce the fundamentals of construction document controls to students that are seeking an entry-level position with a general contractor, construction/project management firm, public agency, or architecture/engineering firm. The course will cover, but is not be limited to, the legal aspects of document control, spreadsheet logs, web-based logs, popular document control software, requests for information (RFI), submittals, substitutions, proposed change orders, change orders, field clarifications, schedules, payment requests, inspections, and project closeout. Students completing the course should be expected to have the ability to understand basic document control systems and processes. *Prerequisite:* X 407.1 Construction Management or consent of instructor.

Principles of Structural Analysis
Engineering X 412.16 • 4 units
Students gain an understanding of the fundamental structural concepts that individuals working in the field of construction management need to have. This course provides an introduction to structural analysis, and focuses on classification of structural elements; analysis of statically determinate trusses, beams, and frames; deflections in elementary structures; and load calculations.

Advanced Construction Costs & Estimating
Engineering X 412.2 • 4 units
The management and control of costs is the most challenging of the three major deliverables on a project, and is central to the success of construction companies. This course provides a study of the process for creating and utilizing estimates and strategies to manage and control project costs from conception through completion. Instruction covers the development of full project estimates, types of estimates, estimating procedures and characteristics of good estimates, conceptual estimating, value engineering, competitive bidding, CM at risk and the preconstruction process, incorporating and managing sustainability, self-performed work, working with subcontractors, contracts, change order management, risk mitigation, and maximization of profits. Other topics include estimating concrete, foundation systems, earthwork, and structural steel. *Prerequisite:* X 407.1 Construction Management and X 412.1 Fundamentals of Construction Costs and Estimating, or equivalent experience and consent of instructor.

Construction Job Site Management
Engineering X 412.5 • 4 units
This course presents practices of the effective field superintendent based on a commitment to provide leadership rather than simply exercise management techniques. Topics include planning and staffing the field office; proactive safety programs and emergency response procedures; and leadership of the field staff, subcontractors, inspection officials, and clients. Schedules, budgets, change orders, quality control, materials, and traffic handling, as well as maintaining appropriate records, are all examined from the perspective of the working field supervisor. *Prerequisite:* X 407.2 Construction Technology or background in the industry.

Construction Project Management with Microsoft Project
Engineering X 412.8 • 4 units
This course presents the software programs used to manage and control construction projects. Instruction features hands-on training in the use of Microsoft Project 2007 Professional software to conduct multiple tasks such as preparing construction schedules which include definitions of detailed activities and assignments of logic relationships; defining and managing costs and resources (labor, equipment, and materials); sorting and categorizing information; preparing monthly updates of schedules; reviewing, analyzing, and troubleshooting schedules; developing, analyzing, and presenting delay issues; and producing reports and graphics.

Reading Construction Blueprints
Engineering X 412.9 • 4 units
This course provides an introduction to reading and analyzing construction blueprints. Topics include a review of the necessary mathematics, symbols and drawn-line interpretations, dimensioning, survey of specifications, plot plans, foundations, framing, plumbing, HVAC, and electrical and masonry plans. Students work in small groups to resolve such problems typically encountered by construction professionals as blueprint errors, omissions, and code non-compliance. Upon completing the course, you should be able to read and understand a standard set of construction blueprints, determine quantities and dimensional properties of all the materials shown on the construction drawings, and compose a "Request for Clarification" to the appropriate architect or engineer. *Prerequisite:* X 407.2 Construction Technology, background in the industry, or consent of instructor.

The Solar Energy Solution
Engineering X 425.10 • 4 units
Learn how to augment your home and/or business power requirements with solar energy. Students receive a general overview of the knowledge needed to choose and ultimately design an appropriate system. The course discusses the various forms of solar energy with a specific

emphasis on solar electricity (i.e., how electricity can be generated, stored and utilized in the home and workplace through solar energy). In addition, instruction covers typical solar system models in order to understand how the prerequisite subsystems and their associated components are integrated into a final conceptual working system. The class material covers how to calculate anticipated electrical load requirements and the system sizing required to meet these objectives. Additional topics include: proper installation techniques, methods of monitoring systems performance, and the maintenance procedures required to assure maximum system efficiency. This class is primarily for anyone interested in and concerned about the financial, environmental, and self-sufficient aspects of solar energy. While not a highly technical course, a basic electrical/mechanical educational background is helpful due to the technology covered in the class. Home and business owners, contractors, sales people, entrepreneurs seeking business opportunities, and those who have a keen interest in solar technology significantly benefit from this course.

Leadership in Energy and Environmental Design
Engineering X 438.8 • 4 units
Green buildings embody a design intent on balancing environ-mental responsiveness and responsibility, resource efficiency and cultural and community sensitivity. The primary focus of this course is the LEED® Version 3 Rating System, currently the centerpiece of the most innovative and effective aspects of green design. A variety of topics will be discussed, ranging from an exploration of what are sustainable principles, current sustainable design and building practices, to specific elements of the LEED® rating system. It is designed to appeal both to persons who will become very hands-on in their role in the design and construction of a green building, as well as persons with a curiosity and burning interest in understanding the basic nuances of green building.

Sustainable Energy Management
Engineering X 438.9 • 4 units
(For a course description, see our website)

Land Development Procedures
Engineering X 478.1 • 4 units
This course examines the purposes, responsibilities, and needs of planners, builders/developers, contractors, engineers, architects, property owners, and others concerned with residential land development. Major topics include target market analysis, the entitlement process, performing due diligence, development impact fees, site planning, and construction overview.

Electrical Design and Construction
Engineering X 489.14 • 4 units
As a specialty trade in the construction industry, electrical systems can be complex and confusing to the non-expert. This course covers the essentials of electrical systems for commercial construction with an overview of fundamentals, construction procedures, electrical equipment, electrical design, and regulatory requirements. Instruction emphasizes the integration of electrical systems with project site development and related construction trades. This course covers the current requirements of the California Electrical Code and other building and construction regulations as well as applicability to green building design and sustainability development. Topics also include Electrical plan reading, single-line diagram design, panel schedule design, and load calculations.

Intro to Building Information Modeling
Engineering X 489.16 • 4 units
This introductory course in Building Information Modeling (BIM) focuses on Autodesk's Revit Architecture as a platform for learning key principles in the application of digital media in the design and documentation of building elements within a parametric environment. Students receive fundamental training in order to progress to more advanced subject matter in design computation and its application in the construction industry. Through a series of lectures and exercises, basic BIM concepts that apply to all parametrically driven CAD systems are explored.

Construction Estimating and Design Analysis Using BIM
Engineering X 489.19 • 4 units
This course provides an overview of construction cost estimating and design analysis using the latest BIM (Building Information Modeling) technology, which is rapidly transforming the way buildings are designed, estimated, and constructed. Using cutting-edge BIM estimating products including Autodesk Revit, Autodesk QTO, Autodesk Navisworks, and Sage-Timberline Estimating, students receive hands-on training by estimating and analyzing a number of projects built in Southern California. This course benefits project managers, architects, designers, engineers and contractors seeking to maximize their professional potential in the fast growing field of BIM technology in construction. *Prerequisite:* Revit Architecture I, Introduction to Building Information Modeling and Fundamentals of Construction Costs and Estimating recommended; or consent of instructor. *Elective course in the Construction Management Certificate and the Architecture and Interior Design Program.*

Construction Safety and Health Management
Engineering X 490.05 • 4 units
(For a course description, see our website)

Introduction to Civil Engineering for Horizontal Infrastructure
Engineering X 490.1 • 4 units
(For a course description, see our website)

Corporate Training

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Further Information

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