COLLEGE OF ENGINEERING, COMPUTER SCIENCE, & TECHNOLOGY
Civil Engineering

MASTER OF SCIENCE DEGREE IN CIVIL ENGINEERING GRADUATE AND POST BACCALAUREATE PROGRAMS FALL 2016

CIVIL ENGINEERING
DEPARTMENT OFFICE
5151 State University Drive
Los Angeles, CA 90032-8151
Engineering and Technology A212
Phone: (323) 333-4450
FAX: (323) 333-6316
E-mail : dmelend@cslanet.calstatela.edu
Website: http://www.calstatela.edu/academic/ecst/civil/

The Master of Science degree in Civil Engineering at Cal State L.A. is structured to prepare students for advancement in employment with opportunities in design, research, and development, as well as for further study at the doctoral level. Classes are offered year-round on the semester system to accommodate the needs of working professionals. Courses are offered during both daytime and evening hours.

Located at the intersection of the San Bernardino and Long Beach Freeways at the eastern limits of Los Angeles, Cal State L.A. is accessible by freeways or major surface streets from all parts of the city and surrounding areas.

Admission to the Program

Applicants must possess a bachelor's degree in civil engineering or a related field with a GPA of 3.0 or better. A promising applicant with a GPA between 2.5 and 2.99 may be admitted as a special action student. Prerequisite courses may be required for students with a non-civil engineering bachelor's degree, for students from non-ABET accredited civil engineering programs, or for special action students. All students must maintain a minimum GPA of 3.0 to remain in good standing in the program.

Requirements for the Degree (30 units)

A minimum of 30 units is required for the degree, with at least 15 units from 5000-level civil engineering courses, excluding CE 5980. A thesis or comprehensive examination is required. A student's program must be approved by the civil engineering department before enrolling in any course.

Advanced Mathematics (3 units)

MATH 4021 Advanced Mathematics I for Engineers and Physicists; or ME 4090 Mechanical Engineering Analysis is required and must be fulfilled prior to advancement to candidacy.

Electives in Civil Engineering (18-27 units)

Select from 4000 and 5000-level civil engineering courses, with adviser approval.

Electives in Related Fields (0-9 units)
Select from 4000 and 5000-level courses outside civil engineering, with adviser approval.

Comprehensive Examination or Thesis (0 or 3 units)
CE 5960 Comprehensive Examination (0) or CE 5990 Thesis (1-3)(3 units)
Students who select the comprehensive examination should expect to take it the semester they complete all course work in their program and must comply with college and departmental requirements. The comprehensive examination can be attempted a maximum of two times.

Graduation Writing Assessment Requirement
Students are required to satisfy the graduation writing assessment requirement (GWAR) by passing the writing proficiency examination (WPE). Students selecting this option must register for the WPE (listed as UNIV 4000) no later than the add deadline for the second semester they are enrolled in the graduate program. Students with earned doctorate or masters degrees or those who have passed a similar examination at an accredited institution must see the department and may petition to earn credit for UNIV 4000.

Graduate Courses in Civil Engineering (CE)

All 4000-level courses may be applied toward master's degree requirements, subject to limits established by the department and approval of the graduate adviser.
Classified graduate standing is required for admission to all 5000 level courses.

Advanced Topics

CE 5540 Advanced Topics in Civil Engineering (3)
Prerequisites: *Department approval required*. Advanced topics in Civil Engineering. May be repeated to a maximum of 8 units as subject matter changes.

Structural Engineering

CE 5550 Reinforced Concrete Design with FRP Reinforcement (3)
Prerequisite: *CE 4620*. Design of Concrete Structures with Fiber-Reinforced Polymer (FRP) Reinforcement. Lectures will address the design of new, and rehabilitation and strengthening of existing reinforced concrete structures. The design, and design review will be conducted during the laboratory section of the course.

CE 5600 Structural Mechanics III (3)
Prerequisite: *CE 4600*. Column analogy, moment distribution applied to nonprismatic members, elastic energy method applied to arches and curved members, influence lines for indeterminate structures and secondary stresses.

CE 5610 Advanced Steel Design (3)
Prerequisites: *CE 4600, CE 4610*. Emphasis on LRFD method, Unsymmetrical bending and torsion of beams, composite beams, nonprismatic beams, plate girders, beam-columns, frames and connections.

CE 5620 Reinforced Concrete Design II (3)
Prerequisite: *CE 4620*. Creep and plastic flow of concrete. Theory and practice of ultimate strength design. Prestressed concrete structures.

CE 5640 Finite Element Methods in Structural Analysis (3)
Prerequisite: *CE 4600 or CE 4020*. Finite element method for structures: truss, frame, 2D plane, and shell elements; isoparametric formulation; static and dynamic analysis.

CE 5650 Dynamics of Structures (3)
Prerequisite: *CE 4600*. Free vibrations, forced vibrations and transient response of structures and structural components having one and many degrees of freedom; damping and inelastic action, earthquakes and nuclear blasts; dynamic resistance of structures; limit design; design for dynamic loads.

CE 5720 Plates and Shells (3)
Prerequisites: *CE 4020, CE 4600*. Equations of bending of thin elastic plates, energy method; approximate and numerical methods; theory of shells with application to tanks, roofs, and pressure vessels

CE 5770 Bridge Engineering (3)
Prerequisites: *CE 4610, CE 4620*. Design of steel, concrete, and timber bridges, piers, and abutments; American Association of State Highway and Transportation Officials (AASHTO) specifications; criteria for earthquake resistant design of bridges; geometry, safety, economics, and aesthetics.

Geotechnical Engineering

CE 5660 Geotechnical Engineering II (3)
Prerequisite: CE 4670. Advanced in-situ and laboratory test methods, shear strength of cohesionless and cohesive soils, slope stability and remediation methods.

CE 5670 Geotechnical Engineering Design II (3)
Prerequisite: *CE 4670*. Subsurface exploration methods, advanced topics in shallow and deep foundations, dynamic analysis of piles, group capacity and lateral pile loading, NDT of pile foundations, earth retaining structures and tiebacks

CE 5690 Earth Structures (3)
Prerequisite: *CE 4670*. Factors influencing design, explorations for foundations and construction processes, compactions, stability analysis, seepage control, earth dams

CE 5700 Geotechnical Earthquake Engineering (3)
Prerequisite: *CE 4670.* Basic seismology, seismic ground motions, deterministic and probabilistic seismic hazard analysis, dynamic soil properties, site response analysis, liquefaction and lateral spread, seismic slope stability, seismic design of earth retaining structures.

Highway and Transportation Engineering

CE 5710 Highway Design (3)
Prerequisite: *CE 4710*. Practical application of American Association of State Highway and Transportation Officials (AASHTO) policy on design controls; capacity analysis for uninterrupted flow, weaving section and ramps; functional design procedures in development of an interchange.

CE 5740 Traffic Flow Analysis (3)
Prerequisite: *CE 3700*. Measurements and analysis of traffic flow characteristics: speed, density, flow, headway; statistical data analysis, time-space diagrams, traffic flow models, queuing theory, shock wave analysis, traffic models applications.

CE 5750 Urban Transportation Planning (3)
Prerequisite: *CE 3700*. Travel forecasting, data requirements, collection methods, trip generation and distribution models; modal split analysis, trip assignment, plan alternatives, and evaluation methodology.

Hydraulic and Water Resources Engineering

CE 5810 Modeling Techniques in Hydraulic Engineering (3)
Prerequisite: *CE/ME 3030*. Dimensional analysis: similarity law and hydraulic, coastal, and estuarine models; mathematical models

CE 5820 Statistical Hydrology (3)
Prerequisites: *CE 4830, CE/ME 2120*. Statistical and probability analysis of hydrologic processes. Frequency analysis of extreme hydrologic events. Application of correlation and regression method to hydrologic variables. Elementary time series analysis of hydrologic data. Uncertainty and risk analysis.

CE 5830 Hydrology II (3)
Prerequisite: *CE 4830.* Space-time characteristics and mechanics of rainfall, surface run-off and infiltration. Theory of drainage basin dynamics. Low stream flow.

CE 5860 Open Channel Hydraulics (3)
Prerequisites: *MATH 2150, (CE 3870 OR 3860)*. Flow types, flow profile computations; design of channels and transition structures; unsteady flow.

CE 5870 Hydraulics II (3)
Prerequisite: *CE 3870*. Unsteady flow in pipes, wave motion, sediment transportation, and coastal engineering.

CE 5880 Hydraulic Structures (3)
Prerequisite: *CE 3870*. Hydraulic structures for impounding, conveying, and controlling water.

CE 5890 Coastal Engineering (3)
Prerequisite: *CE 3870.* Fundamentals of water waves and their effects. Diffraction, reflection, and refraction; impulsively generated waves; effect of waves on coastal structures.

Environmental Engineering

CE 5790 Environmental Mass Transfer (3)
Prerequisite: *CE 3840 or Equivalent*. Study the fate of contaminants in the environment. Emphasis on the fundamentals of mass transfer including: sorption/desorption, contaminant retardation, vaporization and dissolution of Nonaqueous Phase Liquids (NAPL), and other phenomena.

CE 5800 Advanced Environmental Modeling (3)
Prerequisite: *CE 4800*. Numerical methods are used in this course to solve complex environmental transport equations. The emphasis is on finite difference and finite element methods. Topics include derivation of mass-balance-based transport equations, algorithm development for models that range from simple steady-state homogeneous isotropic condition to complex transient heterogeneous anisotropic condition, and implementation into a computer program.

CE 5840 Advanced Environmental Engineering Design (3)
Prerequisite: *CE 4840*. Design of environmental quality and pollution control for water and/or wastewater treatment plants, landfills and incinerators, groundwater remediation, air pollution control systems, and other relevant environmental systems. Lectures will address the design process, optimization, and policy and legal issues. The design and design review will be conducted during the laboratory section.

CE 5850 Environmental Transport (3)
Prerequisite: *CE 3840*. Transport in water and air emphasizing exchanges across boundaries such as sediment-water and air-water; particles, droplets, and bubbles; effect of reactions on transport; linkages between physical, chemical, and biological processes.

Comprehensive Examination, Thesis

CE 5960 Comprehensive Examination (0)
Prerequisites: *Advancement to candidacy. Permission needed by department.*
Students who select the comprehensive examination (CE 5960) should expect to take it the quarter they complete all course work on their program, and must comply with college and department requirements.

CE 5970 Graduate Research (1-3)
Prerequisites: *Instructor consent to act as sponsor and departmental approval of project prior to*

registration. Independent research under guidance of the faculty. May be repeated for credit.

CE 5980 Graduate Directed Study (1-3)
Prerequisites: *Instructor consent to act as sponsor and departmental approval.* Independent, directed study of advanced topics in the field, regular conferences with the sponsor. May be repeated for credit. *Obtain consent form from department office.*

CE 5990 Thesis (1-3)
Prerequisites: *Advancement to candidacy, instructor consent to act as a sponsor and college approval of the topic prior to registration*. Independent research resulting in a thesis. Must be repeated to maximum of 4 units. Graded CR/ NC. *Obtain consent form from website.*

Faculty and Areas of Specialization

Hassan Hashemian, Ph.D.	University of California, Berkeley Registered Professional Civil Engineer Transportation; City Planning
Raymond I. Jeng, Ph.D. *(Emeritus)*	Colorado State University Registered Professional Civil Engineer Hydraulic Engineering; Water Resources
Arezoo Khodayari, Ph.D.	University of Illinois at Urbana-Champaign Air Quality Engineering and Science; Environmental Engineering
Wing Shun Kwan, Ph.D.	The University of Texas at Austin Registered Professional Civil Engineer Geotechnical Engineering
Sonya R. Lopez, Ph.D.	University of California, Los Angeles Hydrology and Water Resources
Mehran Mazari, Ph.D.	The University of Texas at El Paso Transportation Engineering
Gustavo Menezes, Ph.D.	University of North Carolina, Charlotte Environmental Engineering, Ground water Modeling, GIS
Rupa Purasinghe, Ph.D.	Case Western Reserve University Registered Professional Civil Engineer Structural Engineering. Computer Aided Structural Analysis and Design; Finite Element Method
Tonatiuh Rodriguez-Nikl, Ph.D.	University of California, San Diego Registered Professional Civil Engineer Structural Engineering
Narendra Taly, Ph.D. *(Emeritus)*	West Virginia University Registered Professor Civil Engineer Structural Engineering; Bridge Design
Mark R. Tufenkjian, Ph.D.	University of California, Los Angeles Registered Professor Civil Engineer Geotechnical Engineering