

CIVIL AND ENVIRONMENTAL ENGINEERING (CEE)

Subject-area course lists indicate courses currently active for offering at the University of Louisville. Not all courses are scheduled in any given academic term. For class offerings in a specific semester, refer to the Schedule of Classes (https://csprd.louisville.edu/psp/ps_class/EMPLOYEE/PSFT_CS/c/COMMUNITY_ACCESS.CLASS_SEARCH./x/?state=62dab551a0d600a5e8237359c50704e59007&duo_code=sjUx20STj21bWVFeQ3ZThBj/htmlaccess.louisville.edu/classSchedule/)

500-level courses generally are included in both the undergraduate- and graduate-level course listings; however, specific course/section offerings may vary between semesters. Students are responsible for ensuring that they enroll in courses that are applicable to their particular academic programs.

Course Fees

Some courses may carry fees beyond the standard tuition costs to cover additional support or materials. Program-, subject- and course-specific fee information can be found on the Office of the Bursar website (<https://louisville.edu/bursar/tuitionfee/university-fees/>).

CEE 503. Fundamentals of Engineering Exam Review 2 Units

Grading Basis: Pass/Fail

Term Typically Offered: Fall, Spring, Summer

Prerequisite(s): 4th-year standing.

Description: Review of topics covered on eight-hour NCEES Fundamentals of Engineering examination. Not to be counted towards meeting the requirements for a degree.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

CEE 520. Design of Structural Systems 3 Units

Term Typically Offered: Fall, Spring, Summer

Prerequisite(s): CEE 421, CEE 422, and CEE 452.

Description: Introduction to the design of structural systems. Model building codes. Material, structural system and foundation system selection. Design of connections. Economic, detailing constructability and erection issues. Preparation of engineering drawings. Review of shop drawing.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

CEE 522. Fundamentals of Prestressed Concrete 3 Units

Term Typically Offered: Fall, Spring, Summer

Prerequisite(s): CEE 322 and CEE 421.

Description: Introduction to pre-tensioned and post-tensioned prestressed concrete. Design of precast concrete slabs, buildings, and bridges in accordance with ACI specifications and the Prestressed Concrete Institute (PCI) recommended practices. Application of computer programs for member analysis and design.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

CEE 523. Timber Design 3 Units

Term Typically Offered: Fall, Spring, Summer

Prerequisite(s): CEE 254 or consent of instructor.

Description: Concepts of Structural Timber design will be taught. The properties of wood materials will be reviewed and the procedures for the design of typical timber components will be presented. In addition to course assignments, and tests, required of all students, students taking this course for graduate credit will be required to complete a group design of a simple building.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

CEE 524. Bridge Design 3 Units

Term Typically Offered: Summer Only

Description: This class offers detailed coverage of engineering basics for the design of short- and medium-span bridges.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

CEE 530. Construction Materials 3 Units

Term Typically Offered: Spring Only

Prerequisite(s): CEE 254 and CEE 255.

Description: Properties of construction materials such as cement, concrete, asphalt, and structural elastomers. Design of Portland cement concrete and asphaltic concrete mixes.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

CEE 532. Experimental Stress Analysis 3 Units

Term Typically Offered: Fall, Spring, Summer

Prerequisite(s): CEE 530.

Description: Fundamentals of experimental stress analysis, brittle coating, photoelastic coating, and electrical strain gage techniques, strain measurements under static and dynamic loading.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

CEE 540. Construction Management 3 Units

Term Typically Offered: Fall Only

Description: This course discusses construction management including estimating, bidding, time/cost management, provisions, surety bonds, ownership, and project scheduling. Other topics, such as temporary erosion control and plan & print reading will also be covered.

Note: This section is restricted to students with a major in the department.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

<p>CEE 541. Construction Equipment and Practice 3 Units Term Typically Offered: Spring Only Description: This course will provide an overview of construction planning and practices rather than construction management. The emphasis will be on the Construction Depth content of Civil Engineering. The topics covered in the course will be guided by the anticipated content of fundamental construction engineering practice and will follow the various chapters of the required textbook. Note: This section is restricted to students with a major in the department.</p> <p>For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>CEE 565. GIS Applications to Transportation 3 Units Term Typically Offered: Fall, Spring, Summer Prerequisite(s): CEE 460. Description: Introduces an overview and application of current methods of implementing GIS solutions to highway data analysis and planning studies. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>
<p>CEE 552. Earth Pressures and Retaining Structures 3 Units Term Typically Offered: Fall, Spring, Summer Prerequisite(s): CEE 450. Description: Earth pressure calculation: theory and practice. Design techniques for retaining walls, reinforced earth and soil nailing. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>CEE 570. Applied Hydraulics 3 Units Term Typically Offered: Fall, Spring, Summer Prerequisite(s): CEE 572. Description: Application of basic principles of hydraulic engineering to analysis of flow in floodways, through bridge openings, culverts, and spillways. Analysis of stable channel design is also considered. Commonly used computer programs are utilized to design structures in floodways. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>
<p>CEE 553. Advanced Foundation Design 3 Units Description: This course covers site investigation and subsurface exploration with the purpose of foundation design. Then, the course covers the analysis and design of single piles and group piles considering pile capacity and pile head displacement. At the end, the course covers pile driving analysis to test the integrity of the concrete. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>CEE 571. Applied Hydrology 3 Units Term Typically Offered: Fall, Spring, Summer Prerequisite(s): CEE 470. Description: Introduction to hydrologic systems; modeling runoff from watersheds using lumped and distributed methods; stormwater management and design; hydrologic and hydraulic routing including kinematic wave routing; computer rainfall-runoff simulation models. A hydrologic design project will be assigned to all students; special assignments dealing with hydrologic processes will be assigned to MS degree students. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>
<p>CEE 560. Traffic Engineering 3 Units Term Typically Offered: Fall, Spring, Summer Prerequisite(s): CEE 460. Description: Examines characteristics of the vehicle, the driver, and the traffic stream. Highway and intersection capacity, theory of traffic flow, parking, traffic safety. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>CEE 572. Open Channel Hydraulics 3 Units Term Typically Offered: Fall, Spring, Summer Prerequisite(s): CEE 370. Description: Application of basic principles of hydraulics to open channel flow. Theory and analysis of critical, uniform and gradually varied flow and computer analysis. Select topics in rapidly varied and unsteady flow. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>
<p>CEE 562. Geometric Design of Highways 3 Units Term Typically Offered: Occasionally Offered Prerequisite(s): CEE 460. Description: The concepts of geometric design for rural and urban highways, utilizing proprietary design software are introduced and applied. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>CEE 573. Groundwater Hydrology 3 Units Term Typically Offered: Occasionally Offered Prerequisite(s): CEE 450 and CEE 470. Description: Fundamental concepts of fluid flow and soil properties; theory of groundwater movement; mechanics of well flow; groundwater contaminant transport. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>
<p>CEE 563. GPS Theory and Application 3 Units Term Typically Offered: Fall, Spring, Summer Prerequisite(s): CEE 460. Description: This course is designed to give the student an overview of the use of Global Positioning Systems in surveying and engineering applications. Elements of coordinate systems, map projections, GPS principles of operation, mapping, boundary, and construction surveys will be covered. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>CEE 590. Current Topics in Civil Engineering 1-4 Units Term Typically Offered: Occasionally Offered Prerequisite(s): Consent of instructor. Description: An examination of one or more topics in Civil Engineering. Details announced each semester. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>

<p>CEE 604. Interaction of Soils and Structures 3 Units Prerequisite(s): CEE 421, CEE 422, and CEE 452. Description: Response of foundation materials to applied static and dynamic loads. Foundation design procedures based upon consideration of soil-structure interaction. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>CEE 627. Non-Destructive Testing 3 Units Prerequisite(s): Graduate/Professional standing. Description: Introduce different non-destructive testing methods for quality evaluation of concrete. Penetration resistance methods, resonant frequency methods, ultra-sonic pulse velocity, maturity technique will be covered. Ground penetrating radar. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>
<p>CEE 620. Advanced Mechanics of Solids 3 Units Prerequisite(s): By permission of Department Chair. Description: Analysis of stress and strain. Topics include theories of failure, unsymmetric bending, curved beams, shear center, torsion, beams on elastic foundations, beams with combined axial and lateral loads, thick-wall cylinders, rotating disc, introduction to elastic stability. Note: This class is for CEE students; students from other departments will need to get permission from CEE department chair. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>CEE 650. Measurement of Soil Properties 3 Units Prerequisite(s): CEE 450. Description: Laboratory testing of soil mechanical properties; index testing; testing for permeability, compressibility, and shear strength. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>
<p>CEE 621. Finite Element Analysis for Structural Engineers 3 Units Description: Introduction to the finite element method (FEM) and its application to structural engineering. Topics include displacement and variational base one-, two-, and three-dimensional element formulation, introductory elasticity, isoparametric elements, interpolation methods, numeric integration, geometric and material nonlinearity. Emphasis on FEM program development. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>CEE 652. Advanced Earth Pressure and Retaining Structures 3 Units Description: Soil pressure-structure movement interactions. Design of anchored bulkheads. Retained excavation analysis. Design of cellular cofferdams. Introduction to culverts/tunnels. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>
<p>CEE 623. Advanced Structural Engineering 3 Units Description: Design of earthquake resistant steel, concrete, and masonry structures. Introduction to time history, modal analysis and pushover analysis. Model code seismic design provisions. Ductility concepts. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>CEE 653. Design of Earth Structures 3 Units Prerequisite(s): CEE 450. Description: Seepage and internal erosion. Stability analyses. Failure mechanisms in natural slopes. Design of earth dams. Embankment construction, control and instrumentation. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>
<p>CEE 625. Structural Dynamics 3 Units Prerequisite(s): CEE 322. Description: Dynamic analysis of structural systems including dynamic response by modal superposition, step integration, response spectrum frequency analysis. Computer applications. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>CEE 654. Rock Mechanics 3 Units Prerequisite(s): CEE 450. Description: Physical properties of intact rock; mechanical properties of rock masses, emphasis on practical applications. Rock blasting. Tunneling. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>
<p>CEE 626. Masonry Design 3 Units Prerequisite(s): CEE 421. Description: Concepts of masonry design will be taught. The properties of masonry materials will be reviewed and the procedures for the design of typical masonry components will be presented. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>CEE 656. Geotechnical Earthquake Engineering 3 Units Description: This course is an introduction to the problems that engineers face in earthquake prone regions. It is an "interdisciplinary" course in the sense that it covers topics from geology, geophysics, structural and geotechnical engineering, and probability. Emphasis in the course is given to two main issues: (1) assessment of design motion at a site, and (2) evaluation of the effects of this motion on geotechnical/structural systems. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>
	<p>CEE 660. Transportation Planning and Urban Development 3 Units Prerequisite(s): CEE 460. Description: Focuses on the principles of transportation planning in the urban environment, including land use planning, with emphasis on the orderly development of the transportation system. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>

<p>CEE 661. Environmental Analysis of Transportation Systems 3 Units Description: An examination of the various impacts that transportation systems and projects may have on the natural and human environment. A detailed review and application of transportation noise analysis. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>CEE 672. Statistical Methods in Water Resources 3 Units Prerequisite(s): IE 360. Description: Applications of advanced concepts of probability and statistics in hydrology and water resources including frequency analysis and regionalization; parameter estimation; analysis of variance and multiple regression techniques. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>
<p>CEE 662. Airport Planning & Design 3 Units Prerequisite(s): CEE 460. Description: The principles of location, planning, design, and evaluation of airports are examined from the engineering perspective. In addition, laws and regulations concerning airports and the aviation system are thoroughly studied. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>CEE 673. Advanced Hydrology 3 Units Prerequisite(s): CEE 470 and IE 360. Description: Advanced concepts for studying hydrologic processes; theory of linear hydrologic systems; conceptual models for modeling watershed rainfall-runoff response including geomorphological approaches. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>
<p>CEE 663. Advanced Traffic Operations 3 Units Term Typically Offered: Spring Only Description: This course has an emphasis on capacity analysis and using computer techniques to solve traffic problems. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>CEE 674. Water Resources Systems 3 Units Description: Application of systems analysis techniques in the planning and design of water resources projects; mathematical optimization; simulation and risk-based decision-making. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>
<p>CEE 664. Fundamentals of Intelligent Transportation Systems 3 Units Description: Examines the elements of traffic flow theory, incident/emergency management, dynamic route guidance, in-vehicle systems, and traffic signal systems. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>CEE 675. Surface Water Quality Modeling 3 Units Prerequisite(s): Consent of instructor. Description: Modeling, design and control of water quality in river, lake, and estuary systems; dissolved oxygen and toxic substance models; and lake eutrophication. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>
<p>CEE 665. Pavement Design 3 Units Prerequisite(s): CEE 450 and CEE 460. Description: Design of flexible and rigid pavements, base courses, and subgrades. Effects of loading on pavement life. Investigation of pavement distress and rehabilitation. Introduction to pavement management systems. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>CEE 676. Sediment Transport and River Mechanics 3 Units Prerequisite(s): CEE 370. Description: Sediment transport theory; overland erosion; alluvial streams; analysis, prediction, and control of river characteristics; local scour at river structures. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>
<p>CEE 670. Advanced Hydraulics 3 Units Prerequisite(s): CEE 370. Description: Dimensional analysis; integral form of the equations of motion; shear stress distribution; turbulence and boundary layer theory; concepts in particle drag and settling. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>CEE 677. Groundwater Modeling 3 Units Description: Mathematical and numerical modeling of groundwater and pollution transport. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>
<p>CEE 671. Stochastic Processes in Hydrology 3 Units Description: Basic concepts and classification of stochastic processes with emphasis on hydrologic systems; analysis of hydrologic time series; models for stationary hydrologic stochastic processes. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	

- CEE 680. Civil Engineering Capstone Design** **3 Units**
Prerequisite(s): Restricted to CEE Master of Engineering students (SP).
Description: A capstone Civil & Environmental Engineering course to include elements of geotechnical, structural, transportation, and water resources engineering in a comprehensive design project.
Course Attribute(s): CBL - This course includes Community-Based Learning (CBL). Students will engage in a community experience or project with an external partner in order to enhance understanding and application of academic content.
For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- CEE 681. Green Engineering & Sustainable Design** **3 Units**
Description: Understand the origins and applicability of sustainable design and green engineering. Ultimately, be able to apply fundamental engineering concepts to these practices.
For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- CEE 690. Master of Science Thesis in Civil Engineering** **1-6 Units**
Description: Experimental and/or theoretical research to be presented in thesis for degree requirement.
For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- CEE 693. Independent Study in Civil Engineering** **1-6 Units**
Description: Independent study in a selected subject area with approval and supervision by a faculty member.
For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- CEE 694. Special Topics in Civil Engineering** **1-6 Units**
Description: An examination of one or more specified areas of Civil Engineering. Topics vary; details announced each semester.
For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- CEE 697. Master of Engineering Thesis in Civil Engineering** **1-6 Units**
Prerequisite(s): Graduate/professional school standing.
Description: A candidate for the Master of Engineering degree, specializing in the field of civil engineering, is required to perform a study, design, or investigation under the direction of a faculty member. A written thesis is required to be presented and defended orally and submitted to the faculty for approval.
For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- CEE 698. Civil Engineering PhD Seminar** **3 Units**
Grading Basis: Pass/Fail
Prerequisite(s): Permission of the chair.
Description: Current literature in the field of civil engineering; extensive student presentations on research projects with interaction and feedback from students and faculty; guest speakers.
For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- CEE 699. Civil Engineering PhD Research** **1-18 Units**
Prerequisite(s): Permission of dissertation director.
Description: Original research activity in an appropriate civil engineering discipline, under the direction of a Civil Engineering graduate faculty member.
For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)