# COURSES FOR CIVIL, CONSTRUCTION AND ENVIRONMENTAL ENGINEERING

## Civil, Construction and Environmental Engineering

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE121</td>
<td>Intro Civil Constrctn Envir Eg</td>
<td>1</td>
<td>Introduce the student to the areas of professional, civil and environmental engineering practices with exposure to faculty members specializing in each area, solving typical problems in each professional area, learning of the activities of service organizations, and the responsibilities of professional practice.</td>
</tr>
<tr>
<td>CE220</td>
<td>Society Infrastruct &amp; Environm</td>
<td>3</td>
<td>Permitting, environmental impact statements and other environmental issues associated with human activities and engineering projects.</td>
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<tr>
<td>CE260</td>
<td>Civil &amp; Construction Surveying</td>
<td>0-2</td>
<td>Precise measurement of lengths, angles, areas, and elevations in geodetic systems; computation of construction control, including highway alignment and land areas.</td>
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<tr>
<td>CE262</td>
<td>Civil &amp; Constructn Engr Mats</td>
<td>0-3</td>
<td>Introduction to the engineering properties of structural materials, including steel, wood, aggregate, concrete and asphalt, including experimental testing procedures and interpretation of results.</td>
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<tr>
<td>CE270</td>
<td>Climate Changes: European Alps</td>
<td>4</td>
<td>The course focuses on hydrology, climate, dendrohydrology (tree rings) and glaciers. The classroom lectures and in-class labs include the use of remote imagery to evaluate glacier recession, application of empirical equations to estimate glacier mass loss, evaluation of hydrologic (streamflow, snowpack) and climatic datasets, developing skeleton plots and cross dating tree-ring data, and seminars. The field labs consist of hand coring and analyzing tree ring data.</td>
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<tr>
<td>CE271</td>
<td>Glaciology</td>
<td>4</td>
<td>Glacier basics, physical properties, mass and energy balance, climate change impacts, streamflow impacts.</td>
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<tr>
<td>CE320</td>
<td>Intro Environmental Engineerg</td>
<td>3</td>
<td>Introduction to the scientific and engineering principles needed to analyze and solve environmental engineering problems, and lab experience in the practice of environmental engineering related to air, water and waste water management. Writing proficiency within this discipline is required for a passing grade in this course.</td>
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<tr>
<td>CE331</td>
<td>Intro to Structural Eng.</td>
<td>0-3</td>
<td>Introduction and principles of structural analysis of determinate and indeterminate structures. Computing proficiency is required for a passing grade in this course.</td>
</tr>
<tr>
<td>CE340</td>
<td>Geotechnical Engineering</td>
<td>4</td>
<td>Static and dynamic interaction of soil and water; theories of stress distribution, consolidation, stress and failures; stability of soil structures.</td>
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<tr>
<td>CE350</td>
<td>Intro. to Transportation Eng</td>
<td>3</td>
<td>An introduction to different modes of transportation with emphasis on roadway and traffic engineering. Topics include transportation economics and planning, highway geometric and pavement design, drainage, construction, traffic control devices, traffic operations, and management and highway capacity analysis.</td>
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<tr>
<td>CE366</td>
<td>Introduction to Construction Engineering</td>
<td>3</td>
<td>Applying engineering economic principles to construction and engineering problems; construction management processes and methods in planning, scheduling, and monitoring engineering projects.</td>
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<tr>
<td>CE378</td>
<td>Water Resources Engineering</td>
<td>3</td>
<td>Mechanics of steady and unsteady flow in closed and open conduits, hydrology; water supply and wastewater disposal. Computing proficiency is required for a passing grade in this course.</td>
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</tbody>
</table>

Prerequisite(s): CH 101 OR CH 117 min grade of C-
Prerequisite(s) with concurrency: AEM 311 and CHE 304

Prerequisite(s): AEM 250 and CE 262

Prerequisite(s): CE 262 and AEM 250

Prerequisite(s): CE 260 GES 255

Prerequisite(s): CE 262

Prerequisite(s): Dynamics (AEM 264) and Fluid Mechanics (AEM 311); or Fluid Flow Operations (CHE 304)
CE401 Capstone Design: Site Development
Hours 4
Students use software to design site projects in teams, prepare construction drawings and deliver engineering reports. This class is normally taken during the last term on campus. Writing proficiency within the discipline and computing proficiency are required for a passing grade in this course.

Prerequisite(s): Student must satisfy one of the following sets of prerequisite(s): a) CE 320 with a minimum grade of C- And CE 350 with a minimum grade of C- And CE 378 with a minimum grade of C- And Six (6) credit hours of 400- or 500-level CE courses with a minimum grade of C- And Two (2) of the following (may be taken concurrently): CE 424 or CE 524, CE 425 or CE 525, CE 427 or CE 527, CE 442 or CE 542, CE 451 or CE 551, CE 457 or CE 557, CE 459 or CE 559, CE 475 or CE 575, CE 485 or CE 585. b) CE 340 with a minimum grade of C- And CE 366 with a minimum grade of C- And CE 320 or CE 350 or CE 378 with a minimum grade of C- And Six (6) credit hours of 400- or 500-level CE courses with a minimum grade of C- And Two (2) of the following (may be taken concurrently): CE 424 or CE 524, CE 425 or CE 525, CE 427 or CE 527, CE 442 or CE 542, CE 451 or CE 551, CE 457 or CE 557, CE 459 or CE 559, CE 475 or CE 575, CE 485 or CE 585. c) CE 320 with a minimum grade of C- And CE 340 with a minimum grade of C- And CE 378 with a minimum grade of C- And Six (6) credit hours of 400- or 500-level CE courses with a minimum grade of C- And Two (2) of the following (may be taken concurrently): CE 424 or CE 524, CE 425 or CE 525, CE 427 or CE 527, CE 442 or CE 542, CE 485 or CE 585.

CE403 Capstone Design: Building Systems
Hours 4
Students use software to design building projects in teams, prepare construction drawings and deliver engineering reports. The course is normally taken during the last term on campus. Writing proficiency within the discipline and computing proficiency are required for a passing grade in this course.

Prerequisite(s): Student must satisfy the following set of prerequisites: CE 331 with a minimum grade of C- And CE 340 with a minimum grade of C- And CE 366 with a minimum grade of C- And Six (6) credit hours of 400- or 500-level CE courses with a minimum grade of C- And Two (2) of the following (may be taken concurrently): CE 433, CE 434, CE 436 or CE 536, CE 437 or CE 537, CE 438 or CE 538, CE 439 or CE 539, CE 444 or CE 544, CE 462 or CE 562.

CE414 Information Systems Design
Hours 3
An overview of management information systems (MIS). The course will focus on the practical aspects, applications and methodology or MIS, particularly from the construction engineer’s perspective. Information design methodology and building information modeling (BIM) will be covered in detail.

Prerequisite(s): CE 366

CE417 Advanced Project Management
Hours 3
This is an engineering management course designed to introduce students to the functions of project engineering and managers. It details the processes of planning and controlling project scope and cost.

Prerequisite(s): CE 366 or IE 203

Prerequisite(s) with concurrency: GES 255

CE418 Engineering Management
Hours 3
An introduction to management principles and the management functions of planning, organizing, motivating and controlling. Management of engineers in research, design, manufacturing/construction and quality will be studied.

Prerequisite(s): CE 366

CE420 Environmental Measurements
Hours 3
Environmental Engineering phenomena are explored through conducting laboratory experiments, selecting analytical protocols to achieve an objective, evaluating collected data sets, and discussing the results in well written reports. The course is composed of classroom lectures/discussions and weekly laboratory activities.

Prerequisite(s): CE320 and CE378 and GES 255

Prerequisite(s) with concurrency: CE 424

CE422 Solid And Hazardous Waste Mgt
Hours 3
Engineering design and regulatory requirements for the collection, storage, recycling, treatment and disposal of solid wastes.

Prerequisite(s): CE 320

CE424 Water And Wastewater Treatment
Hours 3
Physical, chemical and biological principles and design of municipal water and wastewater treatment units.

Prerequisite(s): CE 320

CE425 Air Quality Engineering
Hours 3
This is an introductory course in Air Quality Engineering. We have to major foci. The first is to understand and evaluate our air resources and air quality (as related to human and environmental health) in terms of fundamental principles and design processes. The second is to introduce the student to a variety of air pollution issues and engineered treatment processes.

Prerequisite(s): AEM 311 or CHE 304; and CE 320

CE427 Storm Water Management
Hours 3
Quality and quantity of urban storm water. Receiving water problems and sources of pollutants. Runoff quality and quantity characteristics, Selection and design of controls; regulations.

Prerequisite(s): CE 378 and CE 475

CE432 Matrix Analysis of Structures
Hours 3
Introduction to the matrix-displacement method of analysis for framed structures, including computer implementation of analysis. An introduction to finite-element analysis is also included.

Prerequisite(s): CE 331
CE433 Reinf Concrete Struct I
Hours 3
Concrete materials, placement of concrete and theory and design of reinforced beams, girders, slabs, columns and footings.
Prerequisite(s): CE 331

CE434 Structural Steel Design I
Hours 3
Theory and design of structural steel members and their connections.
Prerequisite(s): CE 331

CE435 Concrete Materials
Hours 3
Prerequisite(s): CE 331 or CE 340

CE437 Reinforced Concrete Struct II
Hours 3
Design of reinforced concrete building components including two-way slabs, slender columns, prestressed beams, slap-on-grade and retaining walls.
Prerequisite(s): CE 433

CE438 Struct Steel Design II
Hours 3
Basic and elementary design procedures for steel structures such as plate girders, mill buildings, multistory buildings, highway bridges and light-gauge steel structures.
Prerequisite(s): CE 434

CE439 Design of Wood and Masonry Structures
Hours 3
Design of wood and masonry components and subassemblies for low-rise residential and commercial buildings according to current design specifications.
Prerequisite(s): CE 331

CE442 Waste Containment Facility
Hours 3
Introduction to the fundamentals of soil behavior as they relate to environmental engineering. Topics include soil behavior, soil compaction, conduction phenomena, geosynthetics and aspects of landfill design.
Prerequisite(s): CE 340 and CE 320

CE444 Foundation Engineering
Hours 3
Analysis and design of soil foundation systems.
Prerequisite(s): CE 340

CE451 Roadway and Intersection Design
Hours 3
Application of the principles of geometric design and traffic signal layout: vertical and horizontal alignment, intersections, traffic control, and traffic signal layout. Design projects will be prepared to illustrate standard techniques.
Prerequisite(s): CE 350

CE454 Urban Transportation Planning
Hours 3
The course will provide a foundation in urban transportation planning, including an introduction to the planning process, software associated with transportation modeling and conducting transportation planning and traffic impact studies.
Prerequisite(s): CE 350

CE458 Traffic Engineering
Hours 3
Vehicle operating characteristics, traffic flow, geometric design of road and intersections, and methods of traffic control.
Prerequisite(s): CE 350

CE459 Pavement Design and Rehabilitation
Hours 3
This course covers two major areas of asphalt and concrete pavements: pavement thickness design and pavement maintenance. Topics include pavement design by the Asphalt Institute and AASHTO methods. Major maintenance will cover overlay design and slab repair, while routine maintenance will cover distress surveys, pothole repair, and crack and joint sealing.
Prerequisite(s): CE 350 or CE 366

CE460 Front End Planning
Hours 3
Principles and applications for effective, early planning of capital facilities including: finance, economics decision-making, risk management, team alignment and front end planning processes and tools.
Prerequisite(s): CE 366

CE461 Horizontal Construction Methods
Hours 3
Introduction to horizontal construction equipment and methods, design of horizontal construction systems and construction operation analysis and simulation.
Prerequisite(s): CE 366
Prerequisite(s) with concurrency: CE 340

CE462 Vertical Construction Methods
Hours 3
Introduction to vertical construction equipment and methods, design of vertical construction systems and construction operation analysis and management processes.
Prerequisite(s): CE 366
Prerequisite(s) with concurrency: CE 331
CE463 Construction Cost Estimating
Hours 3
Addresses the estimating and cost control function from conceptual planning through project execution. Topics include productivity analysis, organization of estimates, cost forecasting, estimating tools and techniques, contingency planning, and relationship to contract types and project execution strategies.
Prerequisite(s): CE 366

CE464 Safety Engineering
Hours 3
An introduction to safety management and accident prevention, including state and federal laws related to general and construction projects. Topics include accident theories, safety regulations, Construction Safety act, hazards and their control, human behavior and safety and safety management.
Prerequisite(s): CE 366GES 255 and CE 366

CE467 Constr. Accounting & Finance
Hours 3
Financial management of construction projects. Topics include alternative selection, life-cycle analysis, applied financial management techniques, insurance/indemnification, risk management and tax implications.
Prerequisite(s): CE 366

CE468 Construction Scheduling
Hours 3
The management structure of construction companies and the laws, regulations, practices, tools and processes used in planning, scheduling and monitoring construction projects. Writing proficiency within this discipline is required for a passing grade in this course.
Prerequisite(s): CE 366

CE470 Water Resources in the European Alps
Hours 4
The course focuses on statistical hydrology, climate, dendrohydrology (tree rings) and glaciers. The classroom lectures and in-class labs include the use of statistical software to analyze hydrologic datasets, the use of remote imagery to evaluate glacier recession, application of empirical equations to estimate glacier mass loss, evaluation of hydrologic (streamflow, snowpack) and climatic datasets, developing skeleton plots and cross dating tree-ring data, and seminars. The field labs consist of hand coring and analyzing tree ring data.
Prerequisite(s): Sophomore status, 2.5 GPA, CE 378

CE475 Hydrology
Hours 3
Hydrologic cycle, rainfall-runoff relations, unit hydrograph, statistical hydrology and hydrologic simulation. Includes a class project with application to flood control, water supply and multipurpose projects.
Prerequisite(s): CE 378

CE480 Forensic Engineering
Hours 3
When failures in the built environment occur, whether during design, construction or in-service, a thorough examination of the causes is essential to both the evolution sound engineering practices and to dispute resolution through the legal system. The role of the engineer in this process is examined.
Prerequisite(s): AEM 250

CE481 Legal Aspects of Engineering and Construction
Hours 3
Legal aspects of engineering and construction contracts and specifications; contract formation, interpretation, rights and duties, and changes; legal liabilities and professional ethics of architects, engineers and contractors. Writing proficiency within this discipline is required for a passing grade in this course. This is a three hour survey course covering, primarily, the organization of the federal and state courts, construction contracting, potential tort liability and professionalism for engineers in Alabama.
Prerequisite(s): CE 320, CE 331, CE 340, CE 350, CE 366 or CE 378, and one HU elective (3 credits)

CE484 Exp. Design & Field Sampling
Hours 3
Experimental design, sensitivity analyses, water sampling and flow monitoring. Receiving water chemical reactions. Field investigations.
Prerequisite(s): CE 320 and GES 255

CE485 Const. Site Erosion Control
Hours 3
Prerequisite(s): CE 378

CE486 GIS for Civil Engineers
Hours 3
Introduction to geographic information system design and use for civil engineering problem solving.
Prerequisite(s): CE 260 and any CE 300 Level Course

CE491 Special Problems
Hours 1-3
Credit is based on the amount of work undertaken. Analysis and/or design in any phase of civil engineering. The course is intended to take care of needs not covered by regularly offered courses.

CE498 Undergraduate Research Experience
Hours 1-6
Conduct research under the guidance of a faculty member. Analyze data. Produce and present, submit or publish related scholarly work.
Prerequisite(s): CE 320 or CE 331 or CE 340 or CE 350 or CE 366 or CE 378, and Permission of a department faculty member (research advisor)