

# CET - Civil Engineering Technology

## **CET 120 Civil 2D Computer Aided Drafting (2 Credit Hours)**

This course introduces students to computer aided drafting, where methods are taught with a major emphasis on practical application using two-dimensional AutoCAD software in the computer lab. This includes the basic principles of civil engineering drawings to include but not limited to: dimensioning, spot elevations, contours, plan and profile view, section views, details, scaling, measurements. It will introduce students to site plan drawings, structural views, architectural views, as well as buried infrastructure plan and profiles. Finally, it will be the basis for preparation of a working set of plans, for use in all follow-on CET courses.

## **CET 205 Principles of Surveying (3 Credit Hours)**

Basic plane surveying measurements and computations, survey control systems, elementary digital mapping and simple curves, and building construction survey and stakeout. Field exercises using standard surveying instrumentation, traverse and leveling techniques, topographic mapping and curve layout.

**Prerequisites:** MATH 163 and MET 120 or CET 120

## **CET 210 Fundamentals of Building Construction (3 Credit Hours)**

Introduction to various materials and methods available for design and construction of buildings. Covers application and combination of traditional materials and methods, and recent innovations in construction systems.

## **CET 221 Material Testing Laboratory (1 Credit Hour)**

Standard Methods of inspecting and testing structural materials used in construction are demonstrated. Data is collected and interpreted according to industry standards with results reported.

**Prerequisites:** MATH 211

**Pre- or corequisite:** ENGT 220

## **CET 260 CAD for Building Applications (2 Credit Hours)**

A detailed study of the form and content of typical construction drawings and 3D building models used in the construction industry. Commercial 3D CAD software is used to assemble a set of structural construction drawings. Standard specification documents are introduced.

**Prerequisites:** CET 120 or MET 120 and CET 210

## **CET 265 Civil 3D CAD (2 Credit Hours)**

A detailed study into the development of civil site plans. Commercial software (AutoCAD Civil 3D) is introduced as a tool to assist in the design of civil sites and develop a set of civil site drawings.

**Prerequisites:** CET 120 or MET 120 and CET 205 and CET 210

## **CET 295 Topics (1-3 Credit Hours)**

Study of selected topics.

## **CET 296 Topics (1-3 Credit Hours)**

Study of selected topics.

## **CET 301 Introduction to Structural Design (4 Credit Hours)**

Introduction to structural design of buildings and/or nonbuilding type structures using reinforced concrete, steel, and wood as materials. This course utilizes provisions of the American Concrete Institute ACI 318, American Institute of Steel construction AISC 360, and the National Design Specification NDS specifications. Forces, moments, and deflections in statically determinate beams, frames, and trusses due to various load cases and load combinations are determined.

**Prerequisites:** CET 220 and MATH 211

## **CET 325 Introduction to Land Development (3 Credit Hours)**

Applications of fundamental site engineering principles, land design principles and permitting issues. A brief historical review of exemplary subdivision, urban designs and their impact on current practice. Site surveying and engineering issues including hydrology, storm water management, site geometry, grading, design of roads, engineering design standards, and computer applications in site engineering are examined. The principles of siting and theories of design for aesthetic and efficient alignment of roads, layout of structures, and subdivision parcels are introduced.

**Prerequisites:** CET 210

## **CET 330 Fluid Mechanics (4 Credit Hours)**

Elementary mechanics of fluids. Fluid properties; hydrostatics; fluid kinematics; equations of motion; energy equation; momentum principles; flow of liquids and gasses in closed conduits; flow in open channels and/or compressible flow. Laboratory will demonstrate principles from the lecture material. All experiment results will be submitted in a written report format, including presentation and interpretation of experimental data. Use of spreadsheets is required.

**Prerequisites:** CET 220 and MATH 211

## **CET 332 Water Resources Engineering (3 Credit Hours)**

Hydrologic and Hydraulic principles are utilized in the planning, design, operation and construction of water management projects. The course addresses fundamental Hydrology - the occurrence and movement of surface water including weather and climate; precipitation; evaporation; transpiration; runoff; infiltration; stream flow; hydrograph analysis; erosion; and sedimentation. Additional topics covered will include water distribution, use of water, and sustainability of water as a natural resource.

**Prerequisites:** CET 330

## **CET 334 Computer Applications in Hydraulic Engineering (3 Credit Hours)**

Application of computer software in solving water resources problems; program development or application of available packages to solve assigned water resources problems. Use and application of commercial software for analysis and design of water distribution networks and gravity sewer collection systems.

**Prerequisites:** CET 330

## **CET 335 Fluid Mechanics Laboratory (1 Credit Hour)**

A laboratory to demonstrate the verification of fluid equations and principles as well as the characteristics of fluid machinery. All experimental results will be submitted in a report format, including presentation and interpretation of experimental data. Use of spreadsheets is required. This is an online asynchronous class open only to transfer students with credit for the lecture portion of CET 330.

**Prerequisites:** CET 330

## **CET 340 Soils and Foundations (3 Credit Hours)**

A study of the engineering properties of soil including stress, shear strength, and bearing capacity. Movement of water through soils, consolidation and settlement of structures and the design of shallow and deep foundations are also covered. Use of Excel spreadsheets is a requirement.

**Prerequisites:** CET 330

**Corequisites:** CET 341

## **CET 341 Soil Testing Laboratory (1 Credit Hour)**

Course includes standard methods for inspecting, sampling, testing, and evaluating soils. Students use typical test equipment and perform tests on samples of local soils. Data is collected and results are interpreted and plotted.

**Prerequisites:** CET 330

**Corequisites:** CET 340

## **CET 355 Sustainable Building Practices (3 Credit Hours)**

The course will examine industry trends in sustainable building practices. It explores the green building strategies used in the design and construction of sustainable buildings. The role of site selection, water efficiency, energy, materials and resources, and indoor environmental quality will be explored.

**Prerequisites:** Junior standing

**CET 361 Construction Project Management (3 Credit Hours)**

An introduction to the procedures and methods that are used by a contractor during the construction phase of a project. Special emphasis on planning, managing and documenting project activities. Topics include job site layout and control, subcontracting and purchasing and changes and claims/progress payments.

**Prerequisites:** CET 210

**CET 365 Building Information Modeling (BIM) (3 Credit Hours)**

This course is an introduction to building information modeling (BIM) and its implementation in building design and construction. Topics include the fundamentals of information modeling; business benefits of BIM; impacts of BIM on design and construction processes; integrated design process and project delivery; popular software applications and basic modeling techniques; and popular areas and best practices of BIM implementation.

**Prerequisites:** CET 260

**CET 367 Cooperative Education (1-3 Credit Hours)**

Available for pass/fail grading only. Student participation for credit based on the academic relevance of the work experience, criteria, and evaluative procedures as formally determined by the department prior to the semester in which the work experience is to take place (offered fall, spring, summer).

**Prerequisites:** Approval by the CET program director in accordance with the policy for granting credit for Cooperative Education programs; a student who needs to add additional credit to maintain full-time status should contact the program director

**CET 368 Internship (1-3 Credit Hours)**

Available for pass/fail grading only. Academic requirements will be established by the department and will vary with the amount of credit desired. Allows students to gain short duration career-related experience.

**Prerequisites:** approval by department

**CET 395 Topics (1-3 Credit Hours)**

Topics in Civil Engineering Technology.

**Prerequisites:** permission of the instructor

**CET 396 Topics (1-3 Credit Hours)**

Topics in Civil Engineering Technology.

**Prerequisites:** permission of the instructor

**CET 400 Computer Applications in Structural Design (3 Credit Hours)**

Analysis of indeterminate structures including the verification of results using the commercial software RISA 3D. Introduction to computer modeling in 2D and 3D, pre and post processors, interpretation of results and development of professionally written reports. Structural analysis topics include influence lines, cables and arches, slope deflection, moment distribution, and stiffness methods of analysis. Analysis and design of structures using steel, wood, and reinforced concrete materials using RISA 3D. Design meeting strength and serviceability requirements per codes, specifications, and standards.

**Pre- or corequisite:** CET 301

**CET 402 Structural Steel Design (3 Credit Hours)**

Structural analysis and design of steel structures, including beams, girders, columns, composite sections, trusses, rigid frames and connections using the LRFD method. Analysis of statically-determinate cantilever (hungspan) systems also are covered.

**Prerequisites:** CET 301

**CET 405 Environmental Loads (3 Credit Hours)**

Familiarize the student with the analysis of environmental design loads required for the design of building and non-building type structures in the United States. A thorough study of loading categories and load combinations for ASD and LRFD is also covered. Extensive use of the International Building Code (IBC) and the Minimum Design Loads for Building and Other Structures (ASCE 7) is expected.

**Prerequisites:** CET 301

**CET 410 Reinforced Concrete Design (3 Credit Hours)**

Structural analysis and design of reinforced concrete members. Topics include flexural analysis and design of structures, including slabs, beams and columns using strength design procedures.

**Prerequisites:** Junior standing

**Pre- or corequisite:** CET 301

**CET 412 Wood Design (3 Credit Hours)**

Analysis and design of wooden structural elements of buildings to satisfy design codes. Included are shearwall design and connections as well as beams, columns and other elements.

**Prerequisites:** CET 301

**CET 414 Bridge Design (3 Credit Hours)**

Familiarize the student with the analysis and design of simple and continuous span bridge structures utilizing the Load and Resistance Factor Design (LRFD) methodology. Determination of the most common design loads used in bridge design. Introduction to the AASHTO Specification for Structural Bridge Design used in United States.

**Prerequisites:** CET 410 or CET 450 or CET 402

**CET 417 Design of Reinforced Concrete Foundations (3 Credit Hours)**

Analysis and design of reinforced concrete foundations typically used in buildings and bridges. Topics include loads and loading groups, methods of analysis and design, abutments, and isolated and continuous footings. The class will be focused on the load and resistant factor design method. Use of the ASCE 7, ACI and AASTHO codes is necessary.

**Prerequisites:** CET 340 and CET 410

**CET 420 Hydrology and Drainage (3 Credit Hours)**

Hydrologic and hydraulic principles are utilized in the planning, design, operation and construction of water management projects. Topics include elements of stormwater drainage pertaining to hydrology, hydraulics of open channel and pipe flow, stormwater management, and issues pertinent to state stormwater regulations and the Chesapeake Bay Preservation Act.

**Prerequisites:** CET 332

**CET 428 Buried Infrastructure (3 Credit Hours)**

This is a capstone design course in the field of water resources. It incorporates pressurized pipe flow, gravity flow, and hydrology into the design of municipal infrastructure for water, sewer and stormwater projects. Topics will also cover rehabilitation and replacement of aging infrastructure in urban and neighborhood settings. Use of spreadsheets is required.

**Prerequisites:** CET 332 or CET 334 or CET 325

**CET 430 Hydraulic Engineering (3 Credit Hours)**

Analysis of hydraulics problems associated with the design of civil engineering structures. Uniform, steady flow in open channels; hydraulic models; design problems for dams; spillways and hydraulic structures; hydraulic machinery and other related topics will be discussed. Use of spreadsheets is required.

**Prerequisites:** CET 330

**CET 456 Resilience and Sustainability (3 Credit Hours)**

An investigation of emerging construction industry trends in resilience and sustainability. Evaluation of applications for vulnerable, small-scale and rural projects. Quantify increases in project value by incorporating life cycle analysis, planning for continuity of function, and deliberate risk management.

**Prerequisites:** CET 355

**CET 458 Managing the Climate Crisis (3 Credit Hours)**

This course provides a structured framework for developing resilience. It focuses on addressing the impacts of the climate crisis like flooding, heat, water, and wildfire through principles, designs, and real-world solutions. This is achieved by examining hard engineering structures, nature-based design, and hybrid solutions to protect communities and create a resilient design future.

**Prerequisites:** Junior standing

**CET 460 Construction Cost Estimating (3 Credit Hours)**

Evaluation and analysis of the basic elements of estimating construction costs for buildings. Elements of take off and pricing for Division 1 through Division 6 are covered. Use of computers and estimating software are emphasized.

**Prerequisites:** CET 361

**CET 462 Construction Planning and Scheduling (3 Credit Hours)**

The basic elements of planning and scheduling building construction projects. All elements of building construction, including the precedence methods of scheduling. Use of computers and planning and scheduling software are emphasized.

**Prerequisites:** CET 210

**CET 467 Construction Finance and Equipment Utilization (3 Credit Hours)**

This course provides a study of financial management in civil engineering construction projects. It emphasizes the development of techniques for effective financial monitoring. Additionally, the curriculum covers concepts related to construction equipment utilization, ensuring an economic alignment of machine capabilities with project requirements. It also addresses the application of time value of money principles for financial decision-making in equipment selection and utilization for heavy highway and major building construction projects.

**Prerequisites:** CET 361 and CET 301 or CET 330

**CET 472 Contract Documents (3 Credit Hours)**

The basic concepts of contracts and the standard contract documents used in construction. Also included is a study of the dispute resolution process in arbitration.

**Prerequisites:** CET 361

**CET 495 Topics (1-3 Credit Hours)**

Topics in civil engineering technology.

**Prerequisites:** permission of the instructor

**CET 496 Topics (1-3 Credit Hours)**

Topics in civil engineering technology.

**Prerequisites:** permission of the instructor