

CONSTRUCTION ENGINEERING TECHNOLOGY (CNST)

CNST-1050 Construction Safety Awareness **1 Credit**

Construction safety awareness covers the OSHA curriculum for the 10-hour Outreach Training program for Construction Safety and Health. Topics include an introduction to OSHA, fall protection, struck by, caught in or between hazards, electrical hazards, fire protection, material handling, equipment safety, concrete and masonry construction, welding and cutting, excavation, stairways and ladder safety and other applicable topics.

Laboratory: 2 hours

Prerequisite(s): None. Course may not be taken if student already has completed CNST-1750.

CNST-1060 General Industry Safety Awareness **1 Credit**

General Industry safety awareness covers the OSHA curriculum for the 10-hour Outreach Training program for General Industry Safety and Health. Topics include: an introduction to OSHA, fall protection, struck by, emergency action plan, electrical hazards, fire protection, material handling, equipment safety, Machine guarding, hazards communication, respiratory protection, lock-out-tag out, permit required confined spaces, and other applicable topics.

Laboratory: 2 hours

Prerequisite(s): None. Course may not be taken if student already has completed CNST-1760.

CNST-1281 Construction Engineering Orientation **3 Credits**

Introduction to construction management principles. Recognition of professional practices, current issues and developments in construction, including , stages of a construction project, management roles and responsibilities, and concepts for estimating, planning, and scheduling.

Lecture: 3 hours

Prerequisite(s): None.

CNST-1290 Construction Print Reading **2 Credits**

Overview of construction drawings for the major construction disciplines to understand presentation methods, interpretation, sequence of preparation, bid submittal processes, revision control, and code requirements. Commercial building, structural, civil, and highway drawings utilized. Introduction to Maintenance of Traffic drawings and stormwater management related drawings.

Lecture: 1 hour. Laboratory: 2 hours

Prerequisite(s): None CTAN Approved: Career Technical Assurance Guide CTC0N001.

CNST-1300 Real Estate Principles & Practices **3 Credits**

Introduction to real estate. Introduction to the real estate business, ethics, agency, purchase agreements, land surveying and title work, appraisals, finance, property management, construction and construction management, investment techniques, and civil rights.

Lecture: 3 hours

Prerequisite(s): None.

CNST-1310 Real Estate Law **3 Credits**

Ohio real estate law, municipal, state, and federal civil rights law, new case law on housing discrimination, desegregation issues, and methods of eliminating the effects of prior discrimination. Legal phase of real estate transactions. Review of listing, purchase agreement, mortgage, land contract, and settlement forms.

Lecture: 3 hours

Prerequisite(s): None.

CNST-1320 Real Estate Appraisal **2 Credits**

Explores elements of appraisal that affect value with a focus on single and double family dwellings and construction methods. Sales comparison approach, cost approach, and income capitalization approach, along with appraisal techniques to derive opinions of value for subject properties are investigated leading to an evaluation of real property value.

Lecture: 2 hours

Prerequisite(s): CNST-1300 Real Estate Principles & Practices; or concurrent enrollment.

CNST-1330 Real Estate Finance **2 Credits**

Procedures and techniques requisite to analyze risk in financing of real estate. Conventional lending and creative lending are explored. Sources of funds, qualification requirements, and legal elements for each of the different methods reviewed.

Lecture: 2 hours

Prerequisite(s): CNS- 1310 Real Estate Law, or concurrent enrollment.

CNST-1350 Dendrology I **2 Credits**

Identification during the summer season of commonly-encountered woody plants in Northern Ohio emphasizing use of botanical keys for identification. Topics include identifying markings and evidence of tree remnants to identify property corners and witness corners for land surveying. Labs are off-campus at selected local parks and students will be required to provide their own transportation to-and-from each field location.

Lecture: 1 hour. Laboratory: 3 hours

Prerequisite(s): CNST-1290 Construction Print Reading or concurrent enrollment.

CNST-1360 Dendrology II **2 Credits**

Identification during the winter season of commonly-encountered woody plants in Northern Ohio emphasizing use of botanical keys for identification. Topics include identifying markings and evidence of tree remnants to identify property corners and witness corners for land surveying. Labs are off-campus at selected local parks and students will be required to provide their own transportation to-and-from each field location.

Lecture: 1 hour. Laboratory: 3 hours

Prerequisite(s): CNST-1290 Construction Print Reading or concurrent enrollment.

CNST-1411 CAD Technology in Construction

2 Credits

Working drawing techniques of domestic structures using computer-aided drafting software. Floor plans, foundation plans, wall-sections, elevations, site plans and dimensioning techniques will be the core concepts.

Lecture: 1 hour. Laboratory: 3 hours

Prerequisite(s): CNST-1290 Construction Print Reading; or departmental approval.

CNST-1510 Green Building & Sustainability I

3 Credits

Introduction to Green Building and sustainability issues. Study of current practices, systems, and materials used in the construction of Green buildings. Recognition of planning and design features that enhance the energy efficiency of a building and its environment. Overview of Green Building Rating Systems.

Lecture: 3 hours

Prerequisite(s): None.

CNST-1640 Utility Locating and Traffic Flagging

2 Credits

Proper methods to locate and communicate to stakeholders existing communication, electrical, gas, oil, wastewater, water, and other utility facilities in the ground. Familiarization with the basic operation of underground utility locating equipment. OUPS (Ohio Utility Protection Services)/811 procedures, work zone traffic control, safety, and flagger requirements are introduced.

Lecture: 1 hour. Laboratory: 3 hours

Prerequisite(s): CNST-1290 Construction Print Reading, or concurrent enrollment; or departmental approval

CNST-1660 Material Testing

2 Credits

Application of standard procedures for sampling and testing construction materials. Students will use laboratory equipment to test conditions of asphalt, concrete, and soil in relationship to stated material specifications, and then record testing results for analysis by supervisory personnel.

Lecture: 1 hour. Laboratory: 2 hours

Prerequisite(s): MATH-0955 Beginning Algebra or qualified math placement, and CNST-1290 Construction Print Reading, or concurrent enrollment.

CNST-1670 Highway Inspection

2 Credits

Introduces the concepts of field inspection and testing procedures; their applications to various construction activities, equipment, and products, and general work zone operations; interpretation of contract plans and specifications; project record keeping and reporting; and supervisory functions. Field trips may be required.

Lecture: 1 hour. Laboratory: 2 hours

Prerequisite(s): CNST-1290 Construction Print Reading and MATH-0955 Beginning Algebra or qualified math placement.

CNST-1740 Fundamentals of Geographic Information Science

3 Credits

[This course is cross-listed as GEOG-1740. Credit can only be earned once for either course.] Introduction to geographic information science with a focus on learning Geographic Information Systems (GIS) software. Topics include map, interpretation, and analysis, coordinate systems, map projections, scales, topographic mapping, accuracy versus precision, spatial analysis techniques, types of thematic mapping, sources of data, basic database management, advantages and limitations of GIS, and an introduction to applications in engineering, engineering technology, and the sciences. Students are expected to have basic computer skills prior to taking this course.

Lecture: 2 hours. Laboratory: 2 hours

Prerequisite(s): MATH-1410 Elementary Probability and Statistics I, or MATH-1470 Modern Mathematics for Business and Social Sciences I, or MATH-1530 College Algebra or higher.

OAN Approved: Transfer Assurance Guide OSS051.

CNST-1751 Construction Safety

2 Credits

The theories and principles of construction safety and health applied to real-world setting following the Occupational Safety and Health Administration (OSHA) curriculum for the 30-hour Outreach Training Program for construction industry safety and health. Upon completion of course materials and required attendance hours, students receive their OSHA Construction 30-hour Outreach completion cards.

Lecture: 1 hour. Laboratory: 3 hours

Prerequisite(s): None. CTAN Approved: Career Technical Assurance Guide CTC0002.

CNST-1760 General Industry Safety

2 Credits

The theories and principles of general industry safety and health applied to real-world settings. Covers Occupational Safety and Health Administration (OSHA) regulations, employee rights and employer obligations. Includes certificate of Training in basic Industry Safety (OSHA 30: 29 CFR Parts 1910). Must attend designated class dates and pass related competency exams to earn training certificate.

Lecture: 1 hour. Laboratory: 2 hours

Prerequisite(s): None.

CNST-1770 Hazardous Waste Operations and Emergency Response

2 Credits

Comprehensive instruction in the health and safety planning and procedures for 1) uncontrolled hazardous waste site work; 2) hazardous waste treatment, storage or disposal facilities (TSDFs) work; and 3) emergency responses to hazardous materials releases. Meets OSHA's certification requirements for the "40 hour" off-site training portion of 29 CFR 1910.120 (the "HAZWOPER" standard).

Lecture: 1 hour. Laboratory: 3 hours

Prerequisite(s): None

CNST-2050 Advanced Construction Safety

3 Credits

Detailed coverage of fall protection, aerial lift operations, fall restraints, confined spaces, and excavations with a focus in utility construction. Practice use of equipment to solidify safe operations in the field. Students need to be 18 years of age or older due to equipment to be used during lab activities, per Occupational Safety and Health Administration (OSHA) regulations.

Lecture: 2 hours. Laboratory: 2 hours

Prerequisite(s): CNST-1751 Construction Safety or departmental approval

CNST-2110 Basic Survey Practices
3 Credits

Study of construction site engineering using survey instruments for elevation contours, drainage, and grading for construction. Laser-levels, transits, and total stations will be utilized. Emphasis on instrument applications and field data recording.

Lecture: 2 hours. Laboratory: 3 hours

Prerequisite(s): MATH-1540 Trigonometry or qualifying math placement to enroll in MATH-1610; and CNST-1290 Construction Print Reading; or departmental approval.

OAN Approved: Transfer Assurance Guide OET015.

CNST-2131 Construction Methods and Materials
3 Credits

Study of common construction principles that affect jobsite performance, material selection and testing, and the general properties of traditional materials used. There will be focus on sustainability of materials and an introduction to non-traditional materials used in building assemblies.

Lecture: 2 hours. Laboratory: 2 hours

Prerequisite(s): CNST-1290 Construction Print Reading; and MATH-0910 Basic Arithmetic and Pre-Algebra, or qualified Math placement; or departmental approval.

OAN Approved: Transfer Assurance Guide OET016 and Career Technical Assurance Guide CTC003.

CNST-2140 Advanced Material Testing & Inspection
2 Credits

Introduces students to advanced material testing procedures and field inspection. Concrete and asphalt pavement construction methods, inspection, and testing processes. Inspection of surfaces and tolerances. Calculation of quantities. Utility and incidental construction inspection. Work zone configurations. Project responsibilities and documentation. Field trips may be required.

Lecture: 1 hour. Laboratory: 2 hours

Prerequisite(s): CNST-1670 Highway Inspection, and CNST-2131 Construction Methods and Materials; or department approval.

CNST-2201 Introduction to Building Information Modeling
3 Credits

Introduction into building information modeling (BIM). 3-dimensional software will be used to generate a building model and related drawings used in a set of contract documents. BIM software also used to determine material take-off quantities for to create estimates.

Lecture: 1 hour. Laboratory: 4 hours

Prerequisite(s): CNST-1290 Construction Print Reading; or departmental approval.

CNST-2210 Mechanical and Electrical Systems
3 Credits

Study of mechanical and electrical systems for building construction, water supply, waste and sanitation. Heat loss, heat gain and hydronic heating systems; forced air and solar heating systems used in buildings; electrical systems of power distribution and lighting for commercial buildings among the topics covered.

Lecture: 3 hours

Prerequisite(s): CNST-2131 Construction Methods and Materials or concurrent enrollment; and eligibility for MATH-0955 Beginning Algebra; or departmental approval.

CNST-2220 Telecommunication Systems
3 Credits

Introduction to telecommunication systems with a focus on fiber optic technology. Covers the history, safety hazards, system drawings and fiber matrix, jargon, fiber and copper system components, cable and fiber types and specifications, splices and connectors, testing, overall network design, and construction methods of telecommunication systems.

Includes lab activities to reinforce/demonstrate concepts.

Lecture: 2 hours. Laboratory: 2 hours

Prerequisite(s): CNST-1290: Construction Print Reading or concurrent enrollment, or departmental approval

CNST-2230 Gas Pipeline Systems
3 Credits

An introduction to gas pipeline systems. Covers systems drawings, types of pipelines, common safety hazards, system components, common construction methods, maintenance and inspection, and legal requirements of gas pipeline systems. Includes lab activities to reinforce/demonstrate concepts.

Lecture: 2 hours. Laboratory: 2 hours

Prerequisite(s): CNST-1290 Construction Print Reading, or departmental approval

CNST-2240 Water and Wastewater Systems
3 Credits

Introduction to water, wastewater, stormwater systems and treatment. Covers system drawings, common safety hazards, system components, treatment approaches, common construction methods, maintenance and inspections, and introduction to legal requirements of each system type. Includes lab activities to reinforce/demonstrate concepts.

Lecture: 2 hours. Laboratory: 2 hours

Prerequisite(s): CNST-1290 Construction Print Reading, or departmental approval.

CNST-2330 Construction Scheduling
3 Credits

Capstone course that involves time management of construction activities. Use of Gantt charts, activity on arrow diagrams, PERT techniques, and critical path method. Computer scheduling software will be used throughout the course.

Lecture: 2 hours. Laboratory: 2 hours

Prerequisite(s): CNST-2131 Construction Methods and Materials, or departmental approval.

CNST-2500 Construction Surveying
3 Credits

Methods and procedures for construction surveying. Methods and procedures for establishing line, grade, horizontal circular and spiral curves, combinations of circular and spiral curves, vertical curves, parabolic curves, offset staking for rough and finished grade, and earthwork volume determination. Cross-sectioning methods and earthwork. Manual calculations and use of computer software. Introduction to AutoDesk Civil 3D software.

Lecture: 2 hours. Laboratory: 2 hours

Prerequisite(s): CNST-1410 Architectural CAD I, and CNST-2110 Basic Survey Practices; or department approval.

CNST-2510 Introduction to Asset Management

3 Credits

Introduction to asset management with a focus on utility systems spread over a geographic region. Covers principles of cartography and methods for presenting geographic information. Coordinate systems, map projections, scale, topographic mapping, thematic mapping, spatial analysis methods, and mapping accuracy are expanded upon from introductory course. Use Geographic Information Systems (GIS) to analyze and model engineering systems. Probability models and ways to achieve levels of service within an overall system will be covered. Laboratory element with case studies incorporated.

Lecture: 2 hours. Laboratory: 3 hours

Prerequisite(s): MET-2430 Engineering Probability and Statistics; and CNST-1740 Fundamentals of Geographic Information Science.

CNST-2520 Aerial Surveying

3 Credits

Introduction to the methods and procedures of aerial surveying using Unmanned Aircraft Systems (UAS) and its associated applications as it relates to land surveying and mapping. Processing collected data will be done using AutoDesk and/or ESRI software packages.

Lecture: 2 hours. Laboratory: 2 hours

Prerequisite(s): CNST-2110 Basic Survey Practices; and CNST-2500 Construction Surveying, or CNST-1740 Fundamentals of Geographic Systems; or department approval.

CNST-2535 Legal Principles in Surveying

3 Credits

The study of statute and common law pertaining to land surveying and real property rights. Methods to describe real property. A review of current practices, current court decisions, and applicable laws. Ohio Surveying Laws are examined and applied to real world scenarios.

Lecture: 2 hours. Laboratory: 2 hours

Prerequisite(s): CNST-2110 Basic Survey Practices.

CNST-2540 Ohio Lands

2 Credits

The study of the history and development of the original Ohio land subdivisions. Review of colonial systems and the Public Land Survey System in the United States. Historic methods of measuring the earth.

Lecture: 2 hours

Prerequisite(s): CNST-2110 Basic Survey Practices or concurrent enrollment or departmental approval

CNST-2550 3D Laser Scanning for Land Surveying

3 Credits

Introduction to the methods and procedures of 3D Laser Scanning for land surveying applications. Aerial and terrestrial methods of data acquisition will be explored. Quality assurance and quality control. Processing collected data will be done using AutoDesk and/or ESRI software packages.

Lecture: 2 hours. Laboratory: 2 hours

Prerequisite(s): CNST-2110 Basic Survey Practices; and CNST-2500 Construction Surveying or CNST-1740 Fundamentals of Geographic Systems; or department approval.

CNST-2560 Land Development Systems

3 Credits

Advanced surveying topics including section and subdivision lines and residential properties. Reestablishment of property boundaries and legal considerations for boundary descriptions, including local municipal records. This course involves the development of preliminary plats, detailed plans, and a final plat in accordance with conveyance standards.

Lecture: 2 hours. Laboratory: 2 hours

Prerequisite(s): CNST-1410 Architectural CAD I, and CNST-2110 Basic Survey Practices; or department approval.

CNST-2570 Geodetic Surveying

3 Credits

Planning and execution of control surveying, cadastral surveying, network adjustment and topographic surveying using total stations and data collections, satellite positioning (Global Navigation Satellite System) and advanced imagery systems. Introduction to remote sensing such LIDAR and laser scanning.

Lecture: 2 hours. Laboratory: 2 hours

Prerequisite(s): CNST-2500 Construction Surveying; or department approval.

CNST-2590 Professional Aspects of Land Surveying

1 Credit

Introduction to professional practice and safety. Statute and common law pertaining to land surveying and real property rights. Metes and bounds legal descriptions and General Land Office/Bureau of Land Management real property descriptions. Minimum standards for boundary surveys. Minimum standards for mortgage location surveys. Code of ethics for Professional Engineers and Professional Surveyors. Case studies and lab activities.

Laboratory: 3 hours

Prerequisite(s): CNST-1751 Construction Safety, and CNST-2535 Legal Principles in Surveying, or concurrent enrollment; or department approval.

CNST-2631 Construction Management Systems

3 Credits

Study of construction management practices including general contracting, subcontracting, project delivery, cost control, change processes and procurement. Introduction into lien implications, safety, quality and jobsite labor relations.

Lecture: 3 hours

Prerequisite(s): CNST-2131 Construction Methods and Materials.

CNST-2830 Cooperative Field Experience

1-3 Credits

Open to students eligible for the Cooperative Education Program. Employment in an approved training facility under College supervision. Requirement for one credit is 180 hours of approved work. Students may earn up to three credits in one semester. May be repeated for an accrued maximum of nine credits.

Other Required Hours: 180 clock hours of approved work per credit hour.

Prerequisite(s): See campus COOP Advisor for the Cooperative Education Program application.

CNST-2990 Construction Estimating & Cost Analysis

3 Credits

Capstone course in Construction Engineering Technology program. Includes construction cost estimates, cost forecasting, and cost reports for a construction project using computer software.

Lecture: 2 hours. Laboratory: 2 hours

Prerequisite(s): CNST-2131 Construction Methods and Materials or concurrent enrollment.