

# TCS - CONSTRUCTION TECHNOLOGY

## **TCS 100 Construction Blueprint Reading**

This course presents fundamentals in the understanding and use of basic construction drawings to determine methods and materials of light construction. a.) Architectural/Site: Emphasis is placed on residential and light commercial architectural drawings, architectural symbols, drafting practices, use of scales, applied geometry and orthographic projection. b) Heating, Ventilation and Air Conditioning (HVAC): Emphasis is placed on drawings and schematics for various HVAC systems, HVAC symbols, load calculation introduction. c.) Electrical: Instruction on interpreting electrical power plans, lighting plans, panel schedules and single-line diagrams as well as common ANSI (American National Standards Institute) and IEC (International Electro-technical Commission) symbols. d.) Plumbing: Instruction on interpreting plumbing plans and riser drawings including isometric details and common plumbing symbols.

*Upon successful completion of this course, students should be able to:*

*Demonstrate competencies in reading and interpreting architectural construction drawings (floor plans, elevations, details, symbols).*

*Discuss architectural, carpentry, mechanical, electrical and plumbing materials and construction practices.*

*Demonstrate competencies in reading and interpreting HVAC technical drawings (floor plans, details, symbols).*

*Demonstrate competencies in reading and interpreting plumbing technical drawings (floor plans, isometric details, symbols).*

*Demonstrate competencies in reading and interpreting electrical technical drawings (floor plans, line diagrams, symbols).*

*Prepare for advanced studies in the architectural and MEP (mechanical, electrical and plumbing) construction fields.*

*Review and discuss the purpose of specifications for all trades.*

*Create floor plans and orthographic drawings based on blueprints and isometric drawings.*

*Use architectural and engineering scales as well as calculations in conjunction with blueprints to determine the MEP information necessary for construction.*

*Develop working drawings in each of the programs (Architectural, Carpentry, HVAC, Plumbing, Electrical, Construction Supervision, and CADD) Understand the various types of architectural and MEP reference sources and use them effectively.*

**Prerequisite:** NONE New students should complete Placement Testing prior to registration. Visiting students may submit college transcript.

**3 Credits****2 Weekly Lecture Hours**

**2 Weekly Lab Hours**

## **TCS 105 Workplace Safety**

This course is designed to provide students' with a general awareness on recognition, avoidance, abatement and prevention of safety and health hazards on a construction site. Topics covered in the class include fall protection, personal protective equipment, scaffolding, ladder safety, as well as safe and proper handling of tools and other construction equipment.

*Upon successful completion of this course, students should be able to:*

*Demonstrate knowledge of worker rights that are protected under OSHA.*

*Demonstrate knowledge of the responsibilities an employer has under OSHA.*

*Demonstrate an understanding of general safety and health provisions.*

*Identify major fall, electrocution and other types of work hazards.*

*Demonstrate the use of personal protection equipment.*

*Identify major health hazards common to the construction industry.*

*Demonstrate workplace safety practices.*

**Prerequisite:** NONE New students should complete Placement Testing prior to registration. Visiting students may submit college transcript.

**2 Credits****1 Weekly Lecture Hour**

**2 Weekly Lab Hours**

## **TCS 108 Construction Supervision**

Includes the basics of a supervisor's duties while on a construction project. The supervisor must define objectives that meet with the overall strategy of the organization and achieve results through the efforts of others; constantly evaluate and control production performance and motivate subordinates; a "Jack-of-all-trades" under the most adverse circumstances. All too often many skilled craftsmen are thrust into managerial positions without proper training and background and begin to learn by making mistakes in communicating, planning the job, human relations and the effective use of their own valuable, limited time. This course deals, in depth, with the what, why, how, when and where of construction supervision.

*Upon successful completion of this course, students should be able to:*

*Assume the responsibilities and authority of the supervisor's position.*

*Apply the various techniques employed in motivating subordinates.*

*Use communication in leadership and utilize these necessary skills effectively.*

*Use scientific techniques in problem solving and apply these to assigned case studies.*

*Know what is expected of him/her relative to such items as contract documents; estimate preparation; state, federal and local forms; architectural specifications; building codes, etc.*

*Apply construction supervisor's responsibilities relative to setting up and controlling a job site.*

**Prerequisite:** Successful Placement Test Scores or (ENG 050 and REA 050) or ENG 099\* or REA 075 (\*may be taken concurrently).

**3 Credits****3 Weekly Lecture Hours**

**TCS 109 Construction Project Administration**

This course provides an introduction to the principles and techniques of construction project administration (CPA). In addition to the tactical decision making involved in site supervision, field personnel are required to contribute to the overall management system for planning and implementing the construction phases of a building project. The CPA system provides the overall contractor organization with an informed decision-making process, which guides the site supervisor in selecting the best means to expedite a job and provides the necessary data flow for accounting functions like billing and payroll. The CPA system also generates project records necessary for organizational processes such as liability management, costing and bidding, and organizational improvement. This course will prepare the student to participate in the CPA processes for project phasing and scheduling, cost estimating and control, and contract management.

*Upon successful completion of this course, students should be able to:*

*Describe the critical elements of pre-construction operations.  
Explain critical inputs to the process for construction planning and scheduling.  
Monitor work progress.*

*Diagram the elementary work activities given for the job.*

*Track time duration information for activity completion.*

*Outline a logical order in which given work items must be done.*

*Discuss the elements of a sound job philosophy and the means for implementation.*

*Compare variations in type and elements of basic construction contracts.*

*Describe standard procedures for quality control in materials and workmanship.*

*Describe standard procedures for handling changes, claims and disputes.*

*Administer standard documents and procedures for construction project closeout.*

*Explain the documents required to recommend/allocate the final phase of payment and waiver of liens.*

*Prerequisite: Successful Placement Test Scores or (ENG 050 and REA 050) or ENG 099\* or REA 075 (\*may be taken concurrently).*

**3 Credits3 Weekly Lecture Hours**

**TCS 111 Methods/Materials of Construction I**

This is the first course of a two-part introduction to the materials, assemblies and methodologies of general construction organized around Construction Specifications Institute division format. Topics begin with sitework and excavation techniques and proceed through basic building systems in concrete, masonry, wood, plastic and metal. Emphasis is placed on exploring the impact of design decisions and construction scenario on the final product. Case studies and project simulations are an integral part of the course.

*Upon successful completion of this course, students should be able to:*

*Relate standard construction documentation to the materials and methods of general construction.*

*Identify and discuss building components from the perspective of material source and manufacture.*

*Identify and discuss building systems from the perspective of component assemblies and construction methodology.*

*Perform critical analysis and problem solving relative to construction project case studies and simulation scenarios.*

*Prerequisite: TCS 100.*

**3 Credits3 Weekly Lecture Hours**

**TCS 112 Methods/Materials of Construction II**

This is the second course of the two-part introduction to the materials, assemblies and methodologies of general construction organized around Construction Specifications Institute division format. Topics begin with building envelope systems and proceed through finishes, building equipment and basic systems. Emphasis is placed on exploring the impact of design decisions and construction scenario on the final product. Case studies and project simulations are an integral part of the course.

*Upon successful completion of this course, students should be able to:  
Relate standard construction documentation to the materials and methods of general construction.*

*Identify and discuss building components from the perspective of material source and manufacture.*

*Identify and discuss building systems from the perspective of component assemblies and construction methodology.*

*Perform critical analysis and problem solving relative to construction project case studies and simulation scenarios.*

*Prerequisite: TCS 111.*

**3 Credits3 Weekly Lecture Hours**

**TCS 131 Estimating I**

A method of standard construction estimating procedure from take-off to bid. The course includes excavation, concrete, steel, masonry, carpentry, alteration work, mechanical work, electrical work, and general conditions.

*Upon successful completion of this course, students should be able to:*

*Demonstrate fundamental estimating skills.*

*Interpret construction plans and specifications.*

*Develop an estimate to include summaries and costs by category.*

*Prerequisite: MAT 128 and TCS 100 and TCS 111.*

**3 Credits3 Weekly Lecture Hours**

**TCS 132 Estimating II**

A continuation of Estimating I. This occurs is a laboratory presentation utilizing all acquired knowledge to compile essential data for an actual estimate.

*Upon successful completion of this course, students should be able to:*

*Complete an actual estimate from drawings and specifications within the time limits allowed by the bid documents.*

*Obtain experience with the functions performed in a builder's office.*

*Prerequisite: TCS 131.*

**3 Credits2 Weekly Lecture Hours**

**2 Weekly Lab Hours**

**TCS 141 Construction First Aid/Safety**

Emergency first-aid and accident-prevention instruction for construction employees and managers. OSHA requirements are stressed in this course. Administrative aspects of recordkeeping requirements, rights and responsibilities, standards, safety program development and implementation are covered. Safety training includes identification and elimination of accident and health hazards, inspection techniques and administration of first-aid and CPR.

*Upon successful completion of this course, students should be able to:*

*Describe the reasoning for accident prevention program development.*

*Identify the appropriate administrative requirements, as defined by OSHA, to effect an adequate accident prevention program.*

*Develop and implement an accident prevention program.*

*Administer first-aid/CPR or seek appropriate medical attention during a construction-related emergency.*

*Prerequisite: NONE New students should complete Placement Testing prior to registration. Visiting students may submit college transcript.*

**3 Credits3 Weekly Lecture Hours**

**TCS 190 Construction Management Internship (1 credit)**

College-Sponsored Experiential Learning (CSEL) is designed to integrate on-the-job learning experiences with classroom studies. These experiences are structured either to explore career options or to prepare for a specific occupation. Students participating in the Cooperative Education and Internship Program gain college credit and are graded for their learning/work experience by the appropriate faculty. Students participating in this 60 hour internship will earn 1 college credit for this experience. Upon successful completion of this hands-on work experience, the student should be able to satisfy instructionally selected competencies from those below according to the number of credits to be awarded. NOTE To be eligible for an internship, students must: Have completed a minimum of 18 or more credits within the last 5 years. Have begun course work in their major (at least 9 credits). Have an overall grade point average (GPA) of 2.5. Obtain a written recommendation by a DCCC faculty within the discipline of the internship. Submit a current resume to the Office of Student Employment Services.

*Upon successful completion of this course, students should be able to:  
Explain three program-related concepts that have been applied during the work experience.*

*Describe the ways that technology is utilized in the work experience.*

*Analyze the culture of the host organization.*

*Analyze an operational process within the work experience.*

*Demonstrate how assigned tasks depend on successful communication.*

*Describe how time and activity are managed to meet work-imposed deadlines.*

*Describe an instance where problem-solving skills were needed to analyze a situation in the work experience.*

*Formulate a self-assessment for career growth and personal satisfaction.*

*Satisfy the competencies of the chosen CSEL placement (to be developed in consultation with the CSEL instructor).*

*Work closely with a faculty mentor in the student's program/major to complete a project which articulates how the experience helps the student achieve program outcomes.*

**1 Credit**

**TCS 194 Construction Management Internship (2 credits)**

College-Sponsored Experiential Learning (CSEL) is designed to integrate on-the-job learning experiences with classroom studies. These experiences are structured either to explore career options or to prepare for a specific occupation. Students participating in the Cooperative Education and Internship Program gain college credit and are graded for their learning/work experience by the appropriate faculty. Students participating in this 120 hour internship will earn 2 college credits for this experience. Upon successful completion of this hands-on work experience, the student should be able to satisfy instructionally selected competencies from those below according to the number of credits to be awarded. NOTE To be eligible for an internship, students must: Have completed a minimum of 18 or more credits within the last 5 years. Have begun course work in their major (at least 9 credits). Have an overall grade point average (GPA) of 2.5. Obtain a written recommendation by a DCCC faculty within the discipline of the internship. Submit a current resume to the Office of Student Employment Services.

*Upon successful completion of this course, students should be able to:  
Explain three program-related concepts that have been applied during the work experience.*

*Describe the ways that technology is utilized in the work experience.*

*Analyze the culture of the host organization.*

*Analyze an operational process within the work experience.*

*Demonstrate how assigned tasks depend on successful communication.*

*Describe how time and activity are managed to meet work-imposed deadlines.*

*Describe an instance where problem-solving skills were needed to analyze a situation in the work experience.*

*Formulate a self-assessment for career growth and personal satisfaction.*

*Satisfy the competencies of the chosen CSEL placement (to be developed in consultation with the CSEL instructor).*

*Work closely with a faculty mentor in the student's program/major to complete a project which articulates how the experience helps the student achieve program outcomes.*

**2 Credits**

**TCS 199 Construction Management Internship (3 credits)**

College-Sponsored Experiential Learning (CSEL) is designed to integrate on-the-job learning experiences with classroom studies. These experiences are structured either to explore career options or to prepare for a specific occupation. Students participating in the Cooperative Education and Internship Program gain college credit and are graded for their learning/work experience by the appropriate faculty. Students participating in this 180 hour internship will earn 3 college credits for this experience. Upon successful completion of this hands-on work experience, the student should be able to satisfy instructionally selected competencies from those below according to the number of credits to be awarded. NOTE To be eligible for an internship, students must: Have completed a minimum of 18 or more credits within the last 5 years. Have begun course work in their major (at least 9 credits). Have an overall grade point average (GPA) of 2.5. Obtain a written recommendation by a DCCC faculty within the discipline of the internship. Submit a current resume to the Office of Student Employment Services.

*Upon successful completion of this course, students should be able to:*

*Explain three program-related concepts that have been applied during the work experience.*

*Describe the ways that technology is utilized in the work experience.*

*Analyze the culture of the host organization.*

*Analyze an operational process within the work experience.*

*Demonstrate how assigned tasks depend on successful communication.*

*Describe how time and activity are managed to meet work-imposed deadlines.*

*Describe an instance where problem-solving skills were needed to analyze a situation in the work experience.*

*Formulate a self-assessment for career growth and personal satisfaction.*

*Satisfy the competencies of the chosen CSEL placement (to be developed in consultation with the CSEL instructor).*

*Work closely with a faculty mentor in the student's program/major to complete a project which articulates how the experience helps the student achieve program outcomes.*

**3 Credits**

**TCS 221 Construction Survey and Layout**

An introduction to the fundamentals of engineering construction and land surveys. Topics include surveying references, accuracy and errors, measurement of horizontal and vertical distances, and the measurement of angles.

*Upon successful completion of this course, students should be able to:*

*Determine the horizontal location of a point and the direction to a second point utilizing coordinate geometry, azimuths, bearings and offsets.*

*Determine the degree of accuracy of a survey and distinguish between types of errors.*

*Calculate horizontal distances through the application of correction factors for temperature, tension, slope and tape calibration to field measured distances.*

*Determine the vertical location of a series of points with respect to a given datum.*

*Determine the difference in elevation between two points.*

*Measure accurate horizontal and vertical angles between two points.*

*Establish a line at a given angle of intersection with a known line.*

*Determine the magnetic bearing of a line.*

Prerequisite: MAT 128 and TCC 111.

**3 Credits**

**2 Weekly Lecture Hours**

**2 Weekly Lab Hours**