

Springfield Technical Community College  
Academic Affairs

CET-215/215L

Course Number: CET-~~ZZZ~~/~~ZZZL~~ Class/Lect. Hours: 2 Lab Hours: 1 Credits: 3 Dept.: Civil Engineering Technology

Course Number Title: Construction Materials Semester: Fall Year: 2020

**Course Description, Prerequisite, Corequisite:** An advanced study of behavior, applications, and quality control and testing of engineering materials such as metals, concrete, wood, and soils. Industry and professional standards (ASTM, AASHTO, and ACI) will be referenced and applied in data collection, measurement, and experimental techniques. Students will learn industry-standard testing and control techniques; determine mechanical properties; evaluate and compare stresses, strains, and deformations; and explore means and methods considerations. The course will include preparation for ACI licensure in concrete field inspection and soils testing and certification. PRE-REQ: CET-115

**OBJECTIVES/COMPETENCIES**

Course Objectives	Competencies
<ul style="list-style-type: none"> <li>▪ Report engineering measurements and calculate engineering quantities</li> <li>▪ Identify and determine mechanical properties of metals, concrete, wood, and soils</li> <li>▪ Understand behavior of metals, concrete, wood, and soils in engineering applications</li> <li>▪ Perform industry-standard and standards-aligned material testing</li> <li>▪ Prepare technical letters and engineering reports</li> </ul>	<ul style="list-style-type: none"> <li>▪ Report results with accuracy</li> <li>▪ Use engineering symbols</li> <li>▪ Understand and apply formulae</li> <li>▪ Accurate lab measurements and collection of raw data</li> <li>▪ Use engineering units and perform unit conversions</li> <li>▪ Spreadsheet applications and formatting</li> <li>▪ Operate a data acquisition system</li> <li>▪ Use technical/professional tables and resources such as UCSC soil classification system and American Society for Testing and Materials (ASTM) as well as other technical/professional standards</li> <li>▪ Determine properties of fine and coarse aggregates</li> <li>▪ Proportion a concrete mix design to meet specific design parameters</li> <li>▪ Determine moisture contents, absorption capacity, bulk specific gravity, and gradation of fine aggregates</li> <li>▪ Determine moisture contents, absorption capacity, specific gravity, unit weight, and gradation of coarse aggregates</li> <li>▪ Mix and test freshly mixed concrete for slump, air content, and unit weight</li> <li>▪ Make and cure concrete beam and cylinder specimens</li> </ul>

Course Objectives	Competencies
	<ul style="list-style-type: none"> <li>▪ Perform early strength testing on hardened concrete cylinders and estimate 28-day concrete strength</li> <li>▪ Perform tension testing of metals—cast iron, steel, aluminum, and brass</li> <li>▪ Perform tension testing of plastics</li> <li>▪ Understand soil types, behavior, identification, classification</li> <li>▪ Understand soil properties</li> <li>▪ Understand site investigation, methods, and goals</li> <li>▪ Understand concepts of permeability, surface tension, capillarity, and related concerns</li> <li>▪ Understand shear strength; sub-surface stresses, and settlement for soils</li> <li>▪ Perform standard-based geotechnical testing of soils</li> <li>▪ Analysis of stress-strain curves for modulus, yield, and strength and other mechanical properties</li> <li>▪ Comparison of mechanical properties of different structural materials</li> <li>▪ Report testing results in technical letters</li> <li>▪ Report testing results in laboratory and engineering reports in multiple formats</li> </ul>