South Central College

CTLS 2846 Hydrology and Hydraulics

Course Outcome Summary

Course Information

Description	This course introduces the basic design of water treatment and distribution systems, wastewater treatment and collection systems, stormwater flow systems, stormwater detention facilities, erosion control, and stormwater pollution prevention plans. (Prerequisite: CTLS 1110 and MATH 120)
Total Credits	3
Total Hours	64

Types of Instruction

Instruction Type	Credits/Hours
Lecture	2/32
Lab	1/32

Pre/Corequisites

CTLS 1110 and MATH 120

Institutional Core Competencies

Critical and Creative Thinking - Students will be able to demonstrate purposeful thinking with the goal of using a creative process for developing and building upon ideas and/or the goal of using a critical process for the analyzing and evaluating of ideas.

Course Competencies

1. Analyze fluid mechanics

Learning Objectives

Describe the differences among solid, liquid, and gas
Describe properties of water
Calculate specific weight

2. Analyze hydrostatics and hydrodynamics

Learning Objectives

Compute the pressure of water
Compute the buoyant force on submerged objects
Draw energy and hydraulic grade lines
Compute the discharge and velocity of water

3. Examine hydraulic devices

Learning Objectives
Calculate flows through orifices, over weirs, and under gates
Utilize tables to calculate flows through hydraulic devices

4. Analyze open channel hydraulics

Learning Objectives
Compute the slope of a channel
Compute the cross-sectional area, wetted perimeter, and hydraulic radius of channels
Identify the normal depth in a channel
Use the Manning's equation to compute depth in uniform channels or pipes

5. Analyze water treatment processes

Learning Objectives
Summarize sections of the Ten States Standards - Recommended Standards for Water Works
Review conventional treatment methods
Review membrane treatment methods
Summarize disinfection options and standards

6. Analyze pressure distribution systems

Learning Objectives
Describe pressure pipe materials and joint types
Calculate flow characteristics and size pipes accordingly
Analyze loop systems
Summarize water storage requirements
Summarize MDH pressure, valving, and hydrant requirements

7. Examine pumping systems

Learning Objectives
Describe pressure zones
Calculate pump and motor sizes
Calculate electrical usage
Design a booster station

8. Analyze wastewater treatment processes

Learning Objectives
Describe primary treatment processes
Describe secondary treatment processes
Describe tertiary treatment processes
Define disinfection methods
Describe small treatment system options

9. Analyze gravity flow systems

Learning Objectives
Summarize gravity flow piping materials, sizes and shapes
Layout a gravity sanitary and storm sewer system
Describe inlet control
Describe open channel flow measuring devices

10. Examine collection systems

Learning Objectives
Summarize collection system design criteria
Size collection systems
Describe sewage lift station components
Describe alternative collection systems

11. Examine hydrology, overland flow, and detention

Learning Objectives

Describe the hydrologic cycle
Outline drainage ages
Calculate time of concentration
Describe design storms
Calculate runoff using the rational method
Calculate detention
Describe various surface runoff calculation methods

SCC Accessibility Statement

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