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

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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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