

University of Toledo

Construction Engineering Technology

Master Syllabus

Course Title: Hydrology & Hydraulics **Course Code & Number:** CET-3220

Credit Hour Total: 3 **Weekly Contact Hours Lecture:** 3 **Lab Hours:** 0

Prerequisite(s): CET-2030

Text: Hydraulics & Hydrology with Applications for Stormwater Management, 4th Ed.
Gribbin, Cengage Learning, ISBN: 978-1133691839

Software: Bentley (Haestad Flowmaster)

Course Coordinator: Kissoff

A. **Course Description** (Approved catalog description.)

This course is designed to give an understanding of basic hydraulic principles as they pertain to stormwater management; from estimating runoff volumes, to channeling the stormwater in conduits and open channels, to detaining flows to reduce downstream flooding and reducing the effects of erosion due to concentrated stormwater flow. The course will utilize numerous methods including manual and computer-aided design tools.

B. **Related Program Outcomes:**

Upon successful completion of the Construction Engineering Technology program, graduates will have:

ABET/Student Outcomes

- 1) an ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly-defined engineering problems appropriate to the discipline;
- 2) an ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline;
- 5) an ability to function effectively as a member as well as a leader on technical teams.

The course also supports coverage of the following curricular areas:

Program Criteria

- d) the application of fundamental computational methods and elementary analytical techniques in sub-disciplines related to construction engineering;
- i) the performance of standard analysis and design in at least one sub-discipline related to construction engineering.

Discipline Specific Content

+ Local & global impact of engineering solutions on individuals, organizations and society

Evidence of the success of these outcomes is provided by the collection and analysis of:

- Bernoulli Equation Quiz
- Storm Sewer and Culvert Design Projects
- Erosion & Sediment Control Exam Problem

C. Course Objectives:

Upon the completion of this course the student will have:

1. An understanding of the fundamental hydrodynamic and hydrostatic principles.
2. The ability to estimate peak flows of stormwater runoff for use in design of hydraulic conveyances.
3. The ability to design an open channel for a given runoff volume and estimate the volume of flow within a natural watercourse.
4. The ability to design a sewer system for given runoff volumes.
5. The ability to design pipe culverts for given runoff volumes.
6. The ability to design a stormwater detention basin for a given set of criteria.
7. An understanding of erosion causes and sediment control practices used to combat them.
8. The ability to use Haestad Methods Software in the design and analysis of stormwater management problems.

D. Course Outline – Major Content Areas

1. Introduction to Hydrostatics and Hydrodynamics
2. Gravity Flow in Pipes and Open Channels
3. Hydrological Techniques
 - i) Time of Concentration
 - ii) Runoff Coefficients
 - iii) Runoff Estimation Methods (Rational, SCS)
 - iv) Hydrographs
4. Design of Storm Sewers
5. Design of Culverts
6. Stormwater Management
7. Erosion & Sediment Control

E. Suggested Laboratory Tests

None