

# University of Toledo

## Construction Engineering Technology

### Master Syllabus

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**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, 4<sup>th</sup> Ed.  
Gribbin      ISBN: 978-1133691839

**Software:** Bentley (Haestad Flowmaster)

**Course Coordinator:** Kissoff

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**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

- a. an ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities;
- b. an ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies;
- e. an ability to function effectively as part of a team;
- f. an ability to identify, analyze, and solve broadly-defined engineering technology problems;

Program Criteria Outcomes

2. A development of mathematical skills sufficient to solve and analyze technical problems associated with construction projects including building, highway and heavy construction.
3. The ability to demonstrate a thorough knowledge of common construction methods and design procedures associated with building, highway and heavy construction projects.

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

- Bernoulli Equation Quiz
- Storm Sewer and Culvert Design Projects

**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

**E. Suggested Laboratory Tests**

None