

Tennessee Technological University
Department of Civil & Environmental Engineering
CEE 4420 (5420) – Engineering Hydrology
Elective
Fall Semesters 2007

- 2007 Catalog Data: CEE 4420(5420): Engineering Hydrology. Lecture 3. Credit 3. Fundamental processes in the hydrologic cycle, including precipitation, infiltration, and runoff. Quantitative approaches in engineering hydrology to estimate flows for a variety of design problems. Prerequisite: CEE 3420 or consent of instructor.
- Textbook: Gupta, R., *Hydrology and Hydraulic Systems*, Waveland Press, Illinois, 2001.
- Reference: Hornberger, G.S. et al. *Elements of Physical Hydrology*, Johns Hopkins University Press, 1998.
- Coordinator: Faisal Hossain, Assistant Professor of Civil Engineering
- Goal: The goal of CEE 4420 (5420) “Engineering Hydrology” is to introduce students to the fundamental principles of engineering hydrology with application to runoff modeling

Course learning objectives:

1. The student is to develop an up to date background on engineering hydrology with special emphasis on runoff modeling for water resources management.
2. The student is to gain factual knowledge on terminology and use of methods of engineering hydrology; and learn how to apply course material to specific engineering hydrology problems.

Course measurable outcomes:

Students will be expected to:

1. estimate Water Budgets;
2. calculate Transfer Processes in Hydrologic Cycle;
3. characterize Catchment properties;
4. apply Rational Method for Estimating Runoff in Small Catchments;
5. apply NRCS method for Estimating Runoff in Small Catchments;
6. perform Unit Hydrograph Analysis;
7. perform Reservoir Routing;
8. perform Hydrologic Channel Routing with Muskingham Method;
9. design Stormwater systems; and
10. understand basic concept of Hydrologic Modeling .

Topics covered: (Three lecture classes per week, 55 minutes each)

1. Introduction (1 class)
2. Water demand calculation (2 classes)
3. Water budget (2 classes)
4. Catchment properties (2 classes)
5. Rational method for estimating runoff (2 classes)
6. NRCS method for estimating runoff (2 classes)
7. Infiltration (4 classes)
8. Groundwater flow (2 classes)
9. Hydrologic Measurements (2 classes)
10. Unit Hydrograph (4 classes)
11. Reservoir Routing (5 classes)
12. Channel Routing (4 classes)
13. Stormwater systems (3 classes)
14. Rainfall-runoff modeling (5 classes)

15. Review (2 classes)

Contribution of the course to meeting professional component:

This course is a part of the engineering topics component of the curriculum and is an elective.

ABET category content as estimated by faculty member who prepared this course description:

Engineering Science: 2 credits or 67%
Engineering Design: 1 credit or 33%

Relation of course to program outcomes:

- Outcome 1: The graduates will have a broad understanding of the relevant principles of mathematics, science, and engineering.
- Outcome 2: The graduates will have a general comprehension of four technical areas appropriate to civil engineering.
- Outcome 4: The graduates will be capable of design activities and have the ability to identify, formulate, and solve civil engineering problems.
- Outcome 8: The graduates will have the ability to use techniques, skills, and modern engineering tools needed for engineering practice.
- Outcome 11: The graduates will have an understanding of the importance of fundamental and applied research in the advancement of engineering knowledge.

Relation of course to ABET Criteria:

General Criteria

Bloom's Level of Achievement

- | | |
|--|---|
| (3a) Apply knowledge of math and sciences | 3 |
| (3c) Design a system, component or process | 4 |
| (3e) Identify, formulate, and solve engineering problems | 4 |
| (3k) Techniques, skills, modern tools for engineering practice | 3 |

Program Criteria

Bloom's Level of Achievement

- | | |
|--|---|
| 1. Apply knowledge of math and sciences | 3 |
| 2. Apply knowledge of four technical areas appropriate to civil engineering | 4 |
| 3. Design a system, component, or process in more than one civil engineering context | 4 |

Computer (software) usage:

1. Homework assignments will require use of Microsoft Excel and HEC-HMS software for watershed process modeling

Laboratory projects: None

Prepared by: Faisal Hossain

Date: August, 2007