Tennessee Technological University
Department of Civil & Environmental Engineering
CEE 3420 – Hydraulics
Required
Fall Semester 2006, Spring Semester 2007

2007 Catalog Data:	CEE 3420: Hydraulics. Lecture 3. Credit 3. Fundamental principles and design of water supply, stormwater and sanitary sewer systems and their components, including pipes, pumps, storage facilities, detention basins, open-channels and culverts. Prerequisite: ME 3720.
Textbook:	Gupta, R.S., Hydrology & Hydraulic Systems, Second Edition, Waveland Press, Inc., Prospect Heights, Illinois, 2001. Computer Applications in Hydraulic Engineering,Third Edition (incl. Academic CD), Haestad Press, 1997-1999.
Reference:	None
Coordinator:	V. S. Neary, Associate Professor of Civil & Environmental Engineering
Goal:	Students will learn fundamental principles for designing hydraulic systems and components for water supply and wastewater drainage.

Course Learning Objectives:
Students will develop knowledge, understanding, and skills in solving the following hydraulics problems:
1. Calculating Pressure Flows and Losses for Pipes In-Series, Parallel, and Networks
2. Designing Pump(s) for Single- and Multiple- Pump Systems
3. Calculating Critical, Uniform and Non-Uniform Flows in Open Channels
4. Designing Rigid and Loose Boundary Channels
5. Estimating Water Demand and Availability for Water Supply
6. Estimating Reservoir Storage Capacity Requirements
7. Estimating Peak Stormwater Discharge for Drainage Design
8. Designing Culverts
9. Designing Detention Basins
10. Designing Storm and Sanitary Sewer Systems
11. Designing Water Supply Distribution Networks

Course Measurable Outcomes:
During the semester students will be expected to learn how to:
1. calculate Pressure Flows and Losses for Pipes In-Series, Parallel, and Networks;
2. design Pump(s) for Single- and Multiple- Pump Systems.;
3. calculate Critical, Uniform and Non-Uniform Flows in Open Channels;
4. design Rigid and Loose Boundary Channels;
5. estimate Water Demand and Availability for Water Supply;
6. estimate Reservoir Storage Capacity Requirements;
7. estimate Peak Stormwater Discharge for Drainage Design;
8. design Culverts;
9. design Detention Basins;
10. design Storm and Sanitary Sewer Systems; and
11. design Water Supply Distribution Networks.

Topics Covered: (Three lecture classes per week, 55 minutes each)
1. Estimating Flows and Losses for Pipes In-Series, Parallel, and Networks (8 class hours)
2. Analyzing Pump(s) for Single- and Multiple- Pump Systems (3 class hours)
3. Estimating Water Demand (2 class hours)

4. Estimating Water Availability for Water Supply (3 class hours)
5. Designing Water Distribution Systems (3 class hours)
6. Calculating Critical, Uniform and Non-Uniform Flow in Open Channels (9 class hours)
7. Designing Rigid and Loose Boundary Channels (3 class hours)
8. Calculating Occurrence Frequency of Storms (1.5 class hours)
9. Rational Method for Estimating Peak Stormwater Discharge (3 class hours)
10. Designing Storm and Sanitary Sewer Systems (3 class hours)
11. Designing Detention Basins (3 class hours)
12. Designing Culverts (1.5 class hours)

Contribution of the course to meeting professional component:

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

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

Engineering science: 1 credits or 33%
Engineering design: 2 credits or 67%

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)	Knowledge of math, science, engineering	3
(3c)	Design a system, component, or process	4
(3e)	Identify, formulate, and solve engineering problems	3
(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	3
3.	Design a system, component, or process in more than one civil engineering context	4

Computer usage:
1. Homework assignments will require use of Microsoft Excel
2. Homework assignments will require use of Haestad Programs: FlowMaster, WaterCAD, StormCAD, CulvertMaster

Laboratory projects: None

Prepared by: V. S. Neary Date: September 27, 2007