Date: June 29, 2010
Course Number: ERE 540
Course Title: Engineering Hydrology and Hydraulics

- New Course
- Changes in existing course (check all that apply):
  - Prefix
  - Description
  - Number
  - Pre-requisite(s)
  - Credits
  - Co-requisite(s)
  - Title
  - Shared Resources
  - Course Format
  - Content
  - Semester Offered

This course meets the General Education standards in the following knowledge and skills area (check all that apply):

- American History
- Humanities
- Other World Civilizations
- The Arts
- Mathematics
- Social Sciences
- Basic Communication
- Natural Sciences
- Western Civilization

Prerequisites or co-requisite requirements:
- Prerequisites: FEG133, FCH152, MAE341, FEG335, ERE371
- Co-requisites: APM395

Institutional Impact:

- Anticipated Enrollment: 10 per semester

Technology and Classroom Resource Demands: Projector for Internet and document camera
Computing Resources: Computers with MathCAD, ArcGIS, and public domain water engineering software
Library Resources: Online journals and database searches
Transportation Requirements: N/A
Forest Properties or Field Practicum Facilities Required: N/A
Health and Safety Considerations:

Conditions or situations present in association with the course?  Yes / No

1. **Will substances with any of the following properties be used during instruction:** flammability, toxicity, corrosivity, reactivity, registered pesticide, legally controlled, or other characteristics with the potential to cause harm or injury?  
   No

2. **Will any physical hazards be present during instruction?** (e.g., machines that need safety guards; razor blades or syringes; compressed gases, etc.).  
   No

3. **Will any biological hazards be present during instruction?** (e.g., handling animals (rabies or hantavirus); cultures or stocks of infectious agents (fungal spores, viruses, bacteria, etc.).  
   No

4. **Will any radiation hazards be present during instruction?** (e.g., radioisotopes, X-rays, ultraviolet rays, lasers, etc.).  
   No

5. **Will any electrical equipment that, due to its design, location, or method of use, pose any threat to safety during instruction?** (Give considerable thought to electrical use outdoors, or any potentially wet location.).  
   No

6. **Will there be any personal safety issues related to the class?** (e.g., due to time of day or location, at the end of any organized class exercise, will students be in danger of physical assault, etc.).  
   No

7. **Will any students be driving official state or research sponsored land or water vehicles during any class or instructional exercise?**  
   No

8. **Will any type of personal protective equipment be necessary during class exercises?** (e.g., hard-hats, eye/face protection, hearing protection, hand/foot protection, lab coat, visibility clothing, etc.)  
   No

If the answer was “Yes” to any of the **HEALTH AND SAFETY** questions, please explain:

**CATALOG DESCRIPTION** (Please provide using the precise format currently used in the ESF catalog, please do not exceed 500 characters):

FEG 540. Engineering Hydrology and Hydraulics (3)  
Three hours of lecture and discussion. Introduction to water resources engineering. Hydraulics processes include pipe flow, open-channel flow, flows within control structures, and flow through porous media. Hydrologic processes include watershed storage and flux, rainfall-runoff models, flood routing, and stormwater design. Spring.  
Prerequisites: FEG 133, MAE 341, FEG 335, ERE 371, or equivalent  
Co-requisite: APM 395 or equivalent
DETAILED COURSE DESCRIPTION

COURSE: ERE 540– Engineering Hydrology and Hydraulics
3 Credit Hours – Spring Semester
3 Hours Lecture Per Week
Prerequisites: FEG 133, MAE 341, FEG 335, ERE 371, or equivalent.
Co-requisite: APM 395 or equivalent

SCOPE:
1. Level of Instruction:
   a. ERE 540 is a required course for graduates in the Water Resources Engineering area of study.
2. Relation to curriculum or to other ESF or Syracuse University courses:
   a. Shared resource requirements: FEG 340. The FEG 340 course emphasizes the engineering design process and requires weekly laboratory and a final design project. ERE 540 emphasis engineering analysis and requires a final research paper. Credit will not be granted for both ERE 540 and FEG 340.

STUDENT LEARNING OUTCOMES:

After completing this course the student should be able to:

1. Design a water resources engineering system component, or process to meet desired goals;
2. Understand and document the impact of water resources engineering solutions in a global, economic, environmental, and societal context;
3. Use techniques, skills, and modern engineering tools necessary for water resources engineering practice;
4. Apply knowledge of mathematics, science, and engineering to solve water resources engineering problems in hydraulics and hydrology;
5. Design, conduct, analyze, and interpret water resources engineering experiments;
6. Function on a multi-disciplinary team, practice professional and ethical responsibility, and effectively communicate;
7. Recognize the need for, and be able to engage in, life-long learning and knowledge of contemporary water resources engineering issues.

MAJOR CONCEPTS OR METHODOLOGIES:

Engineering hydrology and hydraulics covers the following major concepts: introduction to water resources engineering; watershed hydrology and distribution, occurrence, flux, and properties of water; Reynolds transport theorem and conservation of mass, momentum, and energy; steady pipe hydraulics and pump systems; hydraulics of culverts, reservoirs, and pipe networks; unsteady hydraulics and hydraulic simulation; steady open channel hydraulics; gradually varied open channel flow; rapidly varied and unsteady open channel flow; flood routing with hydrologic, kinematic, and hydraulic analysis; hydrologic frequency analysis; watershed models for rainfall-runoff, infiltration, erosion, and water quality; groundwater flow, mapping and well draw-down; groundwater quality and simulation; urban stormwater systems and quality. Design of a water resources system is performed and evaluated on its ability to meet goals, constraints, comply with design guidelines, and consider contextual impacts. Students will apply earlier work in engineering design, surveying, computational methods, and fluid mechanics, as well as concurrent work in engineering probability and statistics.

CATALOG DESCRIPTION (Please provide using the precise format to be included in the ESF catalog, please do not exceed 50 words)

FEG 540. Engineering Hydrology and Hydraulics (3)
Three hours of lecture and discussion. Introduction to water resources engineering. Hydraulics processes include pipe flow, open-channel flow, flows within control structures, and flow through porous media. Hydrologic processes include watershed storage and flux, rainfall-runoff models, flood routing, and stormwater design. Spring.
Prerequisites: FEG 133, MAE 341, FEG 335, ERE 371, or equivalent. Co-requisite: APM 395 or equivalent

COURSE HISTORY:

This course was approved by the College of Forestry Faculty on 3/10/1965 and was originally numbered Forest Engineering 106. By the Faculty Action of 5/7/1968 it was renumbered Forest Engineering 340, effective 9/1/1968. The Forest Engineering (F Engr) abbreviation was re-designated FEG in August 1973, as part of the computerization of the College records. The course was re-described in 12/6/1974 and approved by Faculty action of that date. Title and credit hours changed from 3 to 4 by Faculty Action of 4/26/1979. The College of Environmental Science & Forestry renamed the course from Engineering Hydrology and Flow Controls to Engineering Hydrology and Hydraulics in February 2001.

Last approved: February 2001

Revised Draft: February 2, 2010 (form in protected format: 6/29/10)