**DETAILED COURSE DESCRIPTION**

**COURSE:** ERE 340– Engineering Hydrology and Hydraulics

 4 Credit Hours – Spring Semester

 3 Hours Lecture and 3 Hours Lab Per Week

 Prerequisite(s): ERE 133, MAE 341, ERE 335, ERE 371

Co-Requisite: APM 395

**SCOPE:**

1. *Level of Instruction:*
	1. ERE 340 is a required course for juniors in the Environmental Resources Engineering program of study. The ERE 340 course emphasizes the engineering design process and requires weekly laboratory and a final design project.
2. *Relation to curriculum or to other ESF or Syracuse University courses:*
	1. ERE 340 is required for ERE 489 Engineering Planning and Design
	2. Shared resource requirements: ERE 540 which emphasizes engineering analysis and requires a final research paper. ERE 540 does not have a lab component.

**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)**

ERE 340. Engineering Hydrology and Hydraulics (4)

Three hours of lecture and three hours of laboratory 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: ERE 133, MAE 341, ERE 335, ERE 371

Co-requisite: APM 395

**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: 9/28/10)

Approved by Faculty Governance Committee on Instruction April 7, 2010

Revised course prefix from FEG 340 to ERE 340.

Updated program name from Forest Engineering to Environmental Resources Engineering.

September 28, 2010