Date: June 29, 2010
Course Number: ERE 530
Course Title: Numerical and Computing Methods

☒ New Course OR ☐ Changes in existing course (check all that apply):

☐ Prefix ☐ Description ☐ Shared Resources
☐ Number ☐ Pre-requisite(s) ☐ Course Format
☐ Credits ☐ Co-requisite(s) ☐ Content
☐ Title ☐ 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

Prequisites or co-requisite requirements:

☒ Prerequisites: Diff. Equations or equivalent ☐ Co-requisites:

Institutional Impact:

Anticipated Enrollment: 5 per semester

Technology and Classroom Resource Demands: Projector, white board, computer lab
Computing Resources: Computer software including MS Office, MATLAB, and MS Visual Studio
Library Resources: No
Transportation Requirements: No
Forest Properties or Field Practicum Facilities Required: No
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?
   Yes / No: No

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

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

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

Three hours of lecture/discussion per week. Programming skills and computing techniques using state-of-the-art software packages. Applications of programming and computing methods for solving geospatial, ecological, and/or water resource engineering problems. Fall. Prerequisite(s): Differential Equations
DETAILED COURSE DESCRIPTION

COURSE: ERE 530 – Numerical and Computing Methods
3 Credit Hours – Fall Semester
3 Hours Lecture Per Week
Prerequisite(s): Differential Equations

SCOPE:

1. Level of Instruction:
   a. ERE 530 is an introductory graduate engineering course intended to provide knowledge
      and skills on computing methods and programming. This course will be offered to
      graduate engineering students, giving them the exposure to programming skills and
      computational engineering tools

2. Relation to curriculum or to other ESF or Syracuse University courses:
   a. This course targets Environmental Resources and Forest Engineering (ERFEG) graduate
      students, who don’t have any programming skills. This course provides graduate students
      with tools and methods that may be used for their research.
   b. There is a similar course at Syracuse University (MAT 581: Numerical Methods and
      Programming). However, ERE 530 is oriented to engineering applications, which is more
      appropriate to ERFEG graduate students.
   c. Shared resource requirements: co-taught with FEG 335. Note: Credit will not be granted
      for both FEG 335 and ERE 530.

STUDENT LEARNING OUTCOMES:

1. Students will be able to identify, formulate, and solve engineering problems.
2. Students will be able to use the techniques, programming skills, and modern engineering tools
   necessary for engineering practice.
3. Students will develop their own research interests (e.g., geospatial modeling, ecological, and/or
   water resource engineering).

MAJOR CONCEPTS OR METHODOLOGIES:

Numerical and computing methods, commonly used in engineering. This course aims to provide a
solid grounding for graduate students, who do not have any programming skills, on algorithm
development and the computing techniques of solving problems. To investigate various
engineering problems, students will utilize state-of-the-art software packages (e.g., MATLAB and
Visual Basic) in writing computer code and analyzing solutions of problems.

The numerical methods include roots of equations, linear algebraic equations, optimization, curve
fitting, and interpolation. Applications of programming and computing methods for solving
topospatial, ecological, and/or water resource engineering problems will be further investigated by
students. Graduate students will work on individual projects according to their own research
interests (e.g., geospatial modeling, ecological, and/or water resource engineering) to practice their
knowledge and analytical techniques, and programming skills that they have obtained during the
course.

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

ERE530. Numerical and Computing Methods (3)
Three hours of lecture/discussion per week. Programming skills and computing techniques using state-of-the-art software packages. Applications of programming and computing methods for solving geospatial, ecological, and/or water resource engineering problems. Fall. Prerequisite(s): Differential Equations

COURSE HISTORY:

This is a new course, and has not been previously taught at ESF.. Approved by Department Action: April 14, 2008. Version: 5.5.2008

Revised Draft: November 10, 2009 (form in protected format: 6/29/10)