Date: June 29, 2010
Course Number: ERE622
Course Title: Digital Image Analysis

- **New Course** OR - **Changes in existing course (check all that apply):**
  - Prefix
  - Number
  - Credits
  - Title
  - Description
  - Pre-requisite(s)
  - Co-requisite(s)
  - 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

**Prequisites or co-requisite requirements:**

- **Prerequisites:**
  - APM391, FEG335 or permission of instructor.
- **Co-requisites:**

**Institutional Impact:**

Anticipated Enrollment: 15 per semester

**Technology and Classroom Resource Demands:**

Projection and sound system for lecture, whiteboard, tables and chairs that can be used for group project work, room darkening ability

**Computing Resources:**

Desktop computer with internet access, printer, access to large format plotter, software (MS Word, Excel, Powerpoint, MathCAD, Erdas Imagine, Matlab, Blackboard)

**Library Resources:**

A complete list of required references will be provided to the library faculty, including access to engineering society and related professional journals.

**Transportation Requirements:**

none

**Forest Properties or Field Practicum Facilities Required:**

none
Health and Safety Considerations:

Conditions or situations present in association with the course?

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 and discussion per week. Elements of digital image processing and analysis systems: Digital image representation, visual perception, sampling and quantization, pixel connectivity, Fourier transforms, image enhancement, filtering, image segmentation, edge detection, thresholding, representation schemes, descriptors, morphology, recognition and interpretation. Spring. Prerequisite(s): APM391, FEG335 or permission of instructor.
DETAILED COURSE DESCRIPTION

COURSE: ERE 622: Digital Image Analysis
3 Credit Hours – Spring Semester
3 Hours Lecture Per Week
Prerequisite(s): APM391, FEG335 or permission of instructor.

SCOPE:

1. Level of Instruction:
   a. ERE 622 is a graduate level course for students specializing in mapping science. Students from other departments performing image analysis are also accommodated. This course could also be taken from FEG seniors and count as an elective.

2. Relation to curriculum or to other ESF or Syracuse University courses:

Syracuse University offers a similar course to Syracuse University graduate students in Electrical Engineering Dept. “ELE 755 Digital Image Processing”. This course has a different focus delivered in a different manner.

   a. Shared resource requirements: none.

STUDENT LEARNING OUTCOMES:

After completing this course the student should be able to:

· Describe the fundamental concepts and process flow of digital image analysis
· Formulate their own hypotheses on a variety of image processing problems and establish a flow plan to test multiple hypotheses for each problem.
· Synthesize various statistical methods for image processing to analyze their hypotheses, critique results from various methods and refine hypotheses as appropriate.

MAJOR CONCEPTS OR METHODOLOGIES:

To achieve the stated objectives, students will engage in individual and team-oriented activities such as lecture, discussion, observation, computation, reading and writing. Lectures will expose them to theory and application examples, while laboratory and homework exercises will facilitate hands-on implementations and investigations of the theoretical aspects. Students will explore different imagery datasets and will be asked to develop their own image analysis algorithms.

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

ERE 622. Digital Image Analysis (3)

Three hours of lecture and discussion per week. Elements of digital image processing and analysis systems: Digital image representation, visual perception, sampling and quantization, pixel connectivity, Fourier transforms, image enhancement, filtering, image segmentation, edge detection, thresholding, representation schemes, descriptors,
morphology, recognition and interpretation. Spring. Prerequisite(s): APM391, FEG335 or permission of instructor.

**COURSE HISTORY:**

Course has been offered as ERE 596 for Spring 2006 and Spring 2009.

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