

**Master Syllabus**  
***Department of Geography***

**GEOG 343/543: Advanced Remote Sensing**

**Course Description**

Lectures will offer instruction on computer processing of remotely sensed images as applied on natural resources and urban landscape, while lab exercises will cover practices and techniques of digital image analysis. Topics include remote sensing data collection, radiometric correction, geometric correction, enhancement, classification, and change detection using multi-temporal satellite images. (3 credit hours).

Prerequisite: GEOG 342 or instructor permission

**Course Objectives**

The goal of this combined undergraduate/graduate level course is intended to introduce the principles and hands-on techniques of digital image processing. The specific objectives of the course are to introduce (1) basic remote sensing data collection and preprocessing methods, (2) the correction of radiometric and geometric errors existing in the remote sensing data, (3) enhancement of remote sensing data for visualization, (4) various methods of classifying satellite imagery to thematic maps, (5) methods for digital change detection, and (6) quantitative accuracy assessment of classified thematic maps.

**Course Rationale**

Digital image processing technology is central in remote sensing data interpretation and application, and is a very important component in geospatial technology and related disciplines. This course is an essential component for option III student in that it introduces the basic techniques and skills in digital image processing using computer resources. This is of particular significance since new satellites and computer resources are revolutionizing this technical field, and students must acquire proper skills to analyze digital remotely sensed images and extract useful information for monitoring the environment.

**Course Content and Format**

Student will be presented mainly computer-based materials that will focus on several of the following topics: principles of digital image processing, image rectification, spectral decomposition and convolution, image filtering, production of vegetation indices, and generation of GIS layers from remotely sensed imagery. The following shows an example of a potential outline of topics for this course, with time allotment for each topic at the discretion of the instructor.

Topic I	Remote Sensing Data Collection
Topic II	Digital Image Processing Hardware and Software
Topic III	Image Quality Assessment
Topic IV	Scientific Visualization/review
Topic V	Radiometric Correction
Topic VI	Geometric Correction
Topic VII	Image Enhancement
Topic VIII	Image classification
Topic IX	Hyperspectral Image Analysis
Topic X	Thematic Map Accuracy Assessment
Topic XI	Digital Change Detection

### **Textbook Suggestions**

John R. Jensen. 2005. *Introductory Digital Image Processing, A remote sensing perspective*. 3<sup>rd</sup> Edition (Prentice Hall Series in Geographic Information Science). ISBN 0-13-145361-0.

### **Methods for Evaluating Student Performance:**

Forms of evaluation might include examinations, quizzes, homework, lab exercises, presentations, and term project. Graduate students enrolled in the course as GEOG543 would be expected to accomplish an additional work load (e.g., term paper, additional problems on homework and exams, etc.).

### **Evaluation of the Course**

Students use university (and departmental) online course evaluation forms to evaluate this course.