

## **GEO 826 Geographic Object-Based Image Analysis**

[raechelportelli.github.io/geobia/geo826.html](https://raechelportelli.github.io/geobia/geo826.html)

Instructor Raechel Porteli, PhD

Lecture Mon Wed : 8:30 AM-9:50 AM Snyder Phillips C301

### **Course Description**

Geographic Object-Oriented Image Analysis, commonly called GEOBIA, is an emerging method of remote sensing image analysis that has developed with strong influences from computer vision, medical imaging, and traditional pixel-based approaches to remote sensing image analysis.

This seminar will serve as an introduction to GEOBIA. We will have three main objectives in this course. First, to provide a theoretical basis for understanding the need for an alternative remote sensing paradigm and the development of such a paradigm. Second, to provide a practical starting point for conducting GEOBIA using Python. Finally, this course will spend a great deal of time investigating current GEOBIA research trends through student lead discussion and external reading assignments. It is expected that students enrolled in this course have some experience programming, preferably in Python.

### **Textbook**

There is no assigned text for this class. We will use online-available materials only. You can expect to read between 3-5 peer reviewed articles per week.

### **Grade**

Student-Led Discussion/Class	30%
Code-based Homework Assignments	20%
Final Review Paper	50%

### **Final Grade**

91 to 100%	4.0
86 to 90%	3.5
81 to 85%	3.0
75 to 80%	2.5
70 to 74%	2.0
61 to 69%	1.5
50 to 60%	1.0

Less than 50% 0.0

## **Course Policy**

**Attendance** Understanding beyond pure memorization requires engagement with course material. Student success is directly correlated with active participation in class. Therefore, attendance is mandatory for both lecture and lab portions of this course. Assignment due dates are provided at the start of each assignment, and are stringent. Lateness will not be tolerated and will cost you 10% per day. If you will be missing a lab or lecture for any reason, please let one of us know as soon as you are able. The instructor reserves the right to make changes to this syllabus.

**Academic Integrity** The student shares with the faculty the responsibility for maintaining the integrity of scholarship, grades, and professional standards." In addition, the Geography Department adheres to the policies on academic honesty as specified in General Student Regulations 1.0, Protection of Scholarship and Grades; the all-University Policy on Integrity of Scholarship and Grades; and Ordinance 17.00, Examinations. (See Spartan Life: Student Handbook and Resource Guide and/or the MSU Web site: [www.msu.edu](http://www.msu.edu).)

Therefore, unless authorized by your instructor, you are expected to complete all course assignments, including homework, lab work, quizzes, tests and exams, without assistance from any source. You are expected to develop original work for this course; therefore, you may not submit course work you completed for another course to satisfy the requirements for this course. Also, you are not authorized to use the [www.allmsu.com](http://www.allmsu.com) Web site to complete any course work in this course. Students who violate MSU academic integrity rules may receive a penalty grade, including a failing grade on the assignment or in the course. Contact your instructor if you are unsure about the appropriateness of your course work. (See also the Academic Integrity webpage.)

**Accommodations for Students with Disabilities** Michigan State University is committed to providing equal opportunity for participation in all programs, services and activities. Requests for accommodations by persons with disabilities may be made by contacting the Resource Center for Persons with Disabilities at 517-884-RCPD or on the web at [rcpd.msu.edu](http://rcpd.msu.edu). Once your eligibility for an accommodation has been determined, you will be issued a Verified Individual Services Accommodation ("VISA") form. Please present this form to me at the start of the term and/or two weeks prior to the accommodation date (test, project, etc.). Requests received after this date may not be honored.

**Use of Social Media** As members of a learning community, students are expected to respect the intellectual property of course instructors. All course materials presented to students are the copyrighted property of the course instructor and are subject to the following conditions of use:

1. Students may record lectures or any other classroom activities (including photographs) and use the recordings only for their own course-related purposes.
2. Students may share the recordings with other students enrolled in the class. Sharing is limited to using the recordings only for their own course-related purposes.
3. Students may not post the recordings or photographs or other course materials online or distribute them to anyone not enrolled in the class without the advance written permission of the course instructor and, if applicable, any students whose voice or image is included in the recordings.

**Any student violating the conditions described above may face academic disciplinary sanctions.**

### **Student-Led Discussion/Class**

Each student will choose a combination of thematic domain and course topic to research throughout the semester outside of class. They will prepare materials for one class period to teach their fellow students about what they have learned about that topic. Students must:

- 1) Choose one or two peer reviewed article to assign to the class the week prior to their presentation
- 2) Present the papers to the class and lead a discussion around the papers and their theme of interest 40 minutes
- 3) Provide a short demonstration of the topic, not to exceed 20 minutes long

### **Final Review Paper**

Each student will prepare a final review paper about the topic/domain that they selected to use for their class days. You will additionally prepare a 5 page review paper on the topic

### **Code-based Homework Assignments**

Where appropriate Python tutorials will be used in class to demonstrate some of the techniques that we discussed in lecture. You will have access to this code via Github and you will be asked to complete the code. This can be done on your own time outside of class or along with the instructor in-class if you bring your personal laptop to class.

### Tentative Course Schedule

W K	TOPIC	Tutorial Topic (Wednesdays)
1	Course Introduction	
2	No Class Monday MLK Day Introduction to Remote Sensing	
3	Air Photo Interpretation & Visual Perception	Air Photo Interpretation
4	Visual Perception	
5	Segmentation	Data Acquisition
6	Semantics, Ontologies, and Knowledge Organization	Image Segmentation
7	Classification Introduction	
8	Supervised Classification Techniques	Maximum Likelihood Classification
9	Spring Break	
10	Morphological and textural measurements	Morphological Metrics
11	Accuracy Assessment	Accuracy Assessment
12	Visualization of Remote Sensing Data Outputs	
13	Student Discussion Lead Days (2 students)	Visualization
14	Student Discussion Lead Days (2 students)	
15	Student Discussion Lead Days (2 students)	
16	Course Wrap Up	