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Office Hours: T.B.A.
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1. **Objective:** This course is designed to give you a foundation in the theory and techniques of remote sensing and geospatial data visualization spanning the electromagnetic (EM) spectrum from the visible to the radar wavelengths. Topics include light/matter interaction, optics and sensor design, image analysis using the commercial ENVI software suite, as well as current applications of remote sensing to science and engineering problems. The course and integrated laboratory are designed to provide you with a skillset in remote sensing applications, the geologic and human processes revealed in remotely-gathered data, as well as how those processes are assessed with these datasets.
2. **Textbook:** "Remote Sensing Principles, Interpretations, and Applications Perspective", 4th edition, by: Floyd Sabins and James Eillis (*Waveland Press, Inc.; 2020, ISBN: 978-1-4786-3710-3*).

Supplementary Textbook: "Remote Sensing of the Environment: An Earth Resource Perspective", 2nd edition, by: J.R. Jensen (*Prentice Hall Publishing; 2007, ISBN: 0-13-188950-8*).

It is recommended that you have your own copy of the textbook for exam preparation and laboratory projects. However, it (along with the supplementary textbook) will be on 2-hour loan at the Bevier Engineering Library. There are also e-book rental options available for the Sabins and Eillis text at the Pitt Bookstore as well as the rental platform [VitalSource](#), which provides several rental options for a lower cost. The second textbook was the one used for this class for many years, but it getting old (like the instructor!). There should be plenty of inexpensive/used options out there for it.

3. **GEOL-1460 Meetings:** the lecture is scheduled on Wednesday from 6:00pm - 8:50pm in **Thaw Hall, room 11** & the computer lab in **SRCC 207**. Attendance is strongly recommended for all scheduled lectures and mandatory for all scheduled labs. Much of the exam material and laboratory insights will be derived from the class notes and therefore attendance will help your grade. I will post a summary of the week's lecture notes on the [schedule page](#) usually in the early afternoon on the day of that lecture. The three computer labs (plus a pre-lab) meet during the regular class meeting times, so there will be no lecture during those weeks (*see laboratory information below*). There may also be times during the semester where I will not be here due to research-related obligations. I try to schedule these during the weeks of the labs and/or the exam, but if that is not possible, I will arrange an substitute lecturer familiar with the course material.
4. **GEOL-2461:** Students taking this course are expected to attend the first lecture of the GEOL-1460 course and then inform me which of the two class options they are going to pursue (*see below*). We will not meet formally as a group in a seminar; however, I would like to meet with each student during their project formulation.
5. **Illness-related Information:** all lecture and labs will meet in-person as specified by University rules. There will be no recordings of the lecture, nor virtual attendance (unless dictated by the University during the semester). If you do test positive for COVID (or the flu) and need to isolate, please contact me as soon as possible. You can review the online notes and text, but then contact me if you have questions.

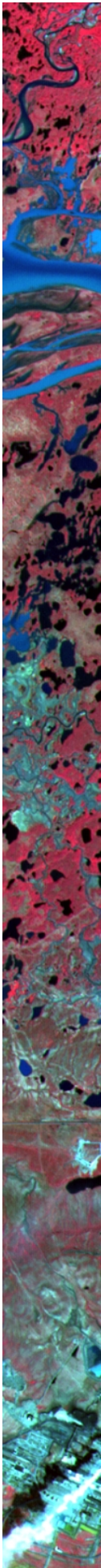
6. **Course Requirements:**

A. *Exam:*

There will be one mid-term exam to be taken in person. The exam will include essay questions, quantitative problem solving, short answers, and multiple choice. Exam questions will be based on the concepts covered in the lectures and textbook, but will require you to think beyond simple memorizing. *I do not give make-up exams or work, so please make sure you are there for the mid-term!*

B. *Final Project:*

In lieu of a final exam, all students taking the GEOL-1460 course will be expected to submit a final project. You will be given the choice of several different datasets similar to the ones that you will see in the labs. You will choose one of these, propose a science question/goal, and conduct some level of image processing on that dataset using the skills that you've learned in the labs to answer that question/goal. You will hand-in the project at the end of the semester (*after Thanksgiving*), which will consist of a 5-slide PowerPoint file and 1-page summary report. More information will be given on the project in the coming weeks.



C. Image-processing Laboratories:

There will be three graded labs in addition to one non-graded "prelab" that use the ENVI image processing software. That software is present on the 10 machines in the Remote Sensing computer lab (SRCC 207). As already mentioned, all labs meet *during* the normal class meeting time. However, the lab exercises will likely take longer than the scheduled meeting time. Each of you will be assigned to one of two lab "groups" that will be given a 90 minute time slot in the lab with the lab instructor. The start time of your slot rotates from lab to lab. Please make sure that you know your lab group and the time to show up for that week's lab. You can find your group assignments and lab meeting times here: [lab groups](#).

Extended laboratory hours *may* be offered by the instructor. She will send out information on this, her office hours, and how she will present the labs during those weeks. *She will also decide on a grading policy for late lab reports. However, you will lose significant points if your lab report is more than one week late!* Finally, she will create a guide to writing your lab reports. That will be posted as a link at the bottom of this page before lab #1.

D. Graduate-level Course:

The GEOL-2461 course is established for graduate students or, in special circumstances, undergraduate students who have prior experience and/or require graduate-level course credit. There are two options for GEOL-2461:

- **course + small project:** students who have never taken a remote sensing course in the past should choose this option. You will be expected to attend the course lectures/labs and take the exam. Students will also work on a **small** (*but larger than the undergraduate requirement*) independent remote sensing research project and present the results to the class at the end of the semester together with 4-page written report. The choice of your project topic, the remote sensing data, and the analysis are up to you, but made in consultation with me.
- **large research project:** students who have had a remote sensing course in the past (*particularly this class taken as an undergraduate*) should take this option. You are, of course, welcome to sit-in on any of the course lectures and labs as a review/refreshers if needed, but it is not required. Your grade, therefore, will be based solely on your **large**, in-depth, independent research project using remote sensing data. The results will be presented at the end of the semester to the class together with a 8-page written report. As with the other option, the choice of your project topic, the remote sensing data, and the analysis are up to you, but made in consultation with me.

7. **Grading:** Grading for the 1460-level course will be based on the exam, final project, the labs and class participation, with the exact breakdown being:

Mid-term exam	30%
Final project	30%
Laboratory #1	5%
Laboratory #2	10%
Laboratory #3	15%
Class participation	10%

8. **Other Policy Statements and Resources:** Can be found [here](#).

9. **Course Web Site:** The primary information portal for this course and labs is the page you are now viewing: <http://ivis.eps.pitt.edu/courses/geol1460/>. It contains the syllabus, schedule, online notes, announcements, and assignments for the class. I tend to continually revise the class schedule as the semester progresses, so please check there for the most current class information.

10. Web Links:

- [Course Schedule & NOTES](#) (*Last updated:*)
- [NRC Online Remote Sensing Tutorial](#) (*for additional review/learning opportunities*)

Academic Integrity:

Cheating/plagiarism will not be tolerated and a minimum sanction of a zero score for the quiz, exam, or project will be imposed. No excuses. Students in this course will be expected to comply with the University of Pittsburgh's [Academic Integrity Guidelines](#). Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in the University Guidelines on Academic Integrity. This may include, but is not limited to, the confiscation of the examination of any individual suspected of violating University Policy. Furthermore, no student may bring any unauthorized materials to an exam, including dictionaries and programmable calculators.

Disability Resources:

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and [Disability Resources and Services \(DRS\)](#), 140 William Pitt Union, (412) 648-7890, drsrecep@pitt.edu, (412) 228-5347 for P3 ASL users, as early as possible in the term. DRS will verify your disability and determine reasonable accommodations for this course.

Email Policy:

Your University e-mail address (username@pitt.edu) is used by the University (and me) for official communication. Students are expected to read e-mail sent to this account on a regular basis. Failure to read and react to email in a timely manner does not absolve the student from knowing and complying with the content of the communications. The University provides an e-mail forwarding service that allows students to read their e-mail via other service providers. Students that choose to forward their e-mail from their pitt.edu address to this address do so at their own risk. If e-mail is lost as a result of forwarding, it does not absolve the student from responding to official communications sent to their University e-mail address. Please see the [E-mail Communication Policy](#) for details.

Statement on Classroom Recording:

To ensure the free and open discussion of ideas, students may not record classroom lectures, discussion and/or activities without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the student's own private use.

Inclusion Statement:

Students, faculty, and guests represent diverse perspectives, backgrounds, and experiences which enrich our research and educational environment. Individuals of all races, colors, ancestries, genders, marital status, familial status, ages, backgrounds, beliefs, ethnicities, gender identities and expressions, national origins, religious or political affiliations, sexual orientations, abilities, and other visible and nonvisible differences are welcomed in this class. We urge all to be mindful in this classroom and to feel responsible for creating a space that is intellectually rigorous and is a respectful, welcoming, and inclusive environment for everyone. No demeaning or discriminatory behavior will be permitted. If you feel uncomfortable, please feel free to approach me during or after class to discuss the situation.

In this class, we will have the chance to indicate the name that we prefer to be called and, if we choose, to identify pronouns with which we would like to be addressed. Please approach me if you have such preferences and I will do my best to address and refer to all students accordingly and support classmates in doing so as well. I will endeavor to use gender-inclusive and nondiscriminatory language in all course communication and materials. Your suggestions for how to improve the effectiveness of the course for you personally or other student groups are encouraged and appreciated. Our faculty is committed to communication from students without judgement. In addition, if any of our class meetings conflict with your religious events, please let me know so arrangements can be made.

<u>WEEK</u>	<u>DATE</u>	<u>TOPIC</u>	<u>CHAPTER(S)</u>
1	8/27	Remote sensing introduction; color theory; and the basics of image processing	1, 9, ##
2	9/3	Atmospheric interactions; aerial photography; imaging systems; and introduction to spectroscopy	1, 2, ##
3	9/10	Multispectral/hyperspectral remote sensing systems; image processing: data transforms & classifications	1, 9, ##
4	9/17	Pre-Laboratory: The ENVI software suite	--
5	9/24	Visible/near infrared (VNIR) theory & spectroscopy + <i>guest lecturer!</i>	3, 4, 13, ##
6	10/1	Thermal infrared (TIR) theory & spectroscopy	5, ##
7	10/8	Laboratory #1: Introduction to image processing	--
8	10/15	Advanced image processing: PC/DCS analysis, filters; DEM's & LIDAR; Data visualizations: Google Earth & Google Earth Engine	7, 9, 10, ##
9	10/22	Midterm Exam	weeks 1 - 8
10	10/29	Laboratory #2: VNIR & TIR image analysis Lab #1 write-up due	--
11	11/5	Introduction to Synthetic Aperture RADAR (SAR)	6
12	11/12	Laboratory #3: TIR + SAR image analysis Lab #2 write-up due	--
13	11/19	SAR resolution/corrections; InSAR	6, 9, ##
14	11/26	<u>No class: Thanksgiving Holiday</u>	--
15	12/3	The "Big Picture": Global scale issues; big data, machine learning, ... Lab #3 write-up due GEOL-2461 student presentations	11 -- 17, ##
16	12/10	GEOL-1460 and GEOL-2461 digital project reports due!	

supplementary material (in-class notes or other textbook)

This page last updated: