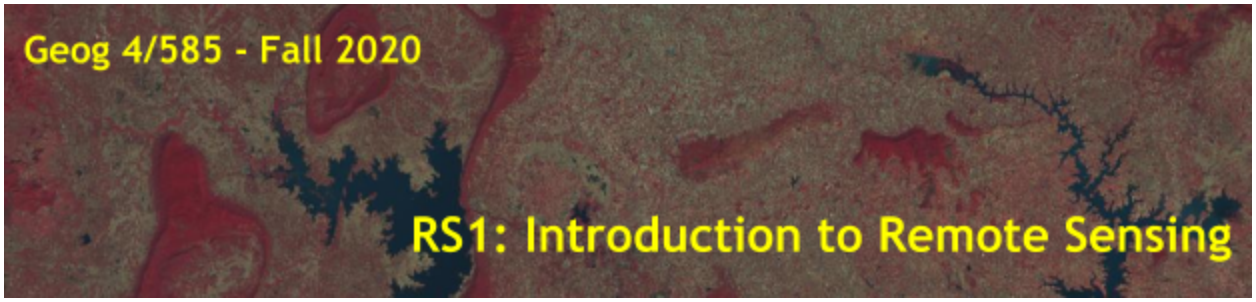

Lecture - 8:00-8:50 Tuesday and Thursday - "The Morning Show"
Lab - 10:15-11:45 or 12:15-1:45 Thursdays - live online support and discussion

Instructor: Dr. Nicholas Kohler (nicholas@uoregon.edu)
Office Hours: Wednesdays 1:30 to 2:45pm, Thursdays 2:15 to 3:30pm

- Sign up for individual 15 minute time slots via 'Slottr'
- If meeting times are full, or these weekly time periods do not work for you, please email Nick for a different appointment time.

GE/Lab Instructor: Adriana Castillo (adrianau@uoregon.edu)
Office Hours: TBA

Course Description

Geog 4/585 is an introduction to remote sensing - the acquisition of data about the world from afar. Often this is in the form of digital imagery acquired by aircraft or satellites, but a variety of other types of remote sensing exist and are discussed in the class.

The course provides an overview of the physical science principles involved in remote sensing, the instruments and platforms used to collect data, and the analysis/visualization of the acquired information. Topics include data acquisition and pre-processing, image enhancement, data classification and visualization. The emphasis of the class is on pixel-based raster spectral data (such as satellite or drone imagery), and other types of remote sensing information - such as lidar, radar, and structure-from-motion (SfM) are also addressed in lectures and lab exercises.

Course Operations

Scheduled lectures/discussions and labs are generally held as live (synchronous) online Zoom meetings during the regularly scheduled course meeting times, with occasional pre-recorded lectures or tests that replace lecture time. Attendance and participation during these times is expected - please let Nick or Adriana know if you are unable to attend. Lecture/discussion sessions will be recorded for later viewing.

Lectures

The format for the lecture time is loosely based on talk radio - you are expected to have some knowledge of lecture topics based on reading, viewing, or listening to the assigned course materials or doing the course assignments, and be willing to participate with questions or comments about. Participation can include written comments in the zoom chat, audio/video questions, or comments and questions for the weekly discussion board. Links to fun stuff related to course content are always welcome!

Lectures cover the broad range of knowledge needed to understand and interpret remote sensing data including:

- the visual interpretation of remote sensing images;
- the electromagnetic spectrum and interactions between electromagnetic energy and matter (including atmospheric and surface effects);
- the varieties of remote sensing data and the basic concepts behind the devices used to record (and sometimes project) electromagnetic signals, and their respective advantages and disadvantages;
- the components of a digital image processing, including:
    - sources of image distortion, and techniques used for image restoration;
    - techniques for enhancing images to better visualize spectral signals and patterns;
    - the use of digital data for classification, mapping, and monitoring environmental processes and environmental change.
- sources of existing remote sensing imagery.

Labs

Lab sessions focus on translating remote sensing data into effective visualizations of the environment (image enhancement), on correcting distortions in imagery (image restoration), and on mapping land cover and characteristics (image classification). To do this, developing skills using the image processing software and analysis tools is an important part of each lab.

Both open-source (primarily QGIS and SNAP Desktop) and commercial (ArcGIS Desktop and ArcGIS Pro) spatial analysis software are employed for lab sessions - reflecting the variety of tools available to process, analyse, and visualize remote sensing information.

Labs provide practical experience that is typical of what you will encounter on most any remote sensing project. Early labs focus on the basic structure of the software and characteristics of remote sensing data. Later labs introduce image enhancement and visualization techniques, techniques for adding geographical coordinates to images, data transformation approaches to extract specific types of information, and classification approaches for mapping land cover.

You are encouraged to collaborate on labs and help one another out, but do not copy other's written answers. Lab questions and writeups are due electronically on Canvas, with your lab data stored in your online class userspace. If you are working with data stored elsewhere, let your lab instructor know.

Active Learning

'Active learning' is encouraged in the course in both lecture and lab sessions. This is intended to encourage the ability to interpret new information (particularly from digital imagery) and to develop spatial reasoning reasoning skills. Using group and individual exercises students are encouraged to find and evaluate relevant content and to solve problems in the application of remote sensing concepts.

This requires the students to engage with each other and the course instructors while exploring the course topics through problem solving, group work, and interaction. Ideally, this will help you to *learn how to learn* in the field of the mapping sciences. It also requires polite interaction between all involved in the course.

Course Materials

- *Primary Text*: Principles of Remote Sensing
- Other online materials linked to in lecture and lab materials.

Course Policies

- **Communicating with the Instructor and Graduate Teaching Assistant**

  Most lecture and lab sessions are 'live' zoom meetings, and are the primary means of interacting with the instructors and your fellow students. Weekly assignments will be discussed during lecture sessions, and a generally due within a week after they are assigned. Recorded lecture sessions will be posted to canvas. Email is the easiest way to contact instructors, and during the week you should have a response within one day - generally much sooner. Meeting times with Nick can be scheduled in 15 minute time slots weekly via 'Slottr'

  Please contact the instructors with questions about the materials and labs, suggestions for the class, and about any other issues related to the class. If you have questions about lab work, it is often good to include a screenshot of the problem and to give the file location of your work on the R: drive.

- **Technical Requirements**

An internet connection and a basic computer with web capabilities are the main technical requirements for the class. Course materials and collaboration with instructors and other students will occur via Canvas and using the associated Zoom virtual meeting accounts. Lab work will require some sophisticated software, but this is available to students via the UO Virtual "High Performance Lab"

- **Participation**

  Participation is expected during scheduled lecture and lab times, and for group projects and exercises outside of scheduled hours. Please let the instructors know if you have difficulties in attending during these times, or need to make up for missed participation - accommodations can usually be made.

- **Student and Instructor Mental Health**

  Usually, it is easier and more fun to learn when things are calm and going well. Sometimes things are not calm or well, and obstacles to participation in the class arise. This is fine, and problems with the class can be taken care of if they are discussed. Please feel free to ask for additional time on assignments, to contact the instructors about seeking additional help on assignments, or just to reach out for some random chit-chat. The UO offers a variety of services to assist with mental health support (linked here).

- **Academic Integrity**

  Academic integrity is important both for your own learning and for the value of the degree you will get from the University of Oregon. You are expected to:
    - Submit your own work for assignments, labs, and tests, expect for group assignments
    - Not share your solutions to work in the class (except for portfolio and CV purposes)
    - Not engage in other activities that dishonestly change my grade or other students grades.

  Academic misconduct will be reported to the Office of Student Conduct and Community Standards, and result in a loss of points for the assignment. Please be clear when you are working with another student to avoid any problems.

Workload and Grading

Undergraduate

50% - Tests and lecture/discussion assignments

- Weekly lecture and discussion assignments
    - group exercises during and outside of lecture time
    - individual exercises given out and discussed in lecture.
- two longer in-class quizzes and a take-home final

50% - Lab exercises

Students have access to the virtual UO “High Performance Lab” at view.uoregon.edu. Live support and lab introductions will be held via the Canvas zoom system during scheduled lab time. You are expected to attend all lab sessions - please make arrangements with your lab instructor if you cannot make a session.

- Short quizzes on Canvas will accompany most labs, due shortly after your scheduled session
- Lab results must be turned by the time they are due for full credit.

Graduate

45% - Tests and lecture/discussion assignments

- Weekly lecture and discussion assignments
    - group exercises during lecture time
    - individual take home exercises given out in lecture.
- two in-class quizzes and a take-home final
- Class zoom or recorded presentation

45% - Lab exercises (students have access to the virtual UO “High Performance Lab” at view.uoregon.edu. Live support and lab introductions will be held via the Canvas zoom system during scheduled lab time. You are expected to attend all lab sessions - please make arrangements with your lab instructor if you cannot make a session.

- Short quizzes on Canvas will accompany most labs, due shortly after your scheduled session
- Lab results must be turned by the time they are due for full credit.

10% - Final project with a short writeup or a research paper / annotated bibliography on a remote sensing topic, including a brief presentation on their project or research to the class sometime during the latter half of the term. The project is of the students' own design, or the paper reviews research articles on a specific remote sensing application topic (ideally related to their graduate work), have at least 5 academic references, and follow standard formatting guidelines.

Work load distribution over the term…

Online Lectures/Presentations/Discussions:	20 hours (20 x 1 hour meetings)
Lecture and discussion assignments:	25 hours (average)
Readings, audio, and video:	25 hours (@ 2.5 hours per week, average)
Lab work - live online support:	20 hours (@ 2 hours per week)
Lab work - unsupervised:	30 hours (@ 3 hours per week)
Total	120 hours

* Graduate Students additional 40 hours on individual projects and presentations

Late work policy

- Lecture and lab assignments: 10% off maximum grade per full day late, 50% off maximum grade after 5 days.