GEOG 172: EARTH FROM SPACE

Department of Geographical Sciences
Summer, 2024

COURSE INFORMATION:

INSTRUCTOR

Rachel Marks
E-mail: rmoore8@umd.edu
Office hours: Online, by appointment

COURSE SCHEDULE

Lecture:(Online, via Zoom)

COURSE SUMMARY

The overall goal of the course is to introduce students to the world of remote sensing, how remote sensing is used to address real world issues, and to interest them in potentially pursing a degree and/or career in remote sensing.

This introductory survey course will focus on the big question -> "Why are Earth observations from space critical for monitoring our changing planet?" Through this course, students will gain an understanding of the capabilities offered by current Earth-observing satellite missions including how satellites view the Earth, what they can observe, and what significant problems can they solve.

During the first week of the course, students will learn the material from lectures presented by the primary course instructor. Students will learn about how satellites view the Earth, what they can observe, why they are designed to collect information that way, and methods that are used to extract meaningful information from satellite images. During the second and third weeks of the course, students will take a deeper dive into a series of earth observation specialty areas. Each day will focus on one specialty area, such as landuse change, forests, or agriculture, and will feature guest lectures given by experts working across the spectrum of federal, state, non-profit, and university organizations. Past guest lectures include experts from NASA, NOAA, UMD, UMBC, Chesapeake Conservancy, and more.

LEARINING OUTCOMES

At the completion of this course, students will be able to:

1. Identify the major questions and issues related to satellite Earth Observations. Specifically, how satellites view the Earth, what they can observe, and why they are designed to collect information that way. Further, students will demonstrate an understanding of basic terms, concepts and approaches in Earth Observations, such as:

    - what ranges of electro-magnetic spectrum are particularly useful for observing different objects and processes on the Earth's surface.
    - what are spatial, spectral, temporal, and radiometric resolutions of imagery means for Earth observations
    - what methods are commonly applied to satellite imagery to extract information
    - how Earth observations contribute to solving environmental and societal problems

2. Demonstrate a broad understanding of scientific principles and the ways scientists in a particular discipline conduct research.

3. Demonstrate an understanding of the political, social, economic and ethical dimensions of global environmental change that is made possible through satellite observations.

4. Articulate how this course has invited them to think in new ways about their place in the global community and global change issues.

COURSE REQUIREMENTS

PREREQUISITES

None

COURSE MATERIALS

There is no required textbook for this course.

All necessary course materials can be accessed through Canvas: www.elms.umd.edu

COURSE STRUCTURE:

- Lectures will begin at 12:00 pm, lasting roughly 2.5 hours. Lectures will be held online via ZOOM. Links to the ZOOM classroom will be posted on ELMS prior to each class.

- Attendance will be taken during the first 5 – 10 minutes of each class. **Attendance is MANDATORY.**

- The course will be broken into **2 main parts:**

    - **Part 1** will consist of **6 lectures** that cover the basic theory and practice of remote sensing of the environment.
        - There will be **1 "worksheet"** per lecture (6 total) that should be completed during or after the lecture period.

        - There will be **1 exam** , which covers the content presented during the 6 lectures in the first part of the course.

    - **Part 2** will allow students to take a deeper dive into a series of earth observation specialty areas via presentations by experts working in the field of remote sensing

        - Students write **2 guest lecture summaries** based on the guest lectures given during weeks 2 and 3. Summaries should include researchers name, organization, area of expertise, and a summary of the specialization area, data, and techniques they use in their research. Summary should include the real world questions the research addresses and/or the ways in which the research outputs are applied to solving real world problems.

- Throughout the semester, students will work in pre-assigned groups to complete a **group Story Map project and presentation**.

    - Story Maps use geography as a means of organizing and presenting information. They tell the story of a place, event, issue, trend, or pattern in a geographic context. They combine interactive maps with other rich content—text, photos, illustrations, video, and audio—within intuitive user experiences. **This group assignment will ask you to integrate mapping and science communication to present an issue related to the use of remote sensing to study environmental issues.** This assignment is adapted from a course project first developed by Dr. Karen Lips in the Department of Biological Sciences, and is also a format used in Dr. Rachel Lamb's GEOG 330 course.

- Project groups will select a specific environmental issue that has been studied using remote sensing data and techniques. Students will develop a Story Map presentation that summaries existing research and peer reviewed journal articles, including:

    - background on the environmental issue and study area(s)
    - remote sensing data and techniques that have been used to study the issue
    - how remote sensing has contributed to understanding or managing the issue
    - any planned future or suggested work.

- Project groups will complete several key project components:

    - **Group Contract and Topic:** On the first day of class, students will find and contact their assigned group using Canvas to determine, and determine the best method of collaborating on the group project assignment. Each team will submit a team contract, specifying the topic you have selected (why you picked it, what your angle is, how it meets the project requirements), and identifying what each member of the team will do for the project, including internal deadlines for completing the work. A template for the contract/topic will be available on ELMS.

    - **Story Map Outline:** Each team will complete a draft outline of their Story Map's content, including intended content sections, images/maps, and appropriate citations. This can be completed as a word document.

    - **Story Map Draft:** Students will create a draft of their story map that integrates and expands up on the content included in their story map outline. Students will be provided with detailed project guidelines and instructions for creation of a story map through ELMS.

    - **Final Story Map:** This interactive final project will be made available to others in the course so they can learn from what you've developed.

    - **Story Map Virtual Presentation:** During the final class period, project groups will present their story map to the class.

    - **Group Participation Peer Review:** Each group participant will score themselves and all other group members based on a number of group participation criteria. Template for peer review will be available through ELMS.

    - ****Note:** *The final story map and virtual presentation will serve as the final for this course. Together, these components will allow students to demonstrate that they understand the remote sensing concepts learned throughout the course.*

ASSIGNMENT SUBMISSION

- All assignments will be accessed and submitted through the course website on ELMS.

ATTENDANCE

- **Attendance** is **MANDATORY**, and will be recorded during each class.

- Lecture absences, late work, and make-up exams will be possible only for students having proof of a University approved excused absence.

- In the event of an excused absence, students should try to notify the Instructor **at least 24 hours <u>BEFORE</u>** a given due date to make alternative arrangements. Students also need to provide valid documents for absence, late work and make-ups. **Otherwise, no late work and make-ups will be accepted.**

COMMUNICATION

- **Course Email:** rmoore8@umd.edu
  I have created an email account for the course. Directing all here will ensure timely responses, as I will check this email throughout the day.

- **E-mail Subject Line**: GEOG172_LastName_[lecture or assignment in question]
  Please use this format for the subject line of your emails, to allow for easy sorting/ organization. If your question does not pertain to a particular lecture or assignment, you can use an alternative keyword, such as GEOG172_Marks_Attendance.

- **Communicate, communicate, communicate**!
  DO NOT hesitate to contact the instructor if you have any concerns, critiques and suggestions. I want you to feel comfortable and confident with all concepts and processes. Keep in mind, the earlier you ask a questions, the better and more thoroughly it can be addressed.

CLASS SCHEDULE (subject to change)**:**

Week 1	Date	Lecture Topic	Assignment(s) Due
Mon	7/10	- Earth Observations - History of Remote Sensing - Properties of Remote Sensing Data	Lecture 1 Worksheet
Tues	7/11	- Electromagnetic (EM) Spectrum - EM Radiation: Interactions with Earth's Atmosphere - EM Radiation: Interactions with Earth's Surface	Lecture 2 Worksheet
Wed	7/12	- Satellite Field of View - Image Interpretation - Aerial photography - Remote Sensing of Water, Soil, and Urban Areas	Lecture 3 Worksheet **Group Contract and Topic**
Thurs	7/13	- Remote Sensing of Vegetation - Spectral Indicies - Change Detection	Lecture 4 Worksheet
Fri	7/14	- Thermal and Infrared Remote Sensing - Active Remote Sensing: Radar and Lidar	Lecture 5 Worksheet *Topic Feedback Received*
Week 2			
Mon	7/17	- Image Classification - Machine Learning and Modeling - Data Quality	Lecture 6 Worksheet **Story Map Outline**
Tues	7/18	Landcover Landuse Mapping and Change Detection	
Wed	7/19	Forests and Habitats	EXAM
Thurs	7/20	Wetlands, Coasts, and Oceans	**Guest Lecture Summary 1**
Fri	7/21	Agriculture and Fire	*Outline Feedback Received*
Week 3			
Mon	7/24	Urbaniation and Human Health	**Story Map Draft**
Tues	7/25	Snow and Ice	
Wed	7/26	Surface Water, Flooding, and Hydrology	*Draft Feedback Received*
Thurs	7/27	NASA DEVELOP Program - Future steps for remote sensing education and careers	**Guest Lecture Summary 2**
Fri	7/28	Final - Virtual Group Presentation of Story Maps	**Final Group Story Map** **Group Participation Peer Review**

GRADING

Student learning will be assessed through a combination of individual and group work, each contributing 50% towards the final grade for the course:

Individual Work:

1. Class attendance (15)
2. Class Worksheets (6)
3. Guest Lecture Summaries (2)
4. Exam (1)

Group Project:

1. Group Contract
2. Group Topic
3. Group Outline w/ sources
4. Story Map rough draft
5. Final Story Map
6. Group Presentation
7. Peer Review of Participation

GRADE BREAKDOWN

Assignment	# of Assignments	Pts per Assignments	Total Points
Individual Work (250 pts, 50%)			
Attendance	15	1	15
Class Worksheets	6	15	90
Guest Lecture Summaries	2	25	50
Exam	1	95	95
Group Work (250 pts, 50%)			
Group Contract and Topic	1	25	25
Story Map Outline w/ Sources	1	40	40
Story Map Draft	1	40	40
Final Story Map	1	75	75
Group Presentation	1	50	50
Peer Review of Participation	1	20	20
Total			**500**

GRADING SCALE

A+ 100-97	A 96-93	A- 92-90	B+ 89-87	B 86-83
B- 82-80	C+ 79-77	C 76-73	C- 72-70	D+ 69-67
D 66-63	D- 62-60			

ADMINISTRATIVE

CAMPUS POLICIES

Please visit www.ugst.umd.edu/courserelatedpolicies.html for the Office of Undergraduate Studies' full list of campus-wide policies and follow up with me if you have questions.

ACADEMIC INTEGRITY

The University of Maryland, College Park has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the Code of Academic Integrity or the Student Honor Council, please visit http://shc.umd.edu/SHC/Default.aspx.

HONOR CODE

The University also has a nationally recognized Honor Code, administered by the Student Honor Council. The Student Honor Council proposed and the University Senate approved an Honor Pledge. The University of Maryland Honor Pledge reads:

"I pledge on my honor that I have not given or received any unauthorized assistance on this assignment/examination."

ADS ACCOMODATIONS

If you have a documented disability and wish to discuss academic accommodations, please speak to the instructor on the first day of class. We will make every effort to accommodate students who are registered with the Disability Support Services (DSS) Office and who provide us with a University of Maryland DSS Accommodation form by **Thursday, 7/13/21.**

STUDENT CONDUCT

Students must abide by the university's Code of Student Conduct. Please treat your peers and instructors with respect, turn off cell phones during class, remain quiet until called upon, and so forth. We do not anticipate any problems. However, as instructors and staff of the university, we have the right to ask any student disrupting the class to leave immediately. Such disruptions will be referred to the Office of Student Conduct (http://www.jpo.umd.edu).

INLCEMENT WEATHER POLICY

Online classes will continue as normal even if the university is closed due to inclement weather, however the university's operating status is available on the school website (http://www.umd.edu) or by phoning 301-405-SNOW.