GEOG 172: Earth from Space

Tydings 0111

Instructors:
Dr. Evan Ellicott
email: ellicott@umd.edu (best method of contact)
Tel: 301-405-5189
Office: 4600 River Rd., Riverdale MD
Office hours: by appointment (online via Zoom)

Classes:
Lecture: 9:30pm – 12:30 pm Monday - Friday)

First Class:	July 13, 2026
Last class:	July 31, 2026
Final examination:	July 31, 2026

Course Objective:
In this course, the students will focus on a "big question" - *Why are Earth observations from space critical for monitoring our changing planet?* This is an introductory survey course that reviews the capabilities offered by current Earth-observing satellite missions including how satellites view the Earth, what they can observe, and why they are designed to collect information that way. The students will also learn about methods that are used to extract meaningful information from satellite images ranging from statistical clustering to deep learning algorithms. Finally, the course will introduce various applications for satellite monitoring of deforestation, urbanization, agricultural expansion and intensification, sea and continental ice loss, and fire, among others. The students will learn the material from lectures presented by Dr. Ellicott. They will also work independently to explore satellite images using existing online platforms.

Learning 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*.
    - what ranges of the electromagnetic spectrum are particularly useful for observing different objects and processes on the Earth's surface
    - what the 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 an understanding of basic terms, concepts, and approaches in Earth observations*
    - Lecture materials in the course will cover all basic terms and concepts identified in this section as a broad overview. Additional reading assignments, primarily covering well-researched online materials, educational videos and tutorials (primarily produced by NASA, NOAA and other international Space Agencies) will provide a broader context for the instructional materials and help students to expand on the concepts covered during the lectures.
    - The mastery of this learning objective will be assessed through quizzes and final exams.

3. *Demonstrate an understanding of the political, social, economic, and ethical dimensions of global environmental change that is made possible through satellite observations.*
    - Lecture materials and instructional videos will build the basis for understanding the role satellite Earth observations play in global environmental governance, particularly as it is related to issues of global climate change and the political, social, and economic consequences of this global change for various regions and communities within the society.
    - Students' mastery of these concepts will be assessed through a project.

Prerequisites:
None

Course Materials:
No text book will be required for this course. Content will be provided via in-person lectures. Selected readings from popular science reviews, peer-reviewed journals, educational videos and tutorials may be assigned.
Course materials can be accessed through Canvas: www.elms.umd.edu

Assessment:
Student learning will be assessed through a variety of assessment instruments including:

1. **Image of the Day Discussions**: Individuals will select an image of interest to discuss, including the context, instrument, and category (e.g., atmosphere, land). These daily presentations will start in week 2 and students will know what day they will present by the start of the course. This will be worth **10%** of the course grade.
2. **Project:** Students will interpret satellite imagery using existing online platforms (e.g., Google Earth Pro) in an assessment of a natural disaster or changing landscape. A brief (5 minute) slide presentation describing the interpretation process and results will be during the second week of class. This exercise will account for **15%** of the course grade.
    a. https://www.nesdis.noaa.gov/news/the-storm-of-the-century-look-back-noaa-satellites
    b. https://www.nasa.gov/image-article/blizzard-bears-down-u-s-east-coast/
    c. https://www.youtube.com/watch?v=gDDPF6yCzrc

3. **Quiz:** The course will consist of two quizzes, each worth **20%** of the course grade.
4. **Final exam:** The final exam will be worth **35%** of the course grade and will be comprehensive, covering all lectures.

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			

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.

Calendar – subject to change

July 13	Introduction to the course, syllabus review, introduce yourself
July 14	Remote sensing (RS) – a historical overview
July 15	The Electromagnetic Spectrum (EM) and Earth's atmosphere and surface
July 16	Basics of Remote Sensing
July 17	Week 1 review. **QUIZ 1**.
July 20	Earth Observations - Satellite sensors and orbits
July 21	Earth Observations - Measurements and image interpretation
July 22	Image classification and accuracy assessment
July 23	Thermal imaging and Active remote sensing
July 24	Week 2 review. **QUIZ 2.**
July 27	Remote sensing of soils, urban areas, vegetation, and disturbance
July 28	Crop, snow, and ice monitoring from space
July 29	Demographics and monitoring of built-up land from space
July 30	Project Presentations.
July 31	Course Review. **FINAL EXAM**