

**Syllabus**  
**Introduction to Remote Sensing**  
**Geography 3110 – Fall 2021**

**Instructor:** Dr. S. McKenzie Skiles

**Contact Information:** m.skiles@geog.utah.edu, see Canvas for virtual office hour link

**Office Hours:** Mondays & Wednesdays 2:00 PM – 3:00 PM, or by appointment

**Lecture:** Mondays & Wednesdays, 3:00 PM-4:20 PM, Canvas ‘Interactive Live’ Online

**Lab:** Select Mondays & Wednesdays during the semester

**Prerequisite:** None

**Course Description**

Continued advancements in remote sensing technologies have resulted in an extraordinary increase in the availability of remotely sensed images of Earth. The explosion in the availability of remote sensing data has coincided with a growing number of remote sensing applications. Remote sensing data are now used in anthropology, civil engineering, environmental sciences, geography, geology, hydrology, natural resource assessment, meteorology, environmental monitoring, and urban planning. In this course, we will examine remote sensing science, techniques, and applications. We will learn about the physical basis for remote sensing and explore remote sensing technologies that use sunlight (solar radiation), lasers, thermal radiation, microwave radiation, and radar. Five lab exercises provide experience with real remote sensing data and software.

**Canvas**

Class will be administered through Canvas. If you are not familiar with Canvas, the [Canvas Getting Started Guide for Students](#) can be helpful.

**Learning Outcomes**

- Identify and describe the components of a remote sensing system, including principals of electromagnetic radiation.
- Interpret common visual themes in remotely sensed imagery, and associate these themes with remote sensing concepts.
- Summarize interactions between electromagnetic radiation and matter that govern remote sensing within different wavelength regions.
- Demonstrate effective use of remote sensing software, including the ability to solve common analysis problems.
- Explain uses of remote sensing for multiple application areas.

**Optional Textbook**

All of the content needed to succeed in this course is provided in lecture and labs. Students who benefit from having a textbook to accompany lecture and lab materials may wish to use one of the following texts. Lectures and labs will not directly follow the organization of these texts, and will include material that goes beyond what is provided in these texts. You are responsible for the material presented in lecture and labs, regardless of whether you choose to use a textbook or not.

1. *Remote Sensing of the Environment: An Earth Resource Perspective, 2<sup>nd</sup> edition*, John R. Jensen (2007) Prentice Hall, ISBN 9780131889507.

Jensen is an older text, but the class more closely follows the organization of this text. Chapters corresponding to lectures are listed in the course schedule

2. *Fundamentals of Satellite Remote Sensing: An Environmental Approach, Second Edition*, Emilio Chuvieco (2016) CRC Press, ISBN 9781498728058  
 Chuvieco is a recent text, and contains a much better perspective on the current state of remote sensing.

**Course Fee**

There is a \$25 course fee associated with this class. This fee covers part of the licensing cost for remote sensing software.

**Evaluation**

The following weights will be assigned to labs and exams to determine grades for the course:

**Percentage Points:**

Lab Assignments	25 %
Participation	10%
Midterm 1	15 %
Midterm 2	20 %
Final	30 %
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Total	100 %

**Grade Scale:**

A	93-100%
A-	90-93%
B+	87-90%
B	83-87%
B-	80-83%
C+	77-80%
C	73-77%
C-	70-73%
D+	67-70%
D	63-67%
D-	60-63%
E	<60%

Table of Grades

Grades	Points	Explanation
A	(4.0 points)	Excellent performance, superior achievement
A-	(3.7 points)	
B+	(3.3 points)	Good performance, substantial achievement
B	(3.0 points)	
B-	(2.7 points)	
C+	(2.3 points)	Standard performance and achievement
C	(2.0 points)	
C-	(1.7 points)	
D+	(1.3 points)	Substandard performance, marginal achievement
D	(1.0 points)	
D-	(0.7 points)	
E	(0.0 points)	Unsatisfactory performance and achievement

**Labs**

There will be five labs on dates specified in the course schedule below, software is accessed through Citrix server or you can use computer labs in Gardner Commons, if they remain open and accessible this semester. You can ask questions to your peers and myself about lab content or technical details, but are expected to do your own work on the labs. Labs are to be submitted to Canvas by midnight on their due date. Labs are expected to be well formatted and free of spelling and grammatical errors. Poorly formatted assignments will not be graded; assignments will lose points for poor spelling and/or grammar. Labs turned in late will lose 10% of their value each day they are late.

**Exams**

There are three exams in this course, consisting of two midterms and a final. Exams include multiple choice, fill in the blank, and short answer questions. The final exam is cumulative. All exams are taken on Canvas, on the specified day. Exams cannot be made up unless the instructor is contacted prior to an absence.

**Participation**

This online course is ‘synchronous’, meaning we all meet together online during our scheduled class time each week. Participation points are from activities and in class assignments during the class periods. All classes will be recorded and can be watched later if class is missed. There will be periodic opportunities for extra credit, which can be used replace up to two in-class assignment.

## Course Schedule

Date	Topics	Jensen Chapter
Week 1	Course Introduction	
	Remote Sensing System	1
Week 2	History of Remote Sensing	3
	Remote Sensing and the Electromagnetic Spectrum	2
Week 3	<b>Labor Day Holiday (No Class)</b>	
	Remote Sensing and the Electromagnetic Spectrum	
Week 4	Aerial Imagery	4
	Image Interpretation	5
Week 5	Image Interpretation and Photogrammetry	6
	<b>Lab 1</b>	
Week 6	Photogrammetry	
	<b>MIDTERM 1, Lab 1 Due</b>	
Week 7	Multispectral Remote Sensing	7
	Multispectral RS/Imaging Spectroscopy	
	<i>Fall Break</i>	
Week 8	Imaging Spectroscopy/Thermal Remote Sensing	
	<b>Lab 2</b>	
Week 9	Passive Microwave Remote Sensing	8
	Active Microwave Remote Sensing, <b>Lab 2 Due</b>	
Week 10	<b>Lab 3</b>	9 (Pg. 330-332)
	Active Microwave Remote Sensing, <b>Lab 3 Due</b>	
Week 11	Active Microwave Remote Sensing	9 (Pg. 291-330)
	<b>MIDTERM 2</b>	
Week 12	Lidar	
	<b>Lab 4</b>	
Week 13	Remote Sensing of Vegetation, <b>Lab 4 Due</b>	10
	Remote Sensing of Water/Snow	
Week 14	Remote Sensing of Geology (rock, soil)	11
	<b>Lab 5</b>	
Week 15	Remote Sensing of Urban Landscapes	12
	<b>FINAL, Lab 5 Due</b>	

*Note: The syllabus may be modified by the instructor, students will be given notice of the modification.*

## **Academic Misconduct Statement**

As stated in the [Student Code](#); “ ‘Academic misconduct’ includes, but is not limited to, cheating, misrepresenting one's work, inappropriately collaborating, plagiarism, and fabrication or falsification of information, as defined further below. It also includes facilitating academic misconduct by intentionally helping or attempting to help another to commit an act of academic misconduct.”

- “‘Cheating’ involves the unauthorized possession or use of information, materials, notes, study aids, or other devices in any academic exercise, or the unauthorized communication with another person during such an exercise.”
- “‘Misrepresenting one's work includes, but is not limited to, representing material prepared by another as one's own work, or submitting the same work in more than one course without prior permission of both faculty members.’”
- “‘Plagiarism’ means the intentional unacknowledged use or incorporation of any other person's work in, or as a basis for, one's own work offered for academic consideration or credit or for public presentation. Plagiarism includes, but is not limited to, representing as one's own, without attribution, any other individual's words, phrasing, ideas, sequence of ideas, information or any other mode or content of expression.”
- “‘Fabrication’ or ‘falsification’ includes reporting experiments or measurements or statistical analyses never performed; manipulating or altering data or other manifestations of research to achieve a desired result; falsifying or misrepresenting background information, credentials or other academically relevant information; or selective reporting, including the deliberate suppression of conflicting or unwanted data. It does not include honest error or honest differences in interpretations or judgments of data and/or results.”

This course has a zero tolerance policy for academic misconduct. Students will be required to meet with the instructor and Department of Geography’s academic advisor (or the academic advisor of their respective department) to discuss any potential instance of academic misconduct. The resulting academic sanction will be a score of zero for any coursework in which it is demonstrated that a student engaged in academic misconduct. Additionally, an account of the student’s academic misconduct will be entered into the U of U database for misconduct tracking. See the Student Code for additional information on academic sanctions.

## **Disabilities Statement**

The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in the course, reasonable prior notice needs to be given to the Center for Disability & Access, 162 Olpin Union Building, 801-581-5020 (V/TDD). CDA will work with you and the instructor to make arrangements for accommodations. All written information in this course can be made available in alternative format with prior notification to the Center for Disability & Access.

## **Safety & Wellness**

Your safety is our top priority. In an emergency, dial 911 or seek a nearby emergency phone (throughout campus). Report any crimes or suspicious people to 801-585-COPS; this number will get you to a dispatch officer at the University of Utah Department of Public Safety (DPS; [dps.utah.edu](http://dps.utah.edu)). If at any time, you would like to be escorted by a security officer to or from areas on campus, DPS will help — just give a call. For more information regarding safety and to view available training resources, including helpful videos, visit [safeu.utah.edu](http://safeu.utah.edu).

The University of Utah seeks to provide a safe and healthy experience for students, employees, and others who make use of campus facilities. In support of this goal, the University has established confidential resources and support services to assist students who may have been affected by harassment, abusive

relationships, or sexual misconduct. A detailed listing of University Resources for campus safety can be found at <https://registrar.utah.edu/handbook/campussafety.php>

Your well-being is key to your personal safety. If you are in crisis, call 801-587-3000; help is close. The university has additional excellent resources to promote emotional and physical wellness, including the Counseling Center (<https://counselingcenter.utah.edu>), the Wellness Center (<https://wellness.utah.edu>), and the Women's Resource Center (<https://womenscenter.utah.edu>). Counselors and advocates in these centers can help guide you to other resources to address a range of issues, including substance abuse and addiction.

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## COVID-19

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This is an online course, but many of you are still interacting with the campus community, and University leadership has urged all faculty, students, and staff to model the vaccination, testing, and masking behaviors we want to see in our campus community.

*These include:*

- *Vaccination*
- *Masking indoors*
- *If unvaccinated, getting weekly asymptomatic coronavirus testing*

### Vaccination

Get a COVID-19 vaccination if you have not already done so. Vaccination is proving highly effective in preventing severe COVID-19 symptoms, hospitalization and death from coronavirus. Vaccination is the single best way to stop this COVID resurgence in its tracks.

Many in the campus community already have gotten vaccinated:

- More than 80% of U. employees
- Over 70% of U. students

Visit <http://mychart.med.utah.edu/>, <http://alert.utah.edu/covid/vaccine>, or <http://vaccines.gov/> to schedule your vaccination.

### Masking

While masks are no longer required outside of Health Sciences facilities, UTA buses and campus shuttles, CDC guidelines now call for everyone to wear face masks indoors.

Check the CDC website periodically for masking updates—<https://www.cdc.gov/coronavirus/2019-ncov/vaccines/fully-vaccinated-guidance.html>

Treat masks like seasonal clothing (i.e. during community surges in COVID transmission, masks are strongly encouraged indoors and in close groups outside).

### Testing

If you are not yet vaccinated, get weekly asymptomatic coronavirus tests. This is a helpful way to protect yourself and those around you because asymptomatic individuals can unknowingly spread the coronavirus to others.

*Asymptomatic testing centers are open and convenient:*

- Online scheduling
- Saliva test (no nasal swabs)
- Free to all students returning to campus (required for students in University housing)
- Results often within 24 hours
- *Visit [alert.utah.edu/covid/testing](https://alert.utah.edu/covid/testing)*

Remember: Students must self-report if they test positive for COVID-19 via this website:

<https://coronavirus.utah.edu/>.

### **Student Mental Health Resources**

*Rates of burnout, anxiety, depression, isolation, and loneliness have noticeably increased during the pandemic.* If you need help, reach out for campus mental health resources, including counseling, trainings and other support. Consider participating in a Mental Health First Aid or other wellness-themed training provided by our Center for Student Wellness and sharing these opportunities with your peers, teaching assistants and department colleagues