THE OHIO STATE UNIVERSITY

Department of Geography

# SYLLABUS - GEOG 5225
# Geographic Applications of Remote Sensing
# Autumn 2025

**3 Credit Hours**
**Lecture – Online**
**Recitation Section: Tuesday 12:45 – 2:05 p.m., Location: Derby Hall 0135**

## Course overview

### Instructor and Teaching Assistant (TA)

Primary instructor: Dr. Tammy E. Parece
Email: parece.1@osu.edu
Office Location: Derby Hall 1189
Open Office hours: Monday 1 – 2 p.m.; Tuesday and Friday 10 – 11 a.m. in person. Please check for any notes on my door that indicate I am in the computer lab for office hours on that specific day.

Dr. Parece holds a BS in Interdisciplinary Studies, a Graduate Certificate in GIS, an MS in Geography, and a PhD in Geospatial and Environmental Analysis.

You can generally expect a reply to e-mails within **48 hours on school days.**

TA: Ikramul Hasan. hasan.228@buckeyemail.osu.edu
Office hours: In person on Tuesday 11a – Noon & Wednesday Noon – 1p. Thursday 1 – 2p (on Zoom – see link in Carmen Canvas).

If you are ill or have symptoms, please do not visit us in our offices, please email us and we can set up a zoom link for your participation during our office hours. To request an appointment outside of the above times, please send both the instructor and the TA an email with your availability up to a week ahead.

## Course description

This course introduces the fundamentals of remote sensing and its geographic applications. Lectures will focus on basic concepts and techniques in remote sensing data acquisition and analysis. Examples from a variety of topical areas will be used to illustrate how the information derived from remotely sensed data can be used in geographic studies. Computer laboratory exercises are designed to help students to gain hands-on experiences on the digital processing of remotely sensed data. Students are expected to complete a project that applies remote sensing techniques to solve a real-world problem.

## Course learning outcomes

By the end of this course, students should successfully be able to:

- Describe maximal and minimal definitions of remote sensing and explain physical and logical

process of remote sensing.
- Describe the electromagnetic spectrum and explain how it is organized.
- Identify remote sensing data models, platforms and sensor models, and understand sensor characteristics and describe how they impact the quality of remotely sensed data.
- Describe the necessities for radiometric and geometric corrections and explain different types of radiometric and geometric correction methods and apply them via remote sensing software.
- Identify the purposes for remote sensing imagery enhancement and classification.
- Compare and contrast radiometric, spatial and spectral enhancement methods and utilize them under different circumstances.
- Explain the concepts of supervised and unsupervised classifications. Describe most widely used classification methods and be able to identify and apply feasible/appropriate classification methods given a specific remote sensing data set and application scenario.
- Compare and assess performance of different classification methods applied on the same remote sensing image.

## How This Course Works

**Mode of delivery:**

- General lectures – recorded online and in Carmen Canvas
- Readings are from the required textbook, the lab book. Additional readings are within Carmen Canvas
- Recitation and Lab time – Tuesdays in person (required attendance)
- Office hours in-person with zoom option.

**Credit hours and work expectations:** This is a 3-credit-hour course. According to The Ohio State policy, an average student should expect around 3 hours per week of time spent on direct instruction (instructor content and Carmen activities, for example) in addition to 6 hours of homework (reading and assignment preparation, for example) to receive a grade of (C) average.

Do not expect to complete entire lab assignments during the scheduled lab time. Lab sessions are 80 minutes, and it takes longer than 80 minutes to complete a lab.

## Course materials

- Required Textbook: Campbell, J.B., R.H. Wynne & V.A. Thomas. *Introduction to Remote Sensing 6th Edition*. Guilford. ISBN: 9781462549405
- Required Lab Book: Remote Sensing with ArcGIS Pro, 2nd Edition. T. Parece and J. McGee. Link to the book is provided in Canvas. If you prefer a print copy, this can be purchased through Amazon.
- Additional required reading materials/videos will be provided within Canvas.

## Course technology

For help with your password, university e-mail, Carmen, or any other technology issues, questions, or requests, contact the OSU IT Service Desk. Standard support hours are available at https://ocio.osu.edu/help, and support for urgent issues is available 24x7.

### Baseline technical skills

- Basic computer and web-browsing skills
- Use of word processing and spreadsheet software
- Navigating Carmen: see the Canvas Student Guide.
- CarmenZoom virtual meetings

*IMPORTANT: The next two sections indicate equipment and software that you must be able to access to complete lab assignments for this course. You have access to these items in Derby 0135.*

### Hardware

- Computer sufficient to run ArcGIS Pro (these are available in the Derby Hall 135)
- USB Drive
- Other: a mobile device (smartphone or tablet) to use for BuckeyePass authentication
- We do have 1 lab assignment that is completed with ENVI software, which is only available in DH 0135.

### Software

Please keep in mind that you are NOT required to purchase any software for this class. You will use a word processing program, a spreadsheet program, Adobe reader and ArcGIS Pro. We use ENVI later in the semester but due to licensing restrictions, ENVI is not available for your personal computer.

### Carmen Access

You will need to use BuckeyePass multi-factor authentication to access your courses in Carmen. To ensure that you can connect to Carmen at all times, it is recommended that you take the following steps:

If none of these options meet the needs of your situation, you can contact the IT Service Desk at 614-688-4357 (HELP) and IT support staff will work out a solution with you.

## Grading

| Assignment or category | Percentage |
|---|---|
| **Labs** | **55** |
| **Project** | **16** |
| **Proposal (1%)** | |
| **Project Submission (15%)** | |
| **In-Class Presentation (during recitation time)** | **9** |
| **Exams - 2 (10% each)** | **20** |
| **Total** | **100** |

# Assignment information

## Exams (2 @ 10% each or 20% of total grade)

- *Timed.* (If you are registered with SLDS for extended time accommodations, please confirm that time has been granted before you begin the exam.) Once you open the exam, the timer starts to run.
- *Open-note*. You can use lecture slides, the handouts, your notes, the textbook, etc. But this does not mean you can get assistance from another student, the instructor or the TA.
- *Completed independently*. You must complete the exam by yourself. Collaboration with one or more other people is considered academic misconduct.

## Academic Paper Presentation (9%)

You will have 1 presentation. You will need to identify an academic paper regarding a remote sensing application and present the paper and its results during recitation time. Please see the schedule for specific dates and the general topic for that week. You choose the date and must choose this before 9/5. We start the presentations on 9/9.

## Final Project (16% of total grade)

You will have a final project in lieu of a final exam. Specifics will be available on Canvas. Please note that the final project includes a recorded presentation related to that project. This project presentation is in addition to the academic paper presentation noted above.

## Labs (55% of total grade)

You will have multiple lab assignments. Keep in mind that the process of completing any given lab may not go smoothly, plan for unexpected challenges. Set a goal to submit each lab in advance of the deadline. Some labs are submitted in Canvas, under quizzes, these are not timed quizzes, just a mechanism to easily submit your answers. Some questions are graded automatically, and some require manual grading.

# Late assignments

Late submissions for any assignments are not accepted in this course.

You do have 1 opportunity to extend your deadline for 1 calendar day during the semester, applied to a lab assignment of your choice. No permission is required, use this opportunity wisely, it can only be used once.

Accommodations for religious holidays will be considered. A request must be submitted prior to any assignment due date that conflicts with such holidays. Please provide information on the holiday and its date and the number of days requested in the extension.

Additionally, in case of personal and family emergencies, please notify us as soon as possible so that we can work out a submission timeline. Such extensions may or may not be granted, it is decided on a case-by-case basis. Extensions are not granted after the fact, e.g., you can't ask for an extension on an assignment that was due two weeks before or wait until the end of the

semester to submit assignments you missed. To request an extension for one of these emergency conditions, you must put the request in writing to Dr. Parece (cc to the TA) and the email must contain the following information:

Course Name and Code (GEOG 5225 Geographic Applications of Remote Sensing)
Reason for the extension request:
The specific assignment:
Specific extension requested:
Attach documentation of the reason for the extension

Any emails requesting extensions without this information will be returned with a request to provide this information.

## Grading scale

| | | | | |
|---|---|---|---|---|
| 92.5–100: A | 86.5–89.99: B+ | 76.5–79.99: C+ | 66.5 –69.99: D+ | Below 59.99: E |
| 90.0–92.49: A- | 82.5–86.49: B | 72.5–76.49: C | 60.0 –66.49: D | |
| | 80.0–82.49: B- | 70.0 –72.49: C- | | |

Note – I do not round up. An 89.99 does not round up to 90%. If you want an A/A-, you must achieve 90% or better. (https://advising.osu.edu/grades-and-grade-forgiveness)

**Incompletes:** If an emergency prevents you from finishing a course, you may request an "Incomplete" from the instructor. Please see the University website for more information on incompletes. https://advising.osu.edu/grades-and-grade-forgiveness

### Grades and feedback

You can generally expect grades and feedback on assignments and exams to be returned within **7 business days** once the assignment's deadline has passed, depending on the complexity of the assignment.

### Attendance

Attendance is not taken in this class. However, attendance in recitation is highly recommended and required for the date you choose for your academic paper presentation.

### Discussion board Q&A

There are two discussion boards for course questions. One is for general questions and the other is for questions on Lab Assignments. You can expect a reply to these Q&A posts within **48 hours during normal business hours**. Although you might receive replies outside of those hours, please do not expect this. The determination of urgency is ultimately at the discretion of the instructor/TA. If you wait until the day an assignment is due to post a question, we cannot guarantee an immediate reply.

## Course Academic Integrity Policy

Turnitin is enabled for all written assignments. Watch your Turnitin score. At 40%, I will give you a zero for the assignment. If your assignment rises to the level of Academic Misconduct, I will report the

conduct to the University, and you will get a Zero for the entire semester.

*To maintain a culture of integrity and respect, generative AI tools cannot not be used in the completion of course assignments, quizzes, discussion posts, and exams unless specifically authorized by Dr. Parece.*

*Use of any other course materials/assignments in this class must be previously approved by both Dr. Parece and the instructor for the other course.*

## Discussion and communication guidelines

The following are expectations for how we should communicate as a class. Please remember to be respectful and thoughtful.

- **Writing style**: When writing lab reports, you need to write these as if you were writing a formal essay. Use good grammar, spelling, and punctuation.
- **Tone and civility**: Maintain a supportive learning community where everyone feels safe and people can disagree amicably. Sarcasm is not appropriate in the classroom, in discussion posts, or in emails.
- **Citing your sources**: Please cite your sources. For the textbook or other course materials, list at least the title and page numbers. For online sources, include a link as part of the correct and full citation. Not citing sources can result in a violation of The Ohio State University academic integrity policies.

# COURSE AND UNIVERSITY POLICIES

## Academic Misconduct, Artificial Intelligence and Academic Integrity

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct http://studentlife.osu.edu/csc/.

Turnitin has been enabled for the lab and final paper submissions (https://www.turnitin.com/). Turnitin is a plagiarism and AI verification platform. This check is set to automatically review your paper when you submit it on Canvas. Please note that any assignments with significant scores may result in reporting a code of conduct violation to OSU's Committee on Academic Misconduct (please see the Academic Integrity Policy below). Please note that when you use quotes or repeat the assignment instructions within your written report, it increases the Turnitin and AI score. Avoid these when at all possible.

To maintain a culture of integrity and respect, generative AI tools should not be used in this complete of course assignments including lab reports, quizzes, exams, and final paper unless specifically authorized by Dr. Parece.

For more detailed information on Academic Misconduct, see:

- Code of Student Conduct | Ohio State
- Committee on Academic Misconduct | Office of Academic Affairs

## Disability Statement (with Accommodation for Illness)

The university strives to maintain a healthy and accessible environment to support student learning in and out of the classroom. If students anticipate or experience academic barriers based on a disability (including mental health and medical conditions, whether chronic or temporary), they should let their instructor know immediately so that they can privately discuss options. Students do not need to disclose specific information about a disability to faculty. To establish reasonable accommodations, students may be asked to register with Student Life Disability Services (see below for campus-specific contact information). After registration, students should make arrangements with their instructors as soon as possible to discuss your accommodations so that accommodations may be implemented in a timely fashion.

If students are ill and need to miss class, including if they are staying home and away from others while experiencing symptoms of viral infection or fever, they should let their instructor know immediately. In cases where illness interacts with an underlying medical condition, please consult with Student Life Disability Services to request reasonable accommodations.

For more information: slds@osu.edu
https://slds.osu.edu/
098 Baker Hall, 113 W. 12th Ave
614-292-3307 phone

## Religious Accommodations

This course adheres to The Ohio State University's policy on religious accommodations. Please note the late policy above for specifics on how to request accommodation for a specific assignment in this course. The University's policy can be found here: Religious Holidays, Holy Days and Observances | Office of Academic Affairs

## Intellectual Diversity

Ohio State is committed to fostering a culture of open inquiry and intellectual diversity within the classroom. This course will cover a range of information and may include discussions or debates about controversial issues, beliefs, or policies. Any such discussions and debates are intended to support understanding of the approved curriculum and relevant course objectives rather than promote any specific point of view. Students will be assessed on principles applicable to the field of study and the content covered in the course. Preparing students for citizenship includes helping them develop critical thinking skills that will allow them to reach their own conclusions regarding complex or controversial matters.

## Grievances and Solving Problems

According to University Policies, if you have a problem with this class, you should seek to resolve the grievance concerning a grade or academic practice by speaking first with the instructor or professor. Then, if necessary, take your case to the department chairperson, college dean or associate dean, and to the provost, in that order. Specific procedures are outlined in Faculty Rule 3335-8-23. Grievances against graduate, research, and teaching

assistants should be submitted first to the supervising instructor, then to the chairperson of the assistant's department.

## Counseling and Consultation Services / Mental Health Statement
## Columbus:

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing.

If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting ccs.osu.edu or calling 614-292-5766. CCS is located on the 4th floor of the Younkin Success Center and 10th floor of Lincoln Tower. You can reach an on-call counselor when CCS is closed at 614-292-5766 and 24-hour emergency help is also available through the 24/7 by dialing 988 to reach the Suicide and Crisis Lifeline.

## Creating an Environment Free from Harassment, Discrimination, and Sexual Misconduct

The Ohio State University is committed to building and maintaining a welcoming community. All Buckeyes have the right to be free from harassment, discrimination, and sexual misconduct. Ohio State does not discriminate on the basis of age, ancestry, color, disability, ethnicity, gender, gender identity or expression, genetic information, HIV/AIDS status, military status, national origin, pregnancy (childbirth, false pregnancy, termination of pregnancy, or recovery therefrom), race, religion, sex, sexual orientation, or protected veteran status, or any other bases under the law, in its activities, academic programs, admission, and employment. Members of the university community also have the right to be free from all forms of sexual misconduct: sexual harassment, sexual assault, relationship violence, stalking, and sexual exploitation.
To report harassment, discrimination, sexual misconduct, or retaliation and/or seek confidential and non-confidential resources and supportive measures, contact the Civil Rights Compliance Office (CRCO):

Online reporting form: http://civilrights.osu.edu/
Call 614-247-5838 or TTY 614-688-8605
civilrights@osu.edu

The university is committed to stopping sexual misconduct, preventing its recurrence, eliminating any hostile environment, and remedying its discriminatory effects. All university employees have reporting responsibilities to the Civil Rights Compliance Office to ensure the university can take appropriate action:

- All university employees, except those exempted by legal privilege of confidentiality or expressly identified as a confidential reporter, have an obligation to report incidents of sexual assault immediately.
- The following employees have an obligation to report all other forms of sexual misconduct as soon as practicable but at most within five workdays of becoming aware of such information: 1. Any human resource professional (HRP); 2. Anyone who

supervises faculty, staff, students, or volunteers; 3. Chair/director; and 4. Faculty member.

## Inclement Weather

Should in-person classes be canceled, we will meet virtually via CarmenZoom during our regularly scheduled time. I will share any updates via [CarmenCanvas, email or other mode of communication].

## Course Schedule

Disclaimer: This course syllabus provides a general plan for the course; deviations may be necessary. Any changes that affect the entire class will be announced by the instructor with as much advance notice as possible.

| Week & Dates | Topics and Assignments - **This schedule is subject to change** |
|---|---|
| Week 1: Chapter 1<br>August 26 - 30 | Introduction to Class, Remote Sensing and History of Remote Sensing<br>Lab 1 (Downloading Imagery) due by Friday, 8/29<br>Choose the date of your academic paper presentation by 9/5. |
| Week 2: Chapters 2 & 6<br>August 31 – September 6 | Electromagnetic Spectrum, Atmospheric Interactions, Digital Numbers, Image Statistics, Image Interpretation & Image Processing<br>Lab 2 (Information about the downloaded imagery) due 9/8 |
| Week 3: Chapters 3 & 8<br>September 7 - 13 | Remote Sensing Platforms, Active v. Passive RS<br>Lab 3 Compositing and Subsetting Satellite Imagery due 9/15<br>Tuesday 9/9: 5 Student Presentations (Sonar or Radar Topics) |
| Week 4: Chapter 7<br>September 14 - 20 | Land Observation Satellites<br>**Exam 1 opens Tuesday 9/16 at 3 p.m. due Tuesday 9/23 at Noon** |
| Week 5<br>September 21 - 27 | Band Combinations<br>Chapters 5 (5.6 - 5.9), 6 (6.4-6.5) & Chapter 9<br>Tuesday 9/23: 5 Student Presentations (Lidar Topics)<br>Lab 4 (Band Combinations and Other Images from USGS) due 9/29 |
| Week 6: Chapter 11<br>September 28 – October 4 | Image Enhancement - Radiometric and Spatial<br>Tuesday 9/30: 5 Student Presentations (Drone Topics)<br>Lab 5 (Radiometric and Spatial Enhancement) due 10/6 |
| Week 7; Chapters 16 & 18<br>October 5 - 11 | Image Enhancement - Geometric and Spectral<br>Tuesday 10/7: 5 Student Presentations (Forestry Topics)<br>Lab 6 (Spectral Enhancement) due 10/13 |
| Week 8: Chapter 15 & 17<br>October 12 - 18 | Change Detection<br>Tuesday 10/14: 5 Student Presentations (Agriculture Topics)<br>Lab 7 (Georeferencing) due 10/20 |
| Week 9: Chapters 19 & 21<br>October 19 - 25 | Introduction to Image Classification<br>Tuesday 10/21: 5 Student Presentations (Geosciences/Water Topics)<br>Lab 8 (Change Detection) due 10/29 |

| | |
|---|---|
| Week 10: Chapters 12 & 20<br>October 26 – November 1 | Unsupervised Classification<br>5 Student Presentations (Land Use/Cover topics) Tuesday 10/28<br>Lab 9 (Classification) due 11/25 |
| Week 11: Chapter 14<br>November 2 - 8 | Supervised Classifications<br>Tuesday 11/4: 5 Student Presentations (Hyperspectral Remote Sensing topics)<br>Project Proposal due 11/10 |
| Week 12: Chapter 13<br>November 9 - 15 | Accuracy Assessments<br>Tuesday, November 11 – Veteran's Day Holiday – no class |
| Week 13<br>November 16 - 22 | **Exam 2 due Friday, 11/21**<br>Tuesday, 11/18: 5 Student Presentations (Urban) |
| Week 14<br>November 23 – 30 | Tuesday 11/25: 5 Student Presentations (no specific topic)<br>Lab 9 (Classification) due 11/25<br>Thanksgiving Break November 26 - 30 |
| Weeks 15 & 16<br>December 1 - 18 | Tuesday, December 2: Final Student Presentations (only with the agreement of Dr. Parece)<br>Last day of class December 10<br>Final Project due December 15 |