**THE OHIO STATE UNIVERSITY**

# SYLLABUS - GEOG 5225
# Geographic Applications of Remote Sensing

**3 Credit Hours**
**Lecture – Tuesday 9:35 – 10:55 a.m.**
**Lab Sections: Tu or Th 3:55 – 5:15 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 & Tuesday 1 – 2 p.m.; Friday 10 – 11 a.m.
Zoom by appointment only.
You can generally expect a reply to e-mails within **48 hours on school days.**

TA: Srijana Shrestha, Shrestha.137@osu.edu – see Carmen for schedule and zoom link.

**Except where noted, all office hours are in person in our respective offices.**  Links for zoom office hours are available on the course website. To request an appointment outside of the above times, please send both instructor and 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 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:** This class is in-person. All learning materials will be uploaded on Carmen Canvas. Additional components:

- General lectures - Tuesdays
- Labs and exercises – Tuesdays or Thursdays
- 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
- 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.

- **Self-Service and Chat support:** http://ocio.osu.edu/selfservice
- **Phone:** 614-688-HELP (4357)
- **Email:** 8help@osu.edu
- **TDD:** 614-688-8743

### Baseline technical skills

- Basic computer and web-browsing skills
- 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: current PC (Windows 7+) or Mac (OS X) with high-speed internet connection. Please note that ArcGIS Pro only works on Windows PCs
- USB Drive
- Webcam: built-in or external webcam, fully installed and tested
- Microphone: built-in laptop or tablet mic or external microphone
- 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. Again, 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:
- Register multiple devices in case something happens to your primary device. Visit the BuckeyePass - Adding a Device help article for step-by-step instructions.
- Request passcodes to keep as a backup authentication option. When you see the Duo login screen on your computer, click **Enter a Passcode** and then click the **Text me new codes** button that appears. This will text you ten passcodes good for 365 days that can each be used once.
- Download the Duo Mobile application to all of your registered devices for the ability to generate one-time codes.

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.

### Computer Lab Access

BuckID access is required to DH 0135. The instructor and/or TA will be present during scheduled class times. You will need to use your BuckID outside of normal class times. Derby Hall doors are locked on the weekends and after 7 p.m. on scheduled class days. BuckID access is granted by request. Please email the following information to your instructor and TA to get access:

Your Name and .#:
Course Name:
The number from your BuckID:

We will forward the email to the correct party for granting access.  During the first few weeks of the semester, access is not given until after the drop/add date.

## Grading

| Assignment or category | Percentage |
|---|---|
| Labs | 55 |
| Project | 16 |
| Proposal (1%) | |
| Project Submission (15%) | |
| In-Class Presentation | 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 the 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 persons is considered academic misconduct.

### 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 in class.

### Final Project (16% of total grade)
You will have a final project in lieu of a final exam.  Specifics will be available on Canvas.

### 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 both lecture and lab are highly recommended. You are required to do a presentation after spring break so attendance is mandatory, or you will not get credit for that specific assignment.

### 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 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.

## Managing notifications

**How can I manage notifications about course activity?**

You can tailor your notifications by going to Account > Notifications. You can choose Email and/or Push notifications. You can choose what types of activity you want to follow.

If you are not receiving notifications of discussion board activity, you may need to subscribe

to the discussion board itself. Open the discussion board and click Subscribe (near top right). Alternatively, make a reply, and you will be automatically subscribed.

If you want email notifications but you're not getting any at all, regardless of activating email notifications, then you may need to go Account > Settings and verify your email address.

# OTHER COURSE AND UNIVERSITY POLICIES

## Academic Misconduct

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 3335-5-48.7 (B)). For additional information, see the Code of Student Conduct | Ohio State (osu.edu).

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 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. Use of generative AI tools is prohibited in this course.

*There has been a significant increase in the popularity and availability of a variety of generative artificial intelligence (AI) tools, including ChatGPT, Sudowrite and others. These tools will help shape the future of work, research and technology but when used in the wrong way, they can stand in conflict with academic integrity at Ohio State.*

*All students have important obligations under the Code of Student Conduct to complete all academic and scholarly activities with fairness and honesty. Our professional students also have the responsibility to uphold the professional and ethical standards found in their respective academic honor codes. Specifically, students are not to use unauthorized assistance in the laboratory, on field work, in scholarship or on a course assignment unless such assistance has been authorized specifically by the course instructor. In addition, students are not to submit their work without acknowledging any word-for-word use and/or paraphrasing of writing, ideas or other work that is not your own. These requirements apply to all students undergraduate, graduate, and professional.*

*To maintain a culture of integrity and respect, these generative AI tools should not be used in the completion of course assignments unless an instructor for a given course specifically authorizes their use. Some instructors may approve of using generative AI tools in the academic setting for*

*specific goals. However, these tools should be used only with the explicit and clear permission of each individual instructor, and then only in the ways allowed by the instructor.*

# Disability Services

The university strives to maintain a healthy and accessible environment to support student learning in and out of the classroom.  If you anticipate or experience academic barriers based on your disability (including mental health, chronic, or temporary medical conditions), please let me know immediately so that we can privately discuss options.  To establish reasonable accommodations, I request that you register with Student Life Disability Services.  After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion.

If you are ill and need to miss class, including if you are staying home and away from others while experiencing symptoms of a viral infection or fever, please let me know immediately. In cases where illness interacts with an underlying medical condition, please consult with Student Life Disability Services to request reasonable accommodations. You can connect with them at slds@osu.edu; 614-292-3307; or **Disability Services (osu.edu)**.

## Religious Accommodations

Ohio State has had a longstanding practice of making reasonable academic accommodations for students' religious beliefs and practices in accordance with applicable law. In 2023, Ohio State updated its practice to align with new state legislation. Under this new provision, students must be in early communication with their instructors regarding any known accommodation requests for religious beliefs and practices, providing notice of specific dates for which they request alternative accommodations within 14 days after the first instructional day of the course. Instructors in turn shall not question the sincerity of a student's religious or spiritual belief system in reviewing such requests and shall keep requests for accommodations confidential.

With sufficient notice, instructors will provide students with reasonable alternative accommodations with regard to examinations and other academic requirements with respect to students' sincerely held religious beliefs and practices by allowing up to three absences each semester for the student to attend or participate in religious activities. Examples of religious accommodations can include, but are not limited to, rescheduling an exam, altering the time of a student's presentation, allowing make-up assignments to substitute for missed class work, or flexibility in due dates or research responsibilities. If concerns arise about a requested accommodation, instructors are to consult their tenure initiating unit head for assistance.

A student's request for time off shall be provided if the student's sincerely held religious belief or practice severely affects the student's ability to take an exam or meet an academic requirement and the student has notified their instructor, in writing during the first 14 days after the course begins, of the date of each absence. Although students are required to provide notice within the first 14 days after a course begins, instructors are strongly encouraged to work with the student to provide a reasonable accommodation if a request is made outside the notice period. A student may not be penalized for an absence approved under this policy.

If students have questions or disputes related to academic accommodations, they should contact their course instructor, and then their department or college office. For questions or to report discrimination or harassment based on religion, individuals should contact the Office of Institutional Equity. (Policy: **Religious Holidays, Holy Days and Observances | Office of Academic Affairs, The Ohio State University (osu.edu).**
.

## Mental Health Statement

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 24/7 **by dialing 988 to reach the Suicide and Crisis Lifeline**.

## Statement on Title IX

Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories (e.g., race). If you or someone you know has been sexually harassed or assaulted, you may find the appropriate resources at http://titleix.osu.edu or by contacting the Ohio State Title IX Coordinator at titleix@osu.edu.

## Diversity and Inclusion

The Ohio State University affirms the importance and value of diversity in the student body. Our programs and curricula reflect our multicultural society and global economy and seek to provide opportunities for students to learn more about persons who are different from them. We are committed to maintaining a community that recognizes and values the inherent worth and dignity of every person; fosters sensitivity, understanding, and mutual respect among each member of our community; and encourages each individual to strive to reach his or her own potential. Discrimination against any individual based upon protected status, which is defined as age, color, disability, gender identity or expression, national origin, *race, religion, sex, sexual orientation, or veteran status, is prohibited.*

## Inclement Weather

Should in-person classes be canceled, we will be available during lab times via CarmenZoom Please be sure to check announcements in CarmenCanvas for updates.

# Course Schedule – on the following pages

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>January 6 – 11 | Introduction to Class, Remote Sensing and History of Remote Sensing<br>Lab 1 (Downloading Imagery) due by noon on Monday, January 13 |
| Week 2; Chapter 2<br>January 12 – 18 | Electromagnetic Spectrum, Atmospheric Interactions<br>Lab 2 (Information about the downloaded imagery) due January 17 |
| Week 3; Chapters 3 & 8<br>January 19 – 25 | Remote Sensing Platforms, Active v. Passive RS<br>Lab 3 (Compositing and Subsetting Satellite Imagery) due January 27 |
| Week 4; Chapter 7<br>January 26 – February 1 | Land Observation Satellites<br>Exam 1 due 2/3 |
| Week 5<br>February 2 – 8 | Band Combinations, Digital Numbers, Image Enhancement - Radiometric, Geometric, Spectral and Spatial<br>Chapters 5 (5.6 - 5.9), 6 (6.4-6.5) & 11 |
| Week 6<br>February 9 – 15 | Lab 4 (Band Combinations) due February 10<br>Lab 5 (Radiometric and Spatial Enhancement) Due February 17 |
| Week 7; Chapters 15<br>February 16 – 22 | Change Detection & Unsupervised Classification<br>Lab 6 (Change Detection) due February 24 |
| Week 8; Chapter 12<br>February 23 – March 1 | Supervised Classification<br>Lab 7 (Classification) due March 22 |
| Week 9; Chapter 13<br>March 2 – 8 | Accuracy Assessments<br>Exam 2 due March 7 |
| Spring Break March 9 - 15 ||
| Week 10, Chapter 21<br>March 16 – 22 | Applications – Land Use and Land Cover<br>Presentations on Academic Papers begin<br>Lab 8 (Spectral Enhancement) due March 31 |
| Week 11; Chapters 16 & 17<br>March 23 – March 29 | Applications – Plant Sciences & Agriculture<br>Presentations on Academic Papers continue<br>Lab 9 (Georeferencing) due April 7<br>Project Proposal due April 1 |
| Week 12; Chapters 16 & 18<br>March 30 - April 5 | Applications – Plant Sciences & Forestry<br>Presentations on Academic Papers |
| Week 13; Chapters 19 & 20<br>April 6 – 12 | Applications – Earth Sciences & Coastal Processes<br>Presentations on Academic Papers |
| Week 14, 15 & 16<br>April 13 – April 29 | Monday, April 15 – Final Presentations on Academic Papers – Water Topics<br>Final Project due April 25 |