THE OHIO STATE UNIVERSITY

Department of Geography

SYLLABUS - GEOG 5225
Geographic Applications of Remote Sensing

Course overview

Course Details:

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
MGIST Students only – Online Lecture & Lab

Instructor and Teaching Assistant (TA)

Primary instructor: Dr. Tammy E. Parece
Email: parece.1@osu.edu Office: Derby Hall 1189

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.

Open Office hours: Monday and Wednesday 2 – 3 p.m., Tuesday 1 - 2 p.m.; in person. Please watch the announcements in Canvas for any changes related to office hours.

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, location, and zoom link.

If you are ill or have symptoms, please do not visit us in our offices. Please email us and we can set up a Teams link for your participation during our office hours. 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 information

derived from remotely sensed data can be used in geographic studies. Computer laboratory exercises are designed to help students gain hands-on experience 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 the 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:

This class is in-person (with the exception of MGIST Students). All learning materials will be uploaded to Carmen Canvas. Additional components:

- Review of lectures and Quizzes on Tuesdays
- Labs and exercises – Tuesdays or Thursdays

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. Therefore, you will need to either 1) finish the lab using software installed on your own computer or 2) return to the computer lab when it is not in use for other classes.

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 provided in Canvas. A print copy 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 not related to ArcGIS Pro or ENVI, 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

- Computer literacy and web-browsing skills
- Navigating Carmen: see the Canvas Student Guide.

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: available in Derby Hall 0135 or your own PC if it is compatible with the software (with the exception of ENVI software – it is only available in DH 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 (MGIST Students will have remote access).

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.

Computer Lab Access

BuckID access is required to DH 0135 outside of class time. 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. If you are the last person to exit the computer lab, please be sure that the door to the lab closes behind you.

Assignment information

Quizzes (6, 18% of total grade)

- *Untimed, closed note, closed book.*
- *In-Class (except MGIST students):* Check the schedule for the date of each quiz; they are not every week. 6 quizzes (20 points each) and the lowest quiz grade is dropped.

Presentation (7%)

You will have 1 in-person presentation. You identify an academic paper regarding a remote sensing application and present the paper and its results in class. A sign-up schedule is provided. (MGIST students will record their presentation).

Final Project (15% of total grade)

You will have a final project in lieu of a final exam. Specifics will be available on Canvas.

Labs (60% of total grade)

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.

Lab assignments can be submitted as many times as you want up to the due date and time. Resubmissions (or redos) after the due date to get a better grade are not accepted.

Attendance

Attendance will be taken for all in-person sessions.

Late assignments

Late submissions for any assignment are not accepted in this course. If you are not present on the date of a quiz, you will need to provide documentation and a reason for missing the quiz if you request a make-up quiz.

Accommodation 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, the specific assignment, and the number of days requested in the extension.

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; they are 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).

Attendance

Attendance will be taken for all in-person sessions.

Grading

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: 89.99 does not round up to 90%. If you want an A/A-, you must achieve 90% or better.

Incompletes: If an emergency prevents you from finishing a course, you may request an "Incomplete" from the instructor. https://advising.osu.edu/grades-and-grade-forgiveness

Grade Breakdown

Assignment or category	Percentage
Labs	60
Project	15
In-Class Presentation	7
Quizzes - 6	18
Total	100

Grades and feedback

You can generally expect grades and feedback on assignments and exams to be returned within 1 week of the due date, depending on the complexity of the assignment. If you have questions about your grade, you must address them to Dr. Parece within 48 hours of the posting of that grade. For quizzes that are automatically graded, answers will be posted after the due date and available for 1 week only.

Do not post comments in Carmen on an assignment after the due date and after grades have been completed. We do not get any type of notice from Carmen when you post such a comment. These comments should be sent to Dr. Parece via email.

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.

Student participation requirements

The following is a summary of student's expected participation:

- All work in this class must be your own. There are no joint assignment submissions for this class for any assignment!

- *Attendance at labs/recitation is taken*. (Exception is MGIST students)
- Logging in: Be sure you are logging in to the course in Carmen each week. During most weeks you will log in many times. If you have a situation that might cause you to miss an entire week of class, discuss it with me *as soon as possible.*
- Confidential Questions: Don't post questions online that may indicate answers to graded assignments and questions regarding your own grades. The former is an academic integrity concern, and the latter is a privacy concern.

Course Academic Integrity Policy

Turnitin is enabled for all written assignments. Please note that any assignments with significant scores may result in reporting a code of conduct violation to OSU's Committee on Academic Misconduct.

To maintain a culture of integrity and respect, generative AI tools cannot 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 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.

OTHER COURSE AND UNIVERSITY POLICIES

Academic Misconduct:

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).

Disability Services:

This course follows restrictions according to the University Disability Services policies. **Disability Services (osu.edu).**

Religious Accommodations:

This course follows the University religious accommodations policy. See information under assignments and for more information on the University's policy, go to: **Religious Holidays, Holy Days and Observances | Office of Academic Affairs, The Ohio State University (osu.edu).**

Mental Health Statement:

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**.

University Statement on Title IX: http://titleix.osu.edu

Inclement Weather:

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

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 January 11 - 17	Introduction to Class, Remote Sensing and History of Remote Sensing Lab 1 (Downloading Landsat Imagery & Displaying it in ArcGIS Pro) due January 1/22 Sign-up for Paper Presentation Week & Subject (due 1/23)
Week 2 Chapter 2 January 18 - 24	Electromagnetic Spectrum, Atmospheric Interactions Lab 1 due 1/22
Week 3 Chapters 3, 8, 9 January 25 - 31	Quiz 1 on Weeks 1 and 2 Topics Lecture: Remote Sensing Platforms, Active v. Passive RS Lab 2 (Compositing and Subsetting Satellite Imagery) due February 2
Week 4 February 1 - 7	Academic Paper Presentations (Active Remote Sensing) Lecture: Band Combinations, Digital Numbers Chapters 5 (5.6 - 5.9), 6 (6.4-6.5) & 11 Lab 3 (Band Combinations) due 2/12
Week 5 Chapter 7 February 8 – 14	Quiz 2 on Weeks 3 and 4 Topics Lecture: Earth Observation Satellites Lab 3 (Band Combinations) due 2/12
Week 6 February 15 - 21	Academic Paper Presentations (Drone Topics) Lecture: Image Enhancement - Radiometric and Spatial Lab 4 (Radiometric and Spatial Enhancement) due February 22
Week 7 February 22 - 28	Quiz 3 on Weeks 5 & 6 Topics Lecture: Image Enhancement - Geometric and Spectral Lab 5 (Spectral Enhancement) due March 1
Week 8 Chapters 15 & 18 March 1 - 7	Academic Paper Presentations (Forestry) Lecture: Change Detection Lab 6 (Georeferencing) due March 8
Week 9 Chapters 12 & 13 March 8 - 14	Quiz 4 on Weeks 7 & 8 Topics Lecture: Introduction to Classification Lab 7 (Change Detection) due March 14
Spring Break March 15 - 21	
Week 10 Chapters 16, 17 & 21 March 22 - 28	Academic Paper Presentations (Agriculture Topics) Lecture: Unsupervised & Supervised Classification Lab 8 (Classification) due April 12
Week 11 March 29 – April 4	Quiz 5 on Week 9 &10 Topics Lecture: Accuracy Assessment Project Proposal due April 1
Week 12 April 5 - 11	Academic Paper Presentation (Urban Topics) Lecture: Deep Learning Lab 9 Deep Learning due 4/20
Week 13 Chapters 19 & 20 April 12 - 18	Quiz 6 on Week 11 & 12 topics
Weeks 14, 15 & 16 April 19 – May 5	April 21 – Academic Paper Presentation (Water or Geoscience Topics) Last day of Class April 27; Final Project due May 3