GEOG 5225 Geographic Applications of Remote Sensing (Distance Enhanced, DH)
Syllabus AU2020

Instructor Information

- Dr. Yang Song, song.630@osu.edu
- Office Hours and Location: W 8:00-9:20am from week 2 to week 10 in Pomerene Hall 301, or by email and Zoom.

Teaching Associates

- TA: Jian Wang, wang.12679@buckeyemail.osu.edu
- Office Hours and Location: By Zoom appointment only

Cohort use of lab PCs in Derby 135: W&F 9:35-10:55am (check the last page of this syllabus for schedule)

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. 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.

In terms of the structure, approximately 2/3 of the course will focus on basic concepts, theories, platforms, atmospheric/geometric corrections and classification methods of remote sensing. The rest of the course will introduce applications of remote sensing in urban study, water body and vegetation monitoring.

This course is mostly online with weekly in-person office hours, and there is no required log-in to Carmen at a scheduled time. The course is divided into weekly modules which are released weekly. Students are expected to keep up with weekly deadlines. This is a 3-credit hour class. For each week, students should expect approximately 3 hours spent on online lectures and labs, and 6 hours of independent study such as textbook reading, online quizzes, lab assignments and preparation for the exam to earn a C grade.

Course Learning Outcomes

By the end of the semester, students should 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.

Course Materials (will check if Library has electronic version of them)

- Required textbook: Jensen, John R., 2015, ***Introductory Digital Image Processing: A Remote Sensing Perspective***, Prentice Hall: Upper Saddle River, NJ, 4th ed., ISBN 9780134058160.
- Optional reference: Jensen, John R., 2007, ***Remote Sensing of the Environment: An Earth Resource Perspective***, Prentice Hall: Upper Saddle River, NJ, 2nd ed., ISBN 9780131889507.

Evaluation

- Lab assignments – 40%
  - There will be 8 labs through the semester, each one with an assignment containing around 10 open-ended questions based on lab contents.
  - Lab assignments are usually due ***two weeks after the release of associated course module***. Lab 6 and 7 will be given more time to finish due to complexity. Please check course website for specific due dates.
  - All assignments will be submitted via Carmen in.pdf format.
- Exam – 30%
  - There will be one open-book exam for the course. More details on the exam will be provided during the semester.
- Course project – 30%
  - Students are required to complete a final project that applies remote sensing techniques to solve a real-world problem of their own interest.
  - Students will need to submit a project proposal in the middle of the semester and a final report by the end of the semester. More details on project proposal and report can be found in Carmen.
- Grading Scale (OSU standard scale):

A	93-100%	B-	80-82%	D+	67-69%
A-	90-92%	C+	77-79%	D	60-66%
B+	97-89%	C	73-76%	E	0-59%
B	83-86%	C-	70-72%		

Course Policies

- Email policy

    - You are responsible for all course related emails, so be sure to check your inbox daily.
    - When emailing your instructor or TA, please always begin the subject of the email with the course number (GEOG5225) and your name (first name followed by last name). This is important as your instructor and TA teach multiple classes and need to know to which class you are referring. A proper email subject should be like this:
      GEOG5225_John Smith_Schedule a make-up exam
    - Please leave at least 24 hours for instructor/TA to respond during school days.
- Lecture & lab questions policy
    - Carmen discussion boards will be created for lab questions. Please categorize your questions and post them accordingly. You can also help other students with their questions.
    - Lecture questions should be sent to the instructor while lab questions should go to your TA.
- Late submission policy
    - Lab assignments will be penalized 10% for each day late. Project proposal and report will be penalized 20% for each day late.
    - Extensions will not be granted due to lost work. Be sure you back up and keep all your work.
- Academic misconduct policy
    - 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/pdfs/csc_12-31-07.pdf.
    - Collaboration (via internet or face-to-face) for the purposes of troubleshooting is highly encouraged in this course, but everyone is expected to submit their own unique work. For example, asking a classmate how to resolve an unexpected error message is OK, but using another classmate’s work (e.g. screen captures, etc.) as your own is NOT ok, regardless of whether or not they provide consent for the use of their materials. (Note: There are many other acceptable/unacceptable actions than those exemplified here.) If you have any questions or concerns about acceptable/unacceptable actions, ask your instructor for clarification/permission.
    - All open-ended responses to questions, prompts, etc. must be written entirely, nearly entirely, or at least in majority using your own words. Use credible sources, and cite all sources, including those only referenced, those indirectly paraphrased, and those directly quoted, being sure to use quotation marks to identify excerpts from these credible sources. This

expectation to cite all of your sources also extends to the textbook, the lab instructions, lecture slides, other course materials, online resources, etc. Please contact Center for the Study and Teaching of Writing (CSTW, https://cstw.osu.edu/writing-center) or the instructor if you have difficulties organizing language for assignments.

- Disability services policy
    - Students with disabilities that have been certified by the Office for Disability Services (SLDS) will be appropriately accommodated and should inform the instructor as soon as possible of their needs.
        - Address: 098 Baker Hall, 113 W. 12th Ave, Columbus, OH 43210
        - Telephone: 614-292-3307
        - Website: http://slds.osu.edu/
    - Registration with SLDS does not grant accommodations automatically. You need to bring the accommodation form provided by SLDS to the instructor to work out a plan for accommodations. Please contact the instructor as soon as you are registered with SLDS for attendance, assignment and/or exam accommodations.
- Other Course Policy
    - Please refer to Student Academic Services for more academic services provided by OSU.
    - Other student services can be accessed here.

Course Technology

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

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

Basic technical skills necessary for this course

- Basic computer and web-browsing skills
- Navigating and utilizing Carmen

Equipment

- Computer: As ERDAS IMAGINE software will be used, a Windows PC is needed. Specific system requirements can be found here.
- Webcam: built-in or external webcam, fully installed.
- Microphone: built-in laptop or tablet mic or external microphone.

Software

- Microsoft Office 365
    - All Ohio State students are now eligible for free Microsoft Office 365 ProPlus through Microsoft's Student Advantage program. Each student

can install Office on five PCs or Macs, five tablets (Windows, iPad® and Android™) and five phones.
    - Office 365 is installed within student's BuckeyeMail account. Full instructions for downloading and installation can be found here.
- ERDAS IMAGINE
    - ERDAS IMAGINE is a professional software for remote sensing data processing. Students will be provided a one-year trial version of the software for the course. Installation guide can be found in Carmen.
    - Please use this page to review the privacy policy of ERDAS IMAGINE.
- Proctorio: A software to monitor online exams. More details can be found here.

Course Content Schedule

Week	Date	Topics	Readings	Labs
1	08/26	Lecture 1: Introduction to Remote Sensing	Ch.1	Lab 1
2	09/02	Lecture 2: Remote Sensing Basics	Ch.1, Ch.2	Lab 2
3	09/09	Lecture 3: Photography	Ch.3 (RSE)	No Lab
4	09/16	Lecture 4: Remote Sensing Systems	Ch.2	Lab 3
5	09/23	Lecture 5: Radiometric Correction	Ch.6	Lab 4
6	09/30	Lecture 6: Geometric Correction	Ch.7	Lab 5
7	10/07	Lecture 7: Image Enhancement (I)	Ch.8	Lab 6
8	10/14	Lecture 8: Image Enhancement (II)	Ch.8	Lab 6
9	10/21	Lecture 9: Image Classification (I)	Ch.9	Lab 7
10	10/28	Lecture 10: Image Classification (II)	Ch.9, Ch.13	Lab 7
11	11/04	***Exam***		No Lab, project proposal due
12	11/11	Veterans Day, no class		
13	11/18	Lecture 11: Remote Sensing Application (I)		Lab 8
14	11/25	Lecture 12: Remote Sensing Application (II)		No Lab, work for project
15	12/02	Lecture 13: Remote Sensing Application (III)		No Lab. Project report due @11:59pm 12/07

Cohort Lab Use (Derby 135) Schedule

Week	Date	
1	08/26	No lab use
	08/28	Lab use for G1
2	09/02	Lab use for G2
	09/04	Lab use for G1
3	09/09	Lab use for G2
	09/11	Lab use for G1
4	09/16	Lab use for G2
	09/18	Lab use for G1
5	09/23	Lab use for G2
	09/25	Lab use for G1
6	09/30	Lab use for G2
	10/02	Lab use for G1
7	10/07	Lab use for G2
	10/09	Lab use for G1
8	10/14	Lab use for G2
	10/16	Lab use for G1
9	10/21	Lab use for G2
	10/23	Lab use for G1
10	10/28	Lab use for G2
	10/30	Lab use for G1
11	11/04	Lab use for G2
	11/06	Lab use for G1
12	11/11	Veterans Day, No lab use
	11/13	Lab use for G1
13	11/18	Lab use for G2
	11/20	Lab use for G1
14	11/25	No lab use
	11/27	No lab use