

The University of Winnipeg
Department of Geography

GEOG 2316 (3)-001
Introduction to Remote Sensing

Winter Term: T/Th 10:00 am – 11:15 am – CENT 4CM13
Labs: 070 (Wednesday 10:30 am -12:20 pm) Lockhart Hall 5L25
071 (Wednesday 2:30 pm -4:20 pm) Lockhart Hall 5L25

Instructor: Dr. Joni Storie
E-mail: j.storie@uwinnipeg.ca
Phone: 204-258-3862
Office: 5L05
Office Hours: Tuesday and Thursday 1:00 pm – 2:00 pm.

**Please note when corresponding with the instructor, use your University of Winnipeg email account system: name@webmail.uwinnipeg.ca. Emails from accounts such as Hotmail or Gmail are frequently treated as spam and thus may not reach the recipient.*

Course Description

GEOG-2316 (3) Introduction to Remote Sensing (3 hrs Lecture | 2 hrs Lab) This course introduces the principles of remote sensing and image analysis with a focus on the physics, sensor technology, processing, interpretation and applications of remotely sensed imagery with a specific emphasis on optical sensors and technologies.

Restrictions: Students may not hold credit for this course and GEOG-3304.

Requisite Courses: GEOG-2304 or permission of the instructor [prerequisite(s)]; GEOG-2316L (lab) (must be taken concurrently).

Course Learning Objectives

This course introduces the principles of remote sensing and image analysis with a focus on optical data (visible and near infrared) including data acquisition, processing, interpretation, and applications.

The primary objectives for this course are to:

1. Understand and apply the properties of electromagnetic radiation as they relate to remote sensing;
2. Describe the characteristics and appropriate applications of different passive and active sensors used for image data collection;
3. Explore methods of visual interpretation of imagery from digital sensors;
4. Apply the principles of basic digital image processing for information extraction; and
5. Understand the relationships between remote sensing and GIS in context of resource assessments.

Required Textbook

There is no official textbook for the course. Additional materials related to this course will be available on Nexus. All materials posted on NEXUS within the course content areas are required reading unless otherwise stated. Students should consider all posted materials as suitable content for exams.

Suggested Texts (for those that wish to use one):

Jensen, J. R., & Lulla, K. (any version). Introductory digital image processing: a remote sensing perspective.

Lillesand, T., Kiefer, R. W., & Chipman, J. (any version). Remote sensing and image interpretation. John Wiley & Sons.

NEXUS

Documents related to this course (e.g., course syllabus, project guidelines, lecture slides, supplemental readings) will be made available to students through the Nexus system. You must be registered in the course to have access to these materials. To login in to Nexus, go to: <https://nexus.uwinnipeg.ca/>

If you encounter difficulties with Nexus contact the help desk at 204-786-9149 or help.desk@uwinnipeg.ca.

Term Dates of Significance:

Jan 6	TERM LECTURES BEGIN for the 2022 Winter
Feb 20-26	Winter Term Reading Week. No classes.
Feb 21	LOUIS RIEL DAY University closed
Mar 16	FINAL DATE to withdraw without academic penalty from courses which begin in January 2022 and end in April 2022 of the 2022 Winter Term.
Apr 6	LECTURES END for the 2022 Winter Term.
Apr 8-22	The Winter Term evaluation period for final items of work for this term which can include scheduled tests, exams, or the submission of papers or projects.
Apr 15/17	GOOD FRIDAY and EASTER: University closed.

Student Evaluation

Students are required to show identification for exams in this course.

Informed the instructor immediately if there is a need to reschedule midterm exam because of approved documented rationale (illness, funeral, court appearance, inclement weather). Makeup exam will occur within 5 school days of the missed date (or if illness "return to work" date noted on the medical certificate). It is the student's responsibility to schedule the makeup exam. Failure to schedule within the defined timeline will result in a grade of zero (0) for that exam. *Personal conflicts such as travel plans and work schedules do not warrant a change in examination times.*

The course is broken down into two major components. A theoretical component which comprises classroom materials and their associated tests and exams (60% of course grade) and an applied component represented by the laboratory assignments and exam (40% of course grade).

Lab 070 (Wednesday 10:30 am -12:20 pm) Lockhart Hall 5L25

Lab 071 (Wednesday 2:30 pm -4:20 pm) Lockhart Hall 5L25

The expectations for lab assignments will be verbally delivered during the lab time. All assignments are due at the start of following lab time. It is the responsibility of the student to ensure that the files are submitted in a readable format (e.g., Microsoft Word, ppt, pdf). Citations and references should be submitted in a consistent manner (choose APA Style or Chicago style, and stick with it). More information about styles are available from the library. When looking at citation style, it is important to observe style conventions regarding punctuation, capitalization, use of initials, indentation, identification of cities, etc.)

Lab assignments are graded on a three-point scale (**0**-poor/not submitted, **1**-acceptable, **2**-excellent). Assignments are due at the beginning of the student's lab session on the due date specified in the assignment handout. No late lab submissions will be accepted unless there is a documented rationale. The 2-hour lab exam represents an accumulation of the material covered within the lab exercises and is designed to test and ensure students can complete the necessary tasks without assistance (not open book).

Component	Date (Due)	Percent of Final Grade
Mid-Term Exam	February 17, 2022	25% (theory)
Final Exam	TBD - Apr 8-22	35%
Lab #1: Image Acquisition		2%
Lab #2: Image Interpretation		2%
Lab #3: Image Quality Assessment		2%
Lab #4: Image Enhancements	Assignments are due at the beginning of the student's lab session on the due date specified in the assignment handout.	2%
Lab #5: Unsupervised Classification		2%
Lab #6: Supervised Classification		2%
Lab #7: Change Detection		2%
Lab #8: Accuracy Assessment		2%
Lab Exam	March 30	24%

*Dates and times are subject to change. Where a discrepancy exists the official university final exam schedule will supersede the above date (<http://www.uwinnipeg.ca/exam-schedules/>)

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Course Organization

The following course organization outlines the topics to be discussed during lectures. The order, dates, and proposed content of the presentations are subject to change as circumstances dictate. We may also not be able to cover the entire curriculum due to the interest of the class in examining in more detail some of the topics compared to others.

Week Of	Topic	Lab Assignment
1	Introduction to Remote Sensing and Data Collection	No Lab this week
2	Energy Sources and Radiation Principles	Lab #1: Image Acquisition
3	Principles of Image Interpretation	Lab #2: Image Interpretation
4	Image Quality Assessment and Statistical Evaluation	Lab #3: Image Quality Assessment
5	Image Enhancements	Lab #4: Image Enhancements
6	Midterm Review Midterm Exam (Feb 17)	Lab #5: Unsupervised Classification
7	Feb 20-26 - Reading Week - No Classes	
8	Thematic Information Extraction	Lab #6: Supervised Classification
9	Change Detection Accuracy Assessment	Lab #7: Change Detection
10	Information Extraction Using Artificial Intelligence	Lab #7: Two-week lab from last week
11	Hyperspectral, LIDAR	Lab #8: Accuracy Assessment and Final Map Production
12	RADAR Remote Sensing	Lab Exam Practice
13	Applications in Remote Sensing	Lab Exam (March 30)

**All topics listed on the outline may not be covered depending on student interest and time. Topics are also dependent on visiting guest lectures by professionals who use geomatics.*

Grading

The University does not have a standardized grading scheme. For this course, grade equivalents are as follows:

A+	90-100 %	C+	65-69.9 %
A	84-89.9 %	C	56-64.9%
A-	80-83.9%	D	50-55.9 %
B+	75-79.9 %	F	less than 50 %
B	70-74.9 %		

The numeric boundaries separating letter grades may be altered at the request of the Department Review Committee or University Senate.



THE UNIVERSITY OF WINNIPEG

1. When it is necessary to cancel a class due to exceptional circumstances, I will make every effort to inform students via uwinnipeg email (and/or using the preferred form of communication, as designated in this outline), as well as the Departmental Assistant and Chair/Dean so that class cancellation forms can be posted outside classrooms.

2. Students are reminded that they have a responsibility to regularly check their uwinnipeg e-mail addresses to ensure timely receipt of correspondence from the University and/or their course instructors.

3. Please note that withdrawing before the VW date does not necessarily result in a fee refund.

4. The first day of class is Thursday September 6, 2022. Last class will be held on Wednesday April 6, 2022. Evaluation period is Friday, April 8 to Friday, April 22, 2022

[See <https://www.uwinnipeg.ca/academics/calendar/docs/dates.pdf> for all dates]

5. Students may choose not to attend classes or write examinations on holy days of their religion, but they **must notify their instructors at least two weeks in advance**. Instructors will then provide opportunity for students to make up work or examinations without penalty. A list of religious holidays can be found in the 2021-22 Undergraduate Academic Calendar.

6. Students with documented disabilities, temporary or chronic medical conditions, requiring academic accommodations for tests/exams or during lectures/laboratories are encouraged to contact Accessibility Services (AS) at 204.786.9771 or <https://www.uwinnipeg.ca/accessibility-services/> to discuss appropriate options. All information about a student's disability or medical condition remains confidential.

7. Reference to the appropriate items in the Regulations & Policies section of the *Course Calendar*, including Senate appeals and academic misconduct (e.g. plagiarism, cheating) <https://www.uwinnipeg.ca/academics/calendar/docs/regulationsandpolicies.pdf> Instructors should become familiar with the procedures for dealing with alleged academic misconduct at <https://www.uwinnipeg.ca/institutional-analysis/docs/policies/academic-misconduct-procedures.pdf>

Avoiding Academic and Non-academic Misconduct. Students are encouraged to familiarize themselves with the Academic Regulations and Policies found in the University Academic Calendar at: <https://uwinnipeg.ca/academics/calendar/docs/regulationsandpolicies.pdf> . Particular attention should be given to subsections 8 (Student Discipline), 9 (Senate Appeals), and 10 (Grade Appeals). Please note, in particular, the subsection of Student Discipline pertaining to plagiarism and other forms of cheating.

Detailed information can be found at the following:

- The University of Winnipeg library video tutorial “Avoiding Plagiarism”
<https://www.youtube.com/watch?v=UvFdxRU9a8g>
- Academic Misconduct Policy and Procedures: <https://www.uwinnipeg.ca/institutional-analysis/docs/policies/academic-misconduct-policy.pdf> and
<https://www.uwinnipeg.ca/institutional-analysis/docs/policies/academic-misconduct-procedures.pdf>
- Non-Academic Misconduct Policy and Procedures: <https://www.uwinnipeg.ca/institutional-analysis/docs/student-non-academic-misconduct-policy.pdf> and
<https://www.uwinnipeg.ca/institutional-analysis/docs/student-non-academic-misconduct-procedures.pdf>

Misuse of Filesharing Sites. Uploading essays and other assignments to essay vendor or trader sites (filesharing sites that are known providers of essays for use by others who submit them to instructors as their own work) involves “aiding and abetting” plagiarism. Students who do this can be charged with Academic Misconduct.

Avoiding Copyright Violation. Course materials are owned by the instructor who developed them. Examples of such materials are course outlines, assignment descriptions, lecture notes, test questions, and presentation slides. Students who upload these materials to filesharing sites, or in any other way share these materials with others outside the class without prior permission of the instructor/presenter, are in violation of copyright law and University policy. Students must also seek prior permission of the instructor /presenter before photographing or recording slides, presentations, lectures, and notes on the board.

Research Ethics. Students conducting research interviews, focus groups, surveys, or any other method of collecting data from any person, including a family member, must obtain research ethics approval before commencing data collection. Exceptions are research activities done in class as a learning exercise. For submission requirements and deadlines, see <http://www.uwinnipeg.ca/research/human-ethics.html>.

8. All students, faculty and staff have the right to participate, learn, and work in an environment that is free of harassment and discrimination. The UW Respectful Working and Learning Environment Policy may be found at <https://www.uwinnipeg.ca/respect/>.

9. *Indigenous students* seeking additional supports, academic or other, are encouraged to contact the Aboriginal Student Services Centre (ASSC). The ASSC offers a variety of support services, and was created to maintain a safe, educational and culturally sensitive environment for all Aboriginal students (First Nation, Metis and Inuit) as they pursue their academic studies at The University of Winnipeg. More information can be found at: <http://www.uwinnipeg.ca/assc/>.