



GEOG 4200/7480 Advanced Methods in Remote Sensing – Course Outline

Instructor Contact Information

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Office Hours: Tuesdays/Thursdays, 1PM–2PM or by appointment

Course Website

The course website will be used for announcements, content, and assignments.

<https://umanitoba.ca/umlearn>

Textbook

Lillesand T.M., R.W. Kiefer and J. Chipman. 2015. Remote Sensing and Image Interpretation. (7th Ed.) John Wiley and Sons.

Course Description

This course is designed for students who have already acquired a fundamental understanding of remote sensing concepts, techniques, and applications. The goal of this course is to introduce students with a basic knowledge of remote sensing image analysis to advanced topics in digital remote sensing to support environmental and cultural applications. The course emphasizes a hands-on learning environment, with in depth insights into theoretical and conceptual underpinnings in satellite remote sensing. A major component of this course consists of computer-based lab assignments that largely practice the principles and methods introduced in the lectures. Ultimately, the course will empower students to delve more deeply into advanced issues in remote sensing and to customize and develop image processing tools for their particular area of interest.

Course Content

The following topics will be covered:

- Review of remote sensing concepts
- Optical and multispectral remote sensing
- Radiometric and geometric correction
- Image classification
- LiDAR remote sensing
- Microwave remote sensing (active and passive)
- Contemporary topics in remote sensing technologies

Learning Outcomes

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

- Demonstrate knowledge and understanding of remote sensing concepts/theory by solving problems in laboratory assignments and timed examinations
- Describe optical and microwave remote sensing instruments in laboratory assignments and examinations
- Perform radiometric and geometric correction procedures through laboratory assignments
- Perform image classification on remote sensing imagery
- Describe and explain recent developments in remote sensing technologies and their applications

Evaluation

GEOG 4200

Component	Value (%)
Laboratory Assignments	60%
Journal Article Presentation	10%
Journal Article Report	5%
Final Exam	25%

GEOG 7480

Component	Value (%)
Laboratory Assignments	60%
Seminar Presentation	10%
Seminar Report	15%
Final Exam	15%

Grading Scale

Letter	Mark
A+	90% or above
A	80% - 89%
B+	75% - 79%
B	70% - 74%
C+	65% - 69%
C	60% - 64%
D	50% - 59%
F	49% or below

Note: These boundaries represent a guide for the instructor and class alike. Provided that no individual student is disadvantaged, the instructor may vary any of these boundaries to ensure consistency of grading from year-to-year.

Laboratory Assignments

Four assignments will be distributed through the term. Unless otherwise indicated, assignments must be submitted electronically through UMLearn. Grading rubrics and instructions will be provided on each assignment. **Late assignments will be subject to a penalty of 20% per day following the due date/time**, unless the student has obtained Instructor approval in advance of the deadline.

Journal Article Report and Presentation (GEOG 4200)

Undergraduate students (GEOG 4200) are required to review one major research article. The article must be chosen from a major scholarly journal and should not have been reviewed by you in a different course. The article should focus on either the application of a specific remote sensing system to an environmental issue or a digital image processing technique. A summary report must be submitted to the instructor for evaluation. Each undergraduate student needs to create a presentation and lead the discussion for the chosen article. The student must prepare a set of questions for that particular article. All students are expected to participate in the discussion. Further details will be provided in an assignment on UMLearn.

Seminar Report and Presentation (GEOG 7480)

Graduate students (GEOG 7480) are required to prepare a seminar report, consisting of a literature survey on the use of remote sensing (i.e., type of sensor or analytical technique) in the study of their thesis topic.

It should provide a general background on the thesis topic and how a sensor type or analytical technique may be used to examine that topic. The literature survey must be submitted to the instructor for evaluation. Each graduate student needs to create a seminar presentation and lead a discussion. All students are expected to participate in the discussion. Further details will be provided in an assignment on UMLearn.

Final Examination

The final exam will consist of short answer questions. These questions will be based on lectures, assignments, assigned readings, and class discussion. If you miss the final exam due to illness or compassionate reasons, you **must** make arrangements with your own Faculty office for a deferred exam. Scheduling of the deferred exam is at the discretion of the Instructor/department office, in consultation with the student.

Requirements and Regulations

- Attendance at lectures and laboratories is essential for successful completion of this course. Students must satisfy each evaluation component in the course to receive a final grade.
- It is the responsibility of each student to contact the instructor in a timely manner if he or she is uncertain about his or her standing in the course and about his or her potential for receiving a failing grade. Students should also familiarize themselves with the University's General Academic Regulations dealing with incomplete term work, deferred examinations, attendance and withdrawal.
- No programmable devices or systems (such as calculators, PDAs, iPods, iPads, cell phones, wireless communication or data storage devices) are allowed in examinations unless approved by the course instructor.
- Students should be aware that they have access to an extensive range of resources and support organizations. These include Academic Resources, Counselling, Advocacy and Accessibility Offices as well as documentation of key University policies e.g. Academic Integrity, Respectful Behaviour, Examinations and related matters.

Student Responsibilities

- A high level of student cooperation and participation, involving asking and answering questions during the lectures.
- Students may use laptops/tablets to take course notes in class.
- Students are required to attend all lectures and take notes. Not all material presented in the lectures is covered in the text. If you miss a lecture, please make arrangements to get notes from a fellow student. Lecture slides will not be provided on UMLearn (the learning management tool).
- Students are required to read the assigned chapters of the textbook prior to class. Not all the textbook will be covered in the lectures but may be covered on the assignments or exam.
- Students are required to complete the necessary assignments individually and on time, unless otherwise stated. Students may consult with each other; however, all assignments must be submitted in the student's own words.
- Please use your U of M email account for all email communication with the instructor. Please put the course number in the subject line of the email (e.g., GEOG 4200 or GEOG 7480).

Important Dates

Voluntary Withdrawal Deadline: March 20th, 2019

Winter Term Break: February 19th – 22nd, 2019 (No classes or examinations)