

**The University of Winnipeg  
Department of Geography**

**GEOG 3319 (3)-001  
Advanced Remote Sensing**

**Fall Term: 09-07-2021 – 12-23-2021**

**Lectures: Thursdays 1:00 pm – 4:00 pm (Centennial Mezzanine 4CM13)**

**Lab: Tuesdays 2:30 pm to 4:20 pm (Lockhart 5L25)**

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**Instructor:** Joni Storie  
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**Phone:** 204-258-3862  
**Office:** 5L05  
**Office Hours:** Monday 11:00 am -12:00 pm; Thursday 11:00 am – 12:00pm

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

**Important Dates - Fall Term 2021**

Lectures Begin: Tuesday, September 7, 2021

Lectures End for Regularly scheduled classes: Monday, December 6, 2021

**Truth and Reconciliation Day - September 30, 2021 (Uni Closed)**

**Remembrance Day – November 11, 2021 (Uni Closed)**

**Make-up day for Remembrance Day: Tuesday, December 7, 2021**

**Make-up day for Truth and Reconciliation Day: Wednesday, Dec. 8, 2021**

Fall Term Reading Week: Sunday, October 10, 2021 to Saturday, October 16, 2021

Final Withdrawal Date: Tuesday, November 16, 2021

Exams: Thursday, December 10, 2021 to Wednesday, December 23, 2021

**Course Description**

*GEOG-3319(3) ADVANCED REMOTE SENSING (Le3, La2) This course provides instruction on advanced image processing and classification techniques. These techniques are applied to the study of physical and human environments through a series of laboratory exercises and assignments. Students also gain exposure to RADAR and hyperspectral remote sensing including exposure to handheld imaging devices.*

*GEOG-3319L (lab) must be taken concurrently.*

*Prerequisites: GEOG-2316(3) or permission of instructor.*

**Course Objectives**

The learning goal of this course is to build upon students' knowledge gained from GEOG-2316 and increase confidence in working with remotely sensed data for applications of interest. In a world where big data is needed to solve big problems, taking your skills from introductory remote sensing and applying them on a regional, national or global scale is an essential skill. The following course objectives have been identified:

- Show comprehension of remote sensing theory (e.g., resolutions, spectra, image interpretation, etc) and python programming which will be assessed through a midterm exam.
- Development of programming skills by completing assignments using remote sensing imagery through an introduction to Python for remote sensing data analysis.
- Development of communication skills through presentation of your final lab assignment.

## Student Evaluation

		Due Date
Lab 1: Review skills developed in intro RS	15%	September 28 (beginning of lab)
Midterm Exam	20%	October 21 (lecture room)
Lab 2: Advanced Classification Algorithms	20%	November 2 (beginning of lab)
Lab 3: ArcGIS/Pro and Model Builder; Introduction to Python	30%	November 30 (beginning of lab)
Presentation	15%	December 8 (lecture room) Make up day

*The final date to withdraw from the course without academic penalty is **Tuesday November 16, 2021**. Please note that withdrawing before the VW date does not necessarily result in a fee refund.*

## 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](mailto:help.desk@uwinnipeg.ca).

## Assignment Information

Assignments are submitted on the drive folder for the course (will be discussed in lab). Lab assignments will allow students to refresh skills learned in introductory remote sensing (e.g., download Sentinel data, do a classification, change detection or mosaic, complete a LULC map), learn new advanced classification algorithms, batch processing and skills in python programming (general and specific to remote sensing analysis). The final lab will have the students complete a larger map project using python coding.

The first lab will allow you to review and practice skills developed in introduction to remote sensing while using different data and different software. The second lab assignment introduces you to advance classification algorithms such as Random Forest. Finally, the third lab assignment is based on map automation through batch processing and use of coding language such as Python. Lab assignments should be submitted using a report format commonly used in remote sensing which includes Title, Author (student name), Date, Introduction, Methods (Data, Analysis), Results & Conclusions, References, Appendices.

### **Late Assignments**

Extensions without penalty will be granted only if accompanied by a medical certificate, death certificate, or because of a pre-established religious holiday. Please note computer problems are not an acceptable excuse for late submissions. Ten percent per day will be deducted for late assignments (including weekends), commencing as soon as the submission deadline has lapsed. Assignments will not be accepted five business days after the due date.

### **Exams**

Students are not required to show identification for midterm exams in this course. Inform Dr. Storie ASAP if 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. **There is no final exam in this course.**

### **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.

## Course Topics\*

Week	Date	Topic
1	Sept 9	Course Introduction and Overview, Class and lab expectation. Review of remote sensing theory, data and analysis, resolutions
2	Sept 16	RADAR
3	Sept 23	Advanced Classification algorithms: Random Forest
	Sept 30	Truth and Reconciliation Day (university closed)
4	Oct 7	Advanced Classification algorithms: SVM
	Oct 11-15	Reading Week (University Closed)
5	Oct 21	Midterm Intro to Python Functions & Graphics
6	Oct 28	Python Conditions and Modules
7	Nov 4	Open source python libraries for geospatial data
	Nov 11	Remembrance Day (university closed)
8	Nov 18	Batch processing
9	Nov 25	Image processing using GDAL
10	Dec 2	Statistics
11/12	Dec 7 & 8	Practice and Presentations of Projects

The dates the University is closed for holidays, irrespective of campus closure related to COVID-19: September 6 (Labour Day), Truth and Reconciliation Day (Sept. 30), Thanksgiving Day (October 11), November 11 (Remembrance Day), Fall mid-term reading week is October-10-16.

***\*All topics listed on the outline may not be covered depending on student interest and time.***

Readings will be made available on Nexus and identified in class.



# 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 Tuesday September 7, 2021. Last class will be held on December 6 with make-up classes for Remembrance Day on Tuesday December 7 and Truth and Reconciliation Day will be Wednesday, Dec. 8, 2021. Evaluation period is December 10-23, 2021. There is no final exam scheduled for this course

[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/>.