

## **GEOG 4231 – REMOTE SENSING (F19)**

Instructor: Dr. Muditha Heenkenda

Office location: RC 2006E

Office hours: Mon – 1.00 pm to 3.00 pm

Wed – 10.00 am to 12.00 pm

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### **Course Description:**

The course: Remote Sensing will introduce the fundamentals of the basic physical principle of remote sensing. The course is designed to stimulate the current remote sensing activities in natural resource management. Students become familiar with the basic image processing techniques for image pre-processing and data extraction. The lab exercises include many commonly used digital image processing tasks and utilization of ENVI software. A term paper will be introduced for allowing the opportunity to increase students' knowledge on a specific application of remote sensing technology.

### **Learning Outcomes:**

Upon successful completion of this course, students will be able to:

- understand the basic physical principle of remote sensing;
- describe the general procedure (big picture) of remote sensing;
- identify different types of remote sensing data, sensors and platforms and their applications;
- apply radiometric and atmospheric corrections for images; and
- successfully apply different image processing techniques for data extraction using ENVI software.

### **Learning Resources:**

**Required:** Lillesand, T.M., Kiefer, R.W., and Chipman, J.W., 2015. *Remote Sensing and Image Interpretation*, 6th Edition (New Jersey: Wiley), ISBN 978-1-118-34328-9

ebook for renting: <https://www.wiley.com/en-ca/Remote+Sensing+and+Image+Interpretation%2C+7th+Edition-p-9781118919477>

## Grading:

Term paper abstract	5%	(Abstract and five references due on Oct 9 <sup>th</sup> )
Term paper	25%	(Full paper due on Dec 4 <sup>th</sup> )
Lab exercises	20%	
Midterm exam	25%	
Final exam	25%	

## Course Expectations/Student Responsibilities:

1. **Attendance** is expected for each lecture and lab unless communicated with the instructor ahead of time.
2. **Late Assignments** receive a deduction of 10% per day unless an extension is agreed to with the instructor prior to the due date. After class assignments are graded and returned, late assignments receive a zero grade **but must be satisfactorily completed to receive credit in the course.**
3. **Participation** is expected in all class discussions, group work and collaborative efforts.
4. **Exams** (a) Student must obtain a minimum average grade of 50% on exams. If your exam average is not above 50% on these two exams, the lab and term paper marks will be dropped and your final mark will be based on the exams only.  
  
(b) If you miss an exam for any reason other than those deemed acceptable in Lakehead University calendar, then you will be given the opportunity of an essay-based makeup exam that is significantly longer and more difficult.
5. **Citations Style:** For this course, please use the **APA citation style**. You can visit -----  
----- for help with your citations.

## Course Schedule:

Week starting from	Topic	Lab exercise	Reading
Sept. 2	No classes		
9	Introduction to Remote Sensing	No lab this week – literature search for term paper topic	Chapter 1.1 – 1.7
16	Electromagnetic energy, spectral signatures	Introduction to ENVI software, image display and creating spectral signatures	Chapter 1.8 – 1.12
23	Image and sensor characteristics Earth Observation satellites	Online data catalogues, data acquisition and display	Chapters 4 and 5
30	Atmospheric interactions, image corrections (geometric and radiometric)	Image pre-processing, atmospheric and radiometric corrections	Chapter 7.1 - 7.6
Oct 7	Image enhancement/pansharpening Image transformations and spectral indices	Image enhancement – contrast stretching and filtering, pan sharpening and creating indices	Chapter 7.1 - 7.6
14	Reading break no classes		
21	<b>Midterm test</b>		
28	Digital image classification – supervised and unsupervised classifications, accuracy assessment	Image classification and accuracy assessment	Chapter 7.7 – 7.16

Nov 4	Object Based Image Analysis and	Object Based Image Analysis using ENVI software	Chapter 7.17
11	Change detection and biophysical modelling	Analyzing percentage of vegetation coverage over a large area using NDVI	Chapter 7.18 – 7.23
18	Microwave and LiDAR Remote Sensing	RADAR and LiDAR data applications	Chapter 6
25	Applications of Remote Sensing/Review	Explore how to utilize remote sensing for different applications (group assignment, to be presented in class), final exam review	Chapter 8
Dec 2	Final exam Term paper due on Dec 4 <sup>th</sup> .		

*Note that this document is subjected to change pending unforeseen circumstances.*