

## GEOGRAPHY FINAL COURSE OUTLINE: WINTER 2020

### GEOGRAPHY 484 GFC HOURS (3-2)

#### Remote Sensing Essentials

Section	Days	Time	Location
LEC 01	MoWeFr	10:00 – 10:50	MS 217
LAB 01	Mo	11:00 – 12:50	ES 407
LAB 02	Th	09:30 – 11:20	ES 407

Instructor: Geoff Hay	Office: ES 304
Telephone: 403 220 4768	Email: <a href="mailto:gjhay@ucalgary.ca">gjhay@ucalgary.ca</a>

*Please note: The emergency evacuation assembly points for classes taught in Math Sciences is Social Science Food court, and for classes taught in Earth Sciences ICT Food Court.*

#### Official Course Description

Instruction in the background, use and interpretation of remote sensing imagery. Labs and topics introduce fundamental principles of raster-based image analysis, visualization and classification. Labs will include identification, interpretation and mapping of both physical and cultural landscape features.

#### Course Objectives

The course will include instruction in theory, knowledge, use and interpretation of remote sensing imagery. Specific labs will engage students in the identification, interpretation and mapping of both physical and cultural landscape features, as well as multi-band land-cover/land-use classifications and multi-temporal analysis. Students will learn to use state-of-the art digital image processing software to solve real-world processing challenges. They will also gain practical experience using remote sensing technologies for science/resource management, and develop technical/scientific writing skills through formal lab reports.

#### Course Learning Outcomes

The Department of Geography is committed to student knowledge and skill development. The table below lists the key learning outcomes for this course, the program-learning outcomes to which they contribute, and the expected level of achievement.

Course Learning Outcomes	PLO(s)	Level(s)
Identify characteristics of EMR production, transmission & reflection: use wavelength & frequency fluently.	2	1,2
Describe RS history of space and airborne technology @ its current influence.	2	1,2
Perform reflectance & radiance calibrations & correct for atmosphere influence.	3,4,6	2,3
Manipulate data layers, creating colour composites, enhance and visually evaluate satellite and airborne digital images.	3,4,6	1,2
Perform neighbourhood operations on digital images to exploit spatial structure.	4,5,6	1,2
Explain and critique the foundations of RS – including EMR spectrum, energy-matter interactions & the elements of image interpretation.	2,5,7	1,2

Explain and perform RGB colour theory and contrast-enhancements to display multi-band images.	4,5,6	1,2
Explain and perform methods of geometric and radiometric corrections and know when to apply them & to what kinds of data.	4,5,6	1,2
Explain & perform basic image transforms: PCA, Veg Indices, Image Algebra, etc.	4,5,6	1,2
Explain and perform all aspects of classification: supervised/unsupervised, including training and test class selection and accuracy assessments.	2,3,4,5,6	2,3
Explain/critique strengths/limitations of pixel/object-based processing & MAUP.	4,5,6,7	2,3
Write technical reports using standard formats and citation standards.	7,8	2,3

*\*PLOs = Program Learning Outcomes: 1 = reflect and communicate diverse human-environment perspectives, 2 = identify and explain human-environment processes, 3 = implement sampling, data collection, analyses and communication methods, 4 = analyze spatial and temporal aspects of human-environment systems, 5 = employ knowledge, arguments, and methodologies for solving human-environment problems, 6 = evaluate geospatial data and manipulate it to create cartographic products, 7 = communicate geographic concepts using oral, written, graphic, and cartographic modes, and 8 = demonstrate literacy skills.*

*\*\*Levels: 1 = Introductory, 2 = Intermediate, and 3 = Advanced.*

**Prerequisites:**

3 units from Geography 231, 380.

**Learning Resources**

No textbook is required for this course. However, numerous related textbooks are available for overnight sign out from the Resource room, or on request from the instructor who will provide them to the Resource Room. The Internet will serve as an invaluable resource for information in this course and a digital Remote Sensing Text created by CCRS will be provided. There are, however, several recommended textbooks that make for good general reference material. It would be advantageous for students to own, or gain access to one or more of the following texts:

- **Highly recommended:** Jensen, J. R., 2015: Introductory Digital Image Processing: A Remote Sensing Perspective. Prentice Hall. 4<sup>th</sup> Edition. pp 623.
- **(Free) \*\*Fundamentals of Remote Sensing (CCRS- Tutorial), 258 pp.**
- Lillesand, T. M, Keifer, R. W., Chipman, J. W., 2015. Remote Sensing and Image Interpretation. 7<sup>th</sup> Edition. Wiley, pp 720.
- Northey, M. and D.B. Knight, 2012: Making Sense, A Student’s Guide to Research and Writing in Geography and Environmental Sciences, Fifth Edition. Oxford University Press.

**Original Grading (Weighting)**

Item	Weighting
Lab 1	10%
Lab 2	10%
Lab 3	10%
Lab 4	10%
Lab 5	10%
Midterm 1	15%
Midterm 2	20%
Final Exam	10%
Class Participation	5%
<b>Total</b>	<b>100%</b>

**Updated Grading (Weighting) – March 17’20**

Item	Weighting
Lab 1	10%
Lab 2	10%
Lab 3	10%
Lab 4	20%
<del>Lab 5</del>	<del>10%</del>
Midterm 1	15%
Midterm 2	20%
Final Exam	15%
<del>Class Participation</del>	5%
<b>Total</b>	<b>100%</b>

**\*\*Please note** that changes to the proposed grading have been updated in **Red** and components that have been dropped have a ~~line through them~~.

The final (closed book) exam for this course will be held on the last day of classes, and will not be scheduled by the Registrar's Office. Aids (i.e., textbooks, calculators, laptops, etc.) are not permitted. It is not necessary to pass each course component in order to pass the course as a whole.

### Grading System

96 – 100	A+	77 – 80	B	59 – 61	C-
90 – 95	A	71 – 76	B-	55 – 58	D+
86 – 89	A-	65 – 70	C+	50 – 54	D
81 – 85	B+	62 – 64	C	0 – 49	F

### Human subjects

No research will be carried out on human subjects.

### Supplementary Fees

No supplementary fees will be assessed.

### What students should do if they miss a required component of the course.

In the event that a student misses a midterm or any course work due to illness, domestic affliction, or religious conviction, supporting documentation, such as a medical note or a statutory declaration will be required see: <https://www.ucalgary.ca/pubs/calendar/current/m-1.html>

Please refer to <https://www.ucalgary.ca/registrar/registration/appeals/student-faq> for frequently asked questions concerning the provision of a medical note/statutory declaration.

If you miss an assignment or examination, and you provide the instructor with the appropriate documentation, you will have one opportunity to make arrangements for the missed work. Without appropriate documentation, you will receive a zero for that portion of your grade.

**For additional detailed course information posted by the instructor, visit the course Desire2Learn page online at <https://d2l.ucalgary.ca/d2l/home>.**

## SUPPLEMENTAL INFORMATION

### Principles of Conduct

The University Calendar includes a statement on the principles of conduct expected of all members of the university community (including students, faculty, administrators, any category of staff, practicum supervisors, and volunteers), whether on or off university property. This statement applies in all situations where members of the university community are acting in their university capacities. All members of the university community have a responsibility to familiarize themselves with the principles of conduct statement, which is available at: [www.ucalgary.ca/pubs/calendar/current/k.html](http://www.ucalgary.ca/pubs/calendar/current/k.html).

### Plagiarism, Cheating, and Student Misconduct

The University of Calgary is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect.

Academic dishonesty is not an acceptable activity at the University of Calgary, and students are **strongly advised** to read the Student Misconduct section in the University Calendar at: [www.ucalgary.ca/pubs/calendar/current/k-3.html](http://www.ucalgary.ca/pubs/calendar/current/k-3.html). Often, students are unaware of what constitutes

academic dishonesty or plagiarism. The most common are (1) presenting another student's work as your own, (2) presenting an author's work or ideas as your own without adequate citation, and (3) using work completed for another course. Such activities will not be tolerated in this course, and students suspected of academic misconduct will be dealt with according to the procedures outlined in the calendar at: [www.ucalgary.ca/pubs/calendar/current/k-5.html](http://www.ucalgary.ca/pubs/calendar/current/k-5.html).

### **Instructor Intellectual Property**

Information on Instructor Intellectual Property can be found at <https://www.ucalgary.ca/policies/files/policies/Intellectual%20Property%20Policy.pdf>

### **Freedom of Information and Protection of Privacy**

Freedom of Information and Protection of Privacy (FOIP) legislation in Alberta disallows the practice of having students retrieve assignments from a public place, such as outside an instructor's office, the department office, etc. Term assignments will be returned to students individually, during class or during the instructor's office hours; if students are unable to pick up their assignments from the instructor, they must provide the instructor with a stamped, self-addressed envelope to be used for the return of the assignment.

### **Internet and electronic communication device information**

There are no restrictions on the use of laptops and tablets in class if they are used to take notes or find information relevant to the class, and if there is no disturbance or distraction of other students or the instructor. Phones must be turned off during class, unless you have previously identified yourself to the instructor as a health care or law enforcement professional.

### **Posting of Grades and Picking-up of Assignments**

Graded assignments will be returned by the instructor or teaching assistant personally during scheduled lecture or laboratory periods, unless they are made available electronically through the course D2L webpage. Grades and assignments will not be available at the Department of Geography's main office.

### **Academic Accommodations**

It is the student's responsibility to request academic accommodations, according to the university policies and procedures listed in the University Calendar.

The student accommodation policy can be found at: [www.ucalgary.ca/access/accommodations/policy](http://www.ucalgary.ca/access/accommodations/policy). Students needing an accommodation because of a disability or medical condition should communicate this need to Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities: [www.ucalgary.ca/policies/files/policies/student-accommodation-policy.pdf](http://www.ucalgary.ca/policies/files/policies/student-accommodation-policy.pdf).

Students needing an accommodation based on a protected ground other than disability should communicate this need, preferably in writing to their instructor or the Department Head (email: [david.goldblum@ucalgary.ca](mailto:david.goldblum@ucalgary.ca)).

### **Copyright Legislation**

All students are required to read the University of Calgary policy on Acceptable Use of Material Protected by Copyright ([www.ucalgary.ca/policies/files/policies/acceptable-use-of-material-protected-by-copyright.pdf](http://www.ucalgary.ca/policies/files/policies/acceptable-use-of-material-protected-by-copyright.pdf)) and requirements of the copyright act (<https://laws-lois.justice.gc.ca/eng/acts/C-42/index.html>) to ensure they are aware of the consequences of unauthorised sharing of course materials (including instructor notes, electronic versions of textbooks etc.). Students who use material protected by copyright in violation of this policy may be disciplined under the Non-Academic Misconduct Act.

### **Wellness and Mental Health Resources**

The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness, and academic success and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when needed. We encourage you to explore the mental health resources available throughout the university community, such as counselling, self-help resources, peer support, or skills-building available through the SU Wellness Centre (Room 370, MacEwan Student Centre, <https://www.ucalgary.ca/wellnesscentre/services/mental-health-services>) and the Campus Mental Health Strategy website (<http://www.ucalgary.ca/mentalhealth/>).

### **Contact Information for Student and Faculty Representation**

- Student Union VP Academic 403-220-3911, [suypaca@ucalgary.ca](mailto:suypaca@ucalgary.ca)
- Students Union Representatives for the Faculty of Arts – 403-220-3913, [arts1@su.ucalgary.ca](mailto:arts1@su.ucalgary.ca), [arts2@su.ucalgary.ca](mailto:arts2@su.ucalgary.ca), [arts3@su.ucalgary.ca](mailto:arts3@su.ucalgary.ca), [arts4@su.ucalgary.ca](mailto:arts4@su.ucalgary.ca)
- Student Ombuds Office information can be found at: [www.ucalgary.ca/ombuds/](http://www.ucalgary.ca/ombuds/)

### **Campus Safewalk**

Campus Security, in partnership with the Students' Union, provides the Safewalk service, 24 hours a day, to any location on Campus, including the LRT station, parking lots, bus zones, and university residences. Contact Campus Security at 220-5333 or use a help phone, and Safewalkers or a Campus Security officer will accompany you to your campus destination.