

## GEOGRAPHY FINAL COURSE OUTLINE: FALL 2020

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

#### Remote Sensing Essentials

Section	Days	Time	Location
LEC 01	TuTh	11:00 – 12:15	Web Based Course
LAB 01	Mo	11:00 – 12:50	Web Based Course
LAB 02	Th	08:00 – 09:50	Web Based Course

Instructor: Mallik Mahmud	Office: ES 430
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#### 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 goal of GEOG 484 is to develop an understanding on fundamentals of optical remote sensing technology and teach student to establish an image classification workflow. Image classification is the most common task in remote sensing of environment. Students will perform image-processing tasks using Google Earth Engine: a cloud-based platform for planetary scale environmental analysis. Through Google Earth Engine, students will learn how to access Earth Engine's public data catalog and process imagery on Google infrastructure. In parallel, students will also learn how to write JavaScript code on Earth Engine's integrated code editor.

#### Online Meeting Schedule

Section	Meeting Time	Meeting Days/Dates
LEC 01	11:00 – 12:15	Every Tuesday
Lab B01	11:00 – 12:50	Every Monday
Lab B02	08:00 – 09:50	Every Thursday

#### 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**

Jensen, J.E., 2016. Introductory Digital Image Processing: A Remote Sensing Perspective, 4 th Edition. Pearson.

**Learning Technologies and Requirements**

In order to successfully engage in their learning experiences at the University of Calgary, students taking online, remote and blended courses are required to have reliable access to the following technology.

- A computer with a supported operating system, as well as the latest security and malware updates
- A current and updates web browser
- Webcam (built in or external)
- Microphone and speaker (built in or external) or headset with microphone
- Broadband internet connection

**Grading (Weighting)**

- Lab assignments (10 assignments @6% each) 60%
- Class Participation 10%
- Mid-term Test (1 test) 10%
- Final exam (Registrar scheduled) 20%

- It is **not** essential to pass all components in order to pass the course as whole.
- Only pens, pencils and erasers are allowed in exams. No other materials or devices are allowed.
- It is **not** acceptable to copy-paste materials into exams or assignments.
- Late assignments will be assessed a 10% penalty per day unless previous arrangements have been made.

### 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

The only acceptable reasons for missing an examination or assignment in this class, as listed in the Deferral of Final Examinations section of the University of Calgary Calendar are debilitating illness, severe domestic affliction, religious conviction or absence due to a faculty-approved activity. Students who have three final examinations within 24 hours are permitted to request that one examination be deferred to the deferred examination period. If you miss an assignment or examination, and you provide me with supporting 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.

### Supplementary Fees

Not applicable

*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: <https://ucalgary.ca/policies/files/policies/student-academic-misconduct-procedure.pdf>

### **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.

### **Human subjects**

Students in the course will not be expected to participate as subjects or researchers when research on human subjects may take place.

### **Guidelines for Zoom Sessions**

Zoom is a video conferencing program that will allow us to meet at specific times for a "live" video conference, so that we can have the opportunity to meet each other virtually and discuss relevant course topics as a learning community.

To help ensure Zoom sessions are private, do not share Zoom link or password with others, or on any social media platforms. Zoom links and passwords are only intended for students registered in the course. Zoom recordings and materials presented in Zoom, including any teaching materials, must not be shared, distributed or published with the instructor's permission.

The use of video conferencing programs relies on participants to act ethically, honestly and with integrity; and in accordance with the principles of fairness, good faith and respect (as per the [Code of Conduct](#)). When entering Zoom or other video conferencing sessions (such as MS Teams), you play a role in helping create an effective, safe and respectful learning environment. Please be mindful of how your behavior in these sessions may affect others. Participants are required to use names officially associated with their UCID (legal or preferred names listed in the Student Centre) when engaging in these activities. Instructors/moderators can remove those whose names do not appear on class rosters. Non-compliance may be investigated under relevant University of Calgary conduct policies (e.g. Student Non Academic Misconduct Policy). If participants have difficulties complying with this requirement, they should email the instructor of the class explaining why, so the instructor may consider whether to grant an exception, and on what terms. For more information on how to get the most out of your Zoom sessions visit: <https://elearn.ucalgary.ca/guidelines-for-zoom/>.

If you are unable to attend a Zoom session, please contact your instructor to arrange an alternative activity for the missed session (e.g., to review a recorded session). Please be prepared, as best as you are able, to join class in a quiet space that will allow you to be fully present and engaged in Zoom sessions. Students will be advised by their instructor when they are expected to turn on their webcam (for group work, presentations, etc.).

The instructor may record online Zoom class sessions for the purposes of supporting student learning in this class – such as making the recording available for review of the session or for students who miss a session. Students will be advised before the instructor initiates a recording of a Zoom session. These recordings will be used to support student learning only and will not be shared or used for any other purpose.

### **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:

[https://www.ucalgary.ca/policies/files/policies/student-accommodation-policy\\_0.pdf](https://www.ucalgary.ca/policies/files/policies/student-accommodation-policy_0.pdf)

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 <https://www.ucalgary.ca/policies/files/policies/acceptable-use-of-material-protected-by-copyright-policy.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, [suvpaca@ucalgary.ca](mailto:suvpaca@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.