

GEOG*2420 The Earth from Space
DEPARTMENT OF GEOGRAPHY, ENVIRONMENT AND GEOMATICS
COURSE OUTLINE- Fall 2022

1. Instructor

Ben DeVries, HUTT-131, bdv@uoguelph.ca

2. Office hours

Wednesdays, 10am-11am

3. Prerequisite

0.50 credits in Geography and/or Earth Science

4. Overview

This course is one of two foundational courses (the other being GEOG*2480 *Mapping and GIS*) in the Geomatics stream of courses offered by the Department of Geography, Environment and Geomatics. *The Earth from Space* provides an introduction to the fields of remote sensing and photogrammetry, focusing on the history of the disciplines and the basic data sources, techniques, and fields of application. It provides the necessary background for GEOG*3420 *Remote Sensing of the Environment*.

5. Course Description

This course provides an introduction to airborne and satellite Earth Observation systems and data. Topics include physical principles of remote sensing, air photo interpretation, photogrammetry, types of Earth Observation satellites and environmental applications of remote sensing. Lab exercises focus on specific applications of remote sensing image interpretation and analysis in natural habitats and in rural and urban settings.

6. Learning Outcomes

By the end of the course, you should be able to:

- Understand the history and foundational theories behind the field of Earth Observation
- Gained a basic knowledge of the main Earth Observation systems, technologies and data sets
- Analyze imagery data using open-source GIS software
- Understand photogrammetric techniques and practices
- Identify key application areas in Earth Observation
- Practice communicating concepts through formal written and visual forms

7. Course Organization and Presentation

Lectures for GEOG*2420 will be held in a face-to-face setting. Slides will be made available before or after the scheduled lecture. However, not all information covered in the course is included on the slides, and all students are expected to take their own complete notes during lectures.

8. Text and Other Resources

There is no required text for this course. Some required readings may be provided via the Courselink site for this course and will be announced throughout the course. There are many introductory Remote Sensing textbooks.

One *recommended* text for this course is:

Qihao Weng (2012) *An Introduction to Contemporary Remote Sensing*. McGraw Hill, ISBN: 9780071740111.

9. Method of Evaluation

The evaluation for this course will consist of a mid-term and final exam and four equally-weighted lab assignments. The lab material constitutes an integral part of this course, since this is where students receive hands on work with airborne and satellite imagery and must apply the techniques they have learned in lectures. Labs must be submitted to the teaching assistant by the beginning of the lab section in the week they are due, with a late penalty of 10% of the total assignment grade per day, including weekends. Concepts covered in the lab may be included on both the mid-term and final exams.

10. Grade Distribution

- Lab Assignments: 40%
- Mid Term Exam: 30%
- Final Exam: 30%

11. Lecture topics

This course will cover the following topics:

- Introduction to airborne and satellite remote sensing systems
- Principles of electromagnetic radiation
- Spatial, spectral, radiometric and temporal resolution
- Aerial image interpretation
- Photogrammetry
- Multispectral, hyperspectral and thermal remote sensing
- LiDAR remote sensing
- Synthetic Aperture Radar (SAR) remote sensing

12. Lab topics

Labs will be held in a face-to-face format. Meeting times and room numbers will be provided before the beginning of the semester.

Four equally-weighted laboratory exercises are planned for the Fall 2022 semester, worth a total of 40% of your final grade. Your teaching assistant will provide specific details about the procedure for submitting each lab. Late lab assignments will be penalized by 10% per day, including weekends (see *When You Cannot Meet a Course Requirement*).

Lab assignments will cover some material discussed in lectures, but will emphasize practical applications of remote sensing. In some cases, additional concepts may be introduced to build upon topics discussed in lectures. A *tentative* lab schedule is given in the table below:

Week	Start of week	Topic	To be handed in
1	2022-09-05	No lab	
2	2022-09-12	Lab 0: Self-study	
3	2022-09-19	Lab 1: Visualizing Multispectral Imagery	
4	2022-09-26	Lab 1 continued	
5	2022-10-03	Lab 2: Georeferencing airphotos	Lab 1
6	2022-10-10	No labs (Fall break)	
7	2022-10-17	Lab 2 continued	
8	2022-10-24	Lab 3: spectral indices and time series	Lab 2
9	2022-10-31	Lab 3 continued	
10	2022-11-07	Lab 4: Interpreting SAR imagery	Lab 3
11	2022-11-14	Lab 4 continued	
12	2022-11-21	No labs	Lab 4
13	2022-11-28	No labs	

Most of the labs will be conducted in QGIS, a free and open-source GIS software program. All necessary software will be available on the GIS lab computers in the Hutt building. Students wishing to carry out lab work on their personal computers will be responsible for installing and maintaining their own software. Instructions for doing so will be provided in Lab 0.

13. Laboratory Fee

There are no laboratory or printing fees associated with this course. All lab assignments are to be submitted in digital format to folders that will be set upon the Courselink page for this course.

14. Exam Format

There will be one mid-term and one final exam in this course. The exams will be closed-book format and will be held in a face-to-face setting. The midterm exam will be held on **Thursday, October 20th at 2:30pm** in the regularly scheduled lecture room for this course. The final exam is scheduled for **Friday, December 16th at 8:30am**. The location of the final exam will be announced later in the course.

15. Illness

Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g. final exam or major assignment).

16. COVID-19 Safety Protocols

For information on current safety protocols, follow these links:

- <https://news.uoguelph.ca/return-to-campus/how-u-of-g-is-preparing-for-your-safe-return/>
- <https://news.uoguelph.ca/return-to-campus/spaces/#ClassroomSpaces>

Please note, these guidelines may be updated as required in response to evolving University, Public Health or government directives.

17. Disclaimer

Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings, changes in classroom protocols, and academic schedules. Any such changes will be announced via CourseLink and/or class email. This includes on-campus scheduling during the semester, mid-terms and final examination schedules. All University-wide decisions will be posted on the COVID-19 website (<https://news.uoguelph.ca/2019-novel-coronavirus-information/>) and circulated by email.

18. Territorial Acknowledgements

We acknowledge that the University of Guelph resides on the ancestral lands of the Attawandaron people and more recently, the treaty lands and territory of the Mississaugas of the Credit. We recognize the significance of the Dish with One Spoon Covenant to this land and offer our respect to our Anishinaabe, Haudenosaunee and Métis neighbours as we strive to strengthen our relationships with them.

Today, this gathering place is home to many First Nations, Métis and Inuit peoples and acknowledging them reminds us of our important connection to this land where we learn and work.

19. E-mail Communication

As per university regulations, all students are required to check their e-mail account regularly: e-mail is the official route of communication between the University and its students.

20. When You Cannot Meet a Course Requirement

Late assignments will be assessed a penalty of 10% per day (not including weekends). After the graded assignment has been handed back to the class no grade can be assigned on late work.

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. [See the undergraduate calendar for information on regulations and procedures for Academic Consideration.](#)

21. Drop Date

The last date to drop one-semester courses, without academic penalty, is Friday, December 2nd, 2022. For regulations and procedures for Dropping Courses, see the Undergraduate Calendar.

22. Copies of out-of-class assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

23. Accessibility

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact the Student Accessibility Services (SAS) as soon as possible.

For more information, contact SAS at 519-824-4120 ext. 56208 or email csd@uoguelph.ca or see the website: <http://www.uoguelph.ca/csd/>

24. Academic Misconduct

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. **An example of academic misconduct that might occur in this course is a student copying an answer or using a map/image from another student. Students must create their own digital files for computer-based exercises.** University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

[The Academic Misconduct Policy is detailed in the Undergraduate Calendar.](#)

25. Recording of Materials

Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

26. Resources

The [Academic Calendars](#) are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs.