

DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES
CARLETON UNIVERSITY

GEOM3002 – AIR PHOTO INTERPRETATION AND REMOTE SENSING

Instructor: Dr. Andrew Davidson

Office Hours: Monday, 20.05 – 21.55, A200 LA (or by appointment).

Lectures: Monday, 18.05 – 19.55, A200 LA.

Labs: TBD. To be presented in first lecture.

Email: andrew.davidson@carleton.ca

TA: TBD

Email: TBD

Help: TBD

Prerequisite: GEOM 1004, OR 3rd year standing, OR permission of department. Students without these should see me after the 1st class to discuss. Some understanding on the part of the student of spatial patterns on the Earth's surface and of maps and scales is assumed. Basic mathematics and statistics background is beneficial. Some use of calculators is required in labs and exams.

Objectives: Lectures provide the conceptual and technical background related to image formation and spectral reflectance theory, visual interpretation of images, image enhancement, types of remote sensors currently in use, thematic mapping using remotely sensed imagery, and other applications of remote sensing. Labs offer an opportunity for students to apply these concepts and techniques in visual and computer-based identification, interpretation and mapping of Earth surface landforms and materials, urban environments, and land use/land cover mapping using aerial photographs and digital satellite imagery. This course provides a foundation for GEOM 4003W, Remote Sensing of the Environment, a digital image analysis course where quantitative modelling and thematic mapping techniques are presented for the major applications of remote sensing.

Topics: a) Aerial photography: stereo visual interpretation of archival hardcopy photos and of on-screen digital photos; the elements of interpretation; interpretation of the landforms, surface materials, and land use/cultural patterns; landscape change analysis; camera/sensor formats, geometry, and flight planning for aircraft and UAV-based imaging.

b) The electromagnetic spectrum and sensors: the physical basis for remote sensing; the nature of Earth surface reflectance/emittance; spectral reflectance curves; overview of remote sensors and platforms.

c) Introduction to digital image processing and classification: image processing to reduce noise and defects and to enhance imagery for visual interpretation and feature detection; automated thematic classification for mapping of land cover types.

Readings

1) Lillesand, T., R. Kiefer, and J. Chipman. 2004. *Remote sensing and image interpretation*. 5th edition. John Wiley and Sons. Toronto.

2) Jensen, J. R. 2005. *Introductory digital image processing: A remote sensing perspective*, 3rd Ed. Prentice Hall.

3) Jensen, J.R. 2007. *Remote Sensing of the Environment: An Earth Resource Perspective*. 2nd edition. Prentice-Hall.

Although the lectures sometimes follow Jensen (2007), there is no defined course text (i.e. concepts taught in class are covered in many books). Copies of texts are placed on reserve at the Carleton University Library and will be available for in library loan under course listings for **GEOG3002**.

4) Lecture presentations will be made available online. URL will be given in class.

5) Other readings will be assigned as required.

Program:

1. *Lectures*. Twelve (12) lectures will be given, as per the schedule.
2. *Lab exercises*. Five (5) exercises will be assigned, as per the schedule.
3. *Final examination*. A final examination will be scheduled in the Final Exam period.

Evaluation:

Lab reports	60%
Final examination	40%
<i>TOTAL</i>	<i>100%</i>

Standing in a course is determined by the course instructor subject to the approval of the Faculty Dean. This means that grades submitted by the instructor may be subject to revision. No grades are final until they have been approved by the Dean.

Final Exam:

A two-hour short-answer examination will be scheduled in the Final Examination period. Exam will be a combination of multiple choice, short answer, and long answer (synthesis) questions. No aids except calculator required.

Labs:

Labs are in A211 Loeb for the first part of term and in A237 Loeb for the second part. They consist of a combination of visual interpretation of hardcopy images, and theoretical/descriptive questions and computer analysis. They are one or two weeks in duration and will be handed back within 2 weeks. Each week of lab work is generally worth 5%. The lecture and lab schedule will be presented in the 1st lecture.

All labs are due within 1 hour of the beginning of your lab period on the due date. After that, 10% of the lab worth will be deducted per day, starting on the day it is due.

i.e., If your lab is due at 2:30 PM on Tuesday, but the TA receives it Friday evening, you will lose 10% for the rest of Tuesday, 10% for Wednesday, 10% for Thursday, and 10% for Friday, as it was handed in after 2:30 – the time of the lab) i.e. 40% total. If you finish a lab on the weekend, hand it in through cuLearn right away as each day on the weekend counts as 10% (you may need to scan the lab if you use the paper format (e.g. in Labs 2-4).

You may collaborate with others in working through the assignments, but you must prepare and submit your own separate lab report, written in your own words, which clearly demonstrates your understanding, interpretation and analysis. The goal is to learn the material on your own, so try to avoid depending on others for answers to questions in the assignments and try not to give blatant answers to others.

Exams: Combination of multiple choice, short answer, and long answer (synthesis) questions. No aids except calculator. The exam will be discussed, including sample exam questions and a summary of the course, at the end of the course.

Resources: *Help with laboratory and lecture materials:*

There are a variety of ways to get help if you are having difficulties with any of the course materials. PASS (see below), informal study groups with other classmates, judicious use of the text, lab manual and a variety of websites listed on WebCT are valuable resources. The course instructor is there to facilitate your learning. Ask for help when you need it! The instructor will maintain office hours, where you can drop in for assistance. If you need help outside those times, arrange a meeting with them.

Peer Assisted Study Sessions (PASS):

Organized by the Centre for Initiatives in Education, peer assisted study sessions are weekly study sessions led by trained students who have earned an A in this course in past years. PASS facilitators will work with small groups of students to review course content and develop course-appropriate learning strategies. Sessions are entirely voluntary and anonymous and are intended to offer a safe, friendly place to help students develop strategies to be successful. Whether your aim is to survive GEOG1010 or maintain that A average, the PASS facilitator can help you achieve your goal. For more information go to www.carleton.ca/pass, email pass@carleton.ca or call (613) 520-2600 Ext. 1523. Further details about sessions will be provided during the lecture period.

Academic conduct:

The University Senate defines plagiarism as "presenting, whether intentionally or not, the ideas, expression of ideas or work of others as one's own." This can include:

- (a) reproducing or paraphrasing portions of someone else's published or unpublished material, regardless of the source, and presenting these as one's own without proper citation or reference to the original source;
- (b) submitting a take-home examination, essay, laboratory report or other assignment

written, in whole or in part, by someone else;

(c) using ideas or direct, verbatim quotations, or paraphrased material, concepts, or ideas without appropriate acknowledgment in any academic assignment;
using another's data or research findings;

(d) failing to acknowledge sources through the use of proper citations when using another's works and/or failing to use quotation marks;

(e) handing in "substantially the same piece of work for academic credit more than once without prior written permission of the course instructor in which the submission occurs.

Plagiarism is a serious offence which cannot be resolved directly with the course instructor. A rigorous investigation is conducted by the Office of the Faculty Dean, including an interview with the student, when an instructor suspects a piece of work has been plagiarized. Penalties are not trivial.

Students should consult the Student Conduct: Instructional Offenses and Offenses of Conduct – Discrimination and Harassment sections of the Undergraduate Calendar for details regarding policies on academic misconduct (Sections 14 and 15 at <http://www.carleton.ca/cuuc/regulations/acadregsuniv.html>) for more information.

Requests for Academic Accommodations For Students with Disabilities:

Students with disabilities needing academic accommodations are required to contact a coordinator at the Paul Menton Centre to complete the necessary letters of accommodation. The student must then make an appointment to discuss their needs with the instructor at least two weeks prior to the first class or ITV test. This is to ensure sufficient time is available to make the necessary accommodation arrangements.

For Religious Observance:

Students requesting academic accommodation on the basis of religious observance should make a formal, written request to their instructors for alternate dates and/or means of satisfying academic requirements. Such requests should be made during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist, but no later than two weeks before the compulsory academic event. Accommodation is to be worked out directly and on an individual basis between the student and the instructor(s) involved. Instructors will make accommodations in a way that avoids academic disadvantage to the student.

Students or instructors who have questions or want to confirm accommodation eligibility of a religious event or practice may refer to the Equity Services website for a list of holy days and Carleton's Academic Accommodation policies, or may contact an Equity Services Advisor in the Equity Services Department for assistance.

For Pregnancy:

Pregnant students requiring academic accommodations are encouraged to contact an Equity Advisor in Equity Services to complete a letter of accommodation. The student

must then make an appointment to discuss her needs with the instructor at least two weeks prior to the first academic event in which it is anticipated the accommodation will be required.