

GEOG 321 Climatic Environments

(3 credits; Wed & Fri 11:30-13:00)

Instructor: Dr. Ian B. Strachan
Primary office: Macdonald-Stewart Building MS2-076 on the Macdonald Campus
Downtown office: Burnside Hall 6xx
Office hours: Wednesday&Friday after class in BH6xx or by appointment.
Phone: 514.398.7935 (Macdonald)
e-mail: ian.strachan@mcgill.ca

Teaching Assistants: Silvie Harder and Rachel Dryden; Office locations and hours: TBD

Prerequisite: GEOG203 Environmental Systems; permission of instructor; fundamental scientific and mathematical knowledge will be expected.

Content and learning outcomes:

This course provides an introduction to the theory and techniques used in microclimatological research. The lecture material focuses on the nature of the exchanges of energy and trace gases between the earth's surface and the atmosphere. We will explore how the transfer of radiative energy through the earth-atmosphere system results in earth's regional and microclimates and how the transfer of heat and humidity to the atmosphere is influenced by local features. The course largely focuses on microclimatology and the exchange processes of energy, mass and momentum within the earth-atmosphere boundary layer that result in the local climates that we experience. Students completing this course should have gained an understanding of: how exchanges of energy, gas and momentum are made within the lower atmosphere and the basic principles of such exchanges; how the surface influences, and is influenced by, shorter-term changes in atmospheric patterns. Students should have attained an appreciation of the complexity and elegance of the world's diverse landscapes from a climatic perspective, and be well placed to apply this understanding in their degree programs and future career choices.

The following major themes will be covered within the lectures:

1. Radiation properties, laws, transfer, and the balance of surfaces
2. Moisture and temperature distributions
3. Conduction, soil heat and temperature
4. Convection, lapse rates, stability, and wind profiles
5. Atmospheric boundary layers
6. Evapotranspiration and the surface energy balance
7. Surface-atmosphere trace gas (CO₂ and CH₄) exchange
8. Measurement methods for trace gas exchange

Method: Two 1.5 hour lectures per week; assignments; group work; tests.

Textbook: None required. There is currently no single textbook that covers the material in sufficient detail or is free of extraneous content to be worth assigning. A classic text on the subject is: Oke, T.R., 1987. *Boundary Layer Climates*. Second Edition. Routledge, 435 pp. Material in this book is presented at a level suitable for all students taking this class – it is a good reference and used copies should be available.

Readings: The lecture material will be supplemented by journal articles. These will be provided on MyCourses. Students are expected to come to class prepared to use these in discussions.

Course Requirements:

Assignments: There will be several assignments which will provide you with the opportunity to fine tune and demonstrate your understanding of concepts described during the lectures. These assignments may require the use of computer spreadsheets and word processors available on computers throughout the University. It is assumed that you are sufficiently proficient at using these basic computer tools. The MyCourse page will have links to the assignments where you can download the necessary materials.

Policy on lateness: Assignments are due at the beginning of class on the date specified on the assignment when handed out. In fairness to those who complete assignments on time, a penalty of 10% per day will be imposed beginning immediately following the class period. No assignments will be accepted for grading once any graded assignments have been returned. However, circumstances occasionally arise which will be taken into consideration. If you are having academic/personal difficulty – come and discuss your situation with me in advance of the due date!

Examinations: There will be a mid-term examination which will be written in class (date: TBA). There will be a final examination in the formal period at the end of term. The final exam is cumulative. Each of these exams is designed to evaluate your understanding of the lecture material.

Evaluation: 20% Midterm Exam
 35% Final Exam
 45% Assignments

McGILL UNIVERSITY VALUES ACADEMIC INTEGRITY. THEREFORE ALL STUDENTS MUST UNDERSTAND THE MEANING AND CONSEQUENCES OF CHEATING, PLAGIARISM AND OTHER ACADEMIC OFFENCES UNDER THE CODE OF STUDENT CONDUCT AND DISCIPLINARY PROCEDURES (see www.mcgill.ca/students/srr/honest/ for more information).

In accord with McGill University's Charter of Students' Rights, students in this course have the right to submit in English or in French any written work that is to be graded.
