

McGill University
Department of Geography
GEOG-203: ENVIRONMENTAL SYSTEMS
COURSE OUTLINE 2019

This course presents a systems approach to the study of the temporal and spatial variability of the natural environment near the earth's surface. Emphasis is on understanding the processes of mass and energy exchange that drive the variability in the earth's climate, its water cycle, soil development, biogeochemical cycles, plant production, and distribution of plant communities. The knowledge gained sheds light on environmental processes of increasing interest, such as global warming feedback mechanisms involving the water cycle and vegetation, the impacts of agriculture, deforestation and acid precipitation on water and nutrient cycles, soil erosion, and eutrophication of aquatic systems.

There are two lectures per week, Wednesday and Friday, 10:05-11:25, starting September 4 in Evo Residence, 420 Sherbrooke St. W. The sequence of 22 lectures, two tests and one final exam is divided into three sections, covering fundamental aspects of the atmosphere, hydrosphere, lithosphere and biosphere, with a focus on interactions at the drainage basin scale. The two instructors approach the course topics within a common, integrated Earth Surface Systems viewpoint. After each section there will be a Q&A session before the test.

SECTION 1: EARTH SURFACE CLIMATOLOGY AND DRAINAGE BASIN HYDROLOGY

Instructor: **Dr. Tim Moore** (BH 626, tim.moore@mcgill.ca)

September 6 - October 2: seven lectures, one assignment, one test (Wednesday, October 2, evening).

The parts, processes and patterns of the atmosphere: composition, global energy system, air temperature, winds, atmospheric moisture and precipitation, weather systems. The water cycle and hydrological processes at the scale of the drainage basin: precipitation, interception, evapotranspiration, infiltration, and runoff. Effects of changes in land use, such as urbanization and deforestation, on climate and hydrology.

SECTION 2: SOIL FORMATION AND EROSION AND BIOGEOCHEMICAL CYCLING IN DRAINAGE BASINS

Instructor: **Dr. Christian von Sperber** (BH 613B, chris.vonsperber@mcgill.ca)

October 4 – November 1: eight lectures, one assignment, one test (Wednesday, November 6, evening).

An examination of the natural processes and factors that control the formation of soils. This will include an overview of the mineralogy of parent materials, of different weathering processes and of the most important soil physical properties. Consideration of the biogeochemical cycling of carbon, nitrogen and phosphorus in the soil-plant system. Based on what we have learned about the nature of soils, we shall discuss the effects of anthropogenic land-use change on soil physical and chemical properties.

SECTION 3: BIOGEOGRAPHY

Instructor: **Dr. Tim Moore and Dr. Christian von Sperber**

November 6 – November 29: seven lectures, one assignment requiring self-guided field trip to the Montreal Botanical Garden. *You will be examined on this material in the final exam.*

This is an introduction to ecological biogeography covering: distribution of the world's biota and environmental controls with an emphasis on vegetation disturbance and succession in terrestrial and aquatic ecosystems. We will consider energy and carbon flow in the environment, as they relate to global warming and environmental sustainability. We shall examine the functioning of wetland ecosystems and the impact of humans, and ecosystem impact and recovery from acid precipitation.

Email address of teaching assistants will be available through *myCourses*.

Four TEAM mentors (undergraduate who have taken the course) will be available to assist students.

Course Evaluation

3 assignments (one per section, 8.3% each)	25%
2 tests (Oct. 2 and Nov. 6, 25% each)	50%
Final Exam (during exam period)	25%

The two **tests** will be administered during regular lecture periods or in the evening of the same day. The tests are not cumulative: the test on October 2 covers material from section 1; the test on November 6 covers material from section 2.

The **final exam** is held during the formal exam period in December on a date set by the University later in the term. The final exam covers section 3. You must take the final exam, but passing the final exam is not required to pass the course. The Deferred Exam is administered by the University in spring 2020, will be worth 25% of the course grade and covers only the final section.

READINGS

The following are available through the McGill Bookstore and on Course Reserves at the McLennan Library.

Required readings will come from:

Christopherson, R.W., Birkeland, G.H., Byrne, M.-L. and Giles, P. 2016. *Geosystems, 4th Canadian Edition*, Pearson, 669 pp. Call number is GB54.5 C47 2016 3 copies on Reserve (48 h loan) **OR**

Christopherson, R.W, Byrne, M.-L. and Giles, P. 2013. *Geosystems: An Introduction to Physical Geography, 3rd Canadian Edition*, Pearson, 655 pp. Call number is GB54.5 C475 2013 2 copies on Reserve (48 h loan) **OR**

Christopherson, R.W. and Byrne, M.-L. 2009. *Geosystems: An Introduction to Physical Geography, 2nd Canadian edition*, Pearson, 709 pp. Call number is GB54.5 C475 2009 2 copies on Reserve (48 h loan) and 2 copies on Schulich's Regular loan

Students have told us they find a comprehensive text such as this to be a useful reference, particularly in upper level Geography courses. The 3 editions are very similar in content.

A scanned copy of the critical sections of the Christopherson book will be available in pdf form on the MyCourses site, courtesy of the University Library.

Additional required readings will be available on-line.

Recommended:

Northey, M. and Knight, D.B. (2012) *Making Sense: a Student's Guide to Research and Writing in Geography and Environmental Sciences*. Oxford University Press. Call number G74 N67 2012 (2 copies on Reserve). This book will be useful throughout your university career. It provides guidance in using the university library, writing essays, and doing research (such as will be required in your third assignment). Sections on preparation of reports and presentations will be useful in your upper level courses.

OTHER REQUIREMENTS

One of your assignments will require that you visit the Montreal Botanical Gardens (<http://www2.ville.montreal.qc.ca/jardin/en/propos/propos.htm>), easily accessible by the metro. Student admission is \$14.75 with your student ID and further discounted for Quebec residents and those who hold an ACCESS Montreal card.

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 <http://www.mcgill.ca/integrity>) 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.

For information on university and department policies for student assessment and reassessment, please go to <http://www.mcgill.ca/geography/studentassessment>

In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change.

If you have a disability please contact the instructor to arrange a time to discuss your situation. It would be helpful if you contact the Office for Students with Disabilities at 514-398-6009 (<http://www.mcgill.ca/osd/>) before you do this.

Additional policies governing academic issues which affect students can be found in the McGill Charter of Students' Rights ([here](#)).