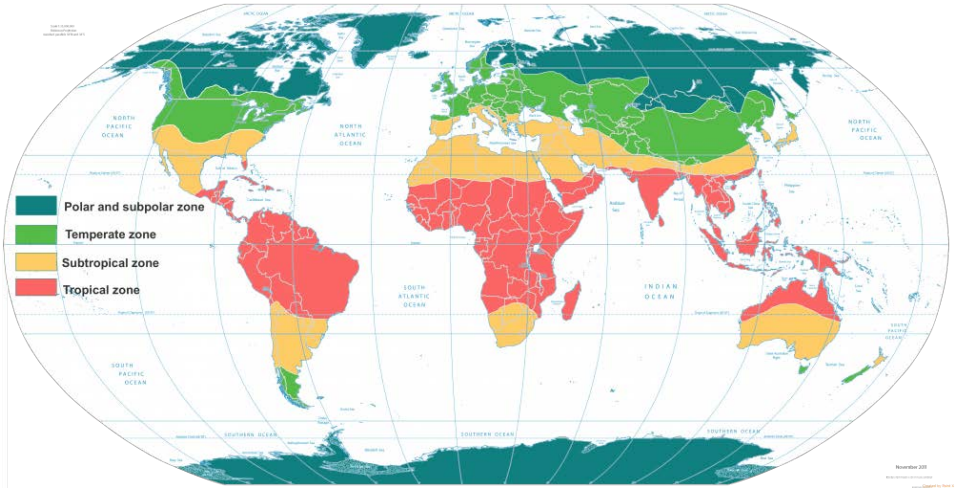
McGill University
Department of Geography
GEOG-203: ENVIRONMENTAL SYSTEMS
PRELIMINARY COURSE OUTLINE 2021



GEOG-203 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.

The Covid-19 pandemic has significantly changed the world we live in and GEOG-203 will be offered remotely in 2021, as was the case in 2020. Apart from the first class, lectures will be pre-recorded and released two per week through myCourses before the class date. The class times will be used for live, question/answer sessions for students to interact with professors and Teaching Assistants and TEAM mentors. Assessment will be based on quizzes, assignments and tests. All readings will be available on myCourses, at no cost.

The format in 2021 follows that in 2020 when the course was well-received by students. Student Mercury evaluations on questions about 'excellence and learning a great deal' averaged 4.1 out of 5.0 for the course and 4.3 out of 5.0 for the instructors, respectively.

The course is divided into three sections covering fundamental aspects of the atmosphere, hydrosphere, lithosphere and biosphere focusing on interactions at the drainage basin scale and role of disturbance in ecosystems. The instructors approach the course topics within a common, integrated Earth Systems Science viewpoint. The course is scheduled for Tuesday and Thursday, 11:35 – 12:55, starting Thursday Sept. 2 and ending Thursday Dec. 2.

SECTION 1: EARTH SURFACE CLIMATOLOGY AND DRAINAGE BASIN HYDROLOGY

Instructor: **Dr. Tim Moore** (tim.moore@mcgill.ca). September 7 – October 30: eight lectures, one assignment, one test (begins Tuesday, October 5). We shall examine include the parts, processes and patterns of the atmosphere: composition, global energy system, air temperature, winds, atmospheric moisture and precipitation, weather systems. This is followed by the water cycle and hydrological processes at the scale of the drainage basin: precipitation, interception, evapotranspiration, infiltration, and runoff. Finally, we assess the effects of changes in land use, such as urbanization and deforestation, on climate and hydrology.

SECTION 2: SOILS AND BIOGEOCHEMICAL CYCLING

Instructor: **Dr. Christian von Sperber** (chris.vonsperber@mcgill.ca). October 7 – 28: seven lectures, one assignment, one test (begins Tuesday, November 2). The objective of this section of the course is to examine 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. We shall then cover the biogeochemical cycles of carbon, nitrogen and phosphorus in the soil-plant system. The understanding of the biogeochemical and physical factors of soil formation will help us to describe the wide range of soils found in Canada and across the world. Based on what we have learned about the nature and properties of soils, we shall discuss the effects of anthropogenic land-use change on soils and the environment.

SECTION 3: BIOGEOGRAPHY

Instructor: **Dr. Gail Chmura** (gail.chmura@mcgill.ca), phone (514) 926-6854
Website https://chmuralab.weebly.com/
Please put GEOG 203 in the email subject line, indicate *your* time zone and availability in the Montreal time zone. We can meet through zoom or alternative media that is accessible to you.
Availability of this section will be from November 4 - December 2 consisting of eight lectures. The assignment may require online research.
You will be assessed on only this last third of the course during the final exam period.
This section 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.