

ESYS 104: The Earth System 2012
LEACOCK 219
1:05 – 2:25 Tuesdays and Thursdays

Earth can be viewed as a dynamic interacting system of atmosphere, life, ocean, rock and soil. Earth is open energetically but largely closed materially. Earth's surface and interior have changed through time and continue to change today. Understanding these changes and what drives them is the goal of Earth system science. This course will introduce the core processes of the 'Earth System' and apply them to the 21st Century global challenges posed by climate change, which is occurring at the same time as increasing stresses on services provided by natural ecosystems due to human population growth and resource utilization.

This course is aimed at the U0 Science level, hence we will build upon your existing math and science knowledge.

Professors:

Frédéric Fabry Burnside Hall, Room 816

Office hours: by appointment

Jan Franssen Burnside Hall, Room 625

Office hours: by appointment

William Minarik Frank Dawson Adams Building, Room 215

Course Coordinator (the person to contact with respect to course administration)

Office hours: after class on Tuesdays (2:30-3:30) or email on *myCourses* for an appointment

Teaching Assistants: (can be emailed through *myCourses*)

Steve Pratte and Qiang Chen (EPSC), Alexandra Anderson-Frey (ATOC),

Thomas Neulieb (GEOG)

Course Topics:

<i>No.</i>	<i>Date</i>	<i>Lecturer</i>	<i>Subject</i>
1.	10-Jan	all three	Introduction
2.	12-Jan	(FF)	Energy and the atmosphere
3.	17-Jan	(FF)	Atmospheric and oceanic circulations
4.	19-Jan	(FF)	Weather and climate
5.	24-Jan	(FF)	Atmospheric variability and extremes
6.	26-Jan	(WM)	Solar system/Earth materials
7.	31-Jan	(WM)	Plate tectonics
8.	2-Feb	(WM)	Reservoirs and resources
9.	7-Feb	(WM)	Introduction to hydrology, soils and their productivity
10.	9-Feb	(WM)	Introduction to biomes, ecology and ecosystems
11.	14-Feb	(WM)	Global population growth
	16-Feb		MIDTERM 1
	21-Feb		Winter break
	23-Feb		Winter break
12.	28-Feb	(WM)	Deep time/Earth history
13.	1-Mar	(WM)	Snowball Earth (evolution of atmosphere)

No.	Date	Lecturer	Subject
14.	6-Mar	(WM)	Himalayas, weathering & Pleistocene glaciation (geological CO ₂ cycle)
15.	8-Mar	(FF)	Natural climate forcings & paleoclimate
16.	13-Mar	(FF)	Global & regional climate change
17.	15-Mar	(FF)	Weather, climate and civilization
18.	20-Mar	(JF)	Intro to ecosystem resilience and catastrophic regime shifts
19.	22-Mar		MIDTERM 2
<i>Two lectures on climate change, population growth and pressures on food and water resources:</i>			
20.	27-Mar	(JF)	Regional case study 1: The Sahel and the subtropics
	29-Mar	(JF)	Regional case study 2: The U. S. Southwest and the Canadian Prairies
21.	3-Apr	(JF)	Coastal vulnerability to sea level rises
22.	5-Apr	(WM)	Geologic hazards
23.	10-Apr	(WM)	Energy alternatives
24.	12-Apr	all three	Climate change mitigation and adaptation: an overview

There is no textbook, but a Course Pack (available at Bookstore) contains the required readings for most of the course. Some additional required readings on topical subjects will be announced in class and posted on *myCourses* (see below).

This is not a Web-based course: accessing complete course content requires lecture attendance. Exam questions will be based on the readings and also on unique material presented in lecture. You are encouraged to ask questions during class!

Marking: 30% assignments, 30% best score of the two midterm exams, 40 % Final Exam

There will be 4 assignments throughout the course, two midterm exams, and a comprehensive final exam. The highest score of the two midterms will be used to determine that 30% of your final mark. **Late assignments** are given a penalty of 10% per day, which can be waived only on delivery to the course coordinator, Prof Minarik, of a dated doctor's note.

myCourses (WebCT Vista)

myCourses will be used extensively through the course. *myCourses* has unique e-mail addresses for the professors, teaching assistants, and students in the course, as well as a Group Discussion section; this is the second best place (the first is in class) to ask questions on the course material. We will also be posting additional readings, links to Earth Systems web sites, lecture material, and study guides on *myCourses*. Check *myCourses* frequently for course announcements.

Additional Information:

"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."