Department of Earth and Environment

GLY 6061-U01 Geoscience Systems
Fall 2018, Tu/Th 11-12:15, AHC4 202

Course Description: Geoscience systems function in the deep Earth, shallow Earth, Earth's surface and Earth's atmosphere. They form one great dynamic system in which each is a part of other systems. We will compare and analyze each of these systems as well as read and discuss recent research, discoveries and debates.

Course Objectives: to examine major concepts in geologic and atmospheric sciences, and read important scientific articles on those subjects

Learning Outcomes: an in-depth understanding of the interaction of Earth's dynamic systems and how they have changed through geologic time, as well as the latest research topics in these areas

Instructors and contact information *(in order of appearance)*:

Professor	Email	Phone	Office Hours
Dr. Grenville Draper	draper@fiu.edu	305-348-3087	ZEB 225, by appointment
Dr. Laurel Collins	collinsl@fiu.edu	305-348-1732	PC 435, T 2-3:30, F 10:30-12
Dr. Michael Sukop	sukopm@fiu.edu	305-348-3117	AHC5 369 M/W 1:30-2:30
Dr. Ping Zhu	zhup@fiu.edu	305-348-7096	AHC5 234 Tu/Th 12:30-1:30 PM

Course structure: Students read and discuss 1-2 scientific articles that are assigned for every class. Before the class discussion, the instructor provides background for understanding the article, and the readings give a fundamental basis of concepts and terminology for that discipline. The scientific articles cover classic research debates and principles, as well as the latest breakthroughs and discoveries. During the last week of class, students become lecturers with presentations in their own areas of research.

Grading: Grades on the scale A-F will be based on:

- periodic pop quizzes and/or assignments (30% of grade),
- class participation (20%),
- participation in two field trips (20%), and
- a 20-minute presentation, including questions (30%).

Grades use the scale: A = 93-100%, A- = 90-92%, B+ = 87-89%, B = 83-86%, B- = 80-82%, C+ = 77-79%, C = 70-76%, D = 60-69%, F = 0-59%. Class participation is evaluated by how much you contribute to the conversation. The student presentation is given in the style of an instructor on a subject that is part of their research area and is related to the course.

Policies:

- Two field trips will be held on weekends in November. Any absence may only be excused with a doctor's note verifying an illness or condition that prevents physical activity.
- You are expected to arrive to class before the class begins, and to stay for the entire class.
- The use of cell phones in class is prohibited. Cell phones must be silenced.
- You are expected to maintain high standards of academic honesty. Any student found in violation of these standards will earn an automatic F and be reported to the Deans Office, no exceptions made. In accordance with FIU's policy on academic honesty, as set forth in Section 2.44 of the Academic Affairs Policies and Procedures Manual (http://academic.fiu.edu/polman/sec2web.htm#two-forty-four), it is expected that students will neither submit the academic work of another as their own, nor provide work they have done for another student to be submitted as that other student's work.
- No sound or video recordings without permission

Class Schedule

Note: Be prepared to rearrange this schedule, including final exams week, in the event of university closure due to hurricanes.

Aug. 21 Introduction to course and instructors, discussion of student presentations

Part 1: Dr. Draper – The Earth's Interior

Aug. 23 A crystal planet: minerals and rocks
28 Deformation of rocks; earthquakes
30 Interior of the earth, geomagnetism/palemagnetism, origin of the Earth
Sept. 4 Continental drift, plate tectonics, plate boundaries
6 Divergent and transform boundaries
11 Convergent plate boundaries

Part 2: Dr. Collins – Evolution of the Earth

Sept. 13 Stratigraphic record: interaction of tectonics, climate and biosphere
18 Early Earth: lithosphere, hydrosphere, atmosphere, biosphere
20 Sedimentary basins and accumulation of organic-rich deposits
25 Sea-level change: causes and detection
27 Mass extinctions
Oct. 2 The (last) Ice Age: Earth's orbital cycles, glaciation, animal evolution

Part 3: Dr. Sukop – Hydrology and Hydrogeology

Oct. 4 Global Hydrologic Cycle
9 Aquifers and aquifer properties with a focus on Biscayne Aquifer
11 Groundwater modeling: analytical steady-state solutions
16 Groundwater modeling: numerical steady-state solutions

	18	Groundwater modeling: numerical transient solutions
	23	Saltwater intrusion and sea level rise

Part 4: Dr. Zhu – Atmosphere and Meteorology

Oct.	25	Atmospheric radiation and energy budget
	30	Hydrostatic balance and balanced winds
Nov.	1	Atmospheric general circulation and oceanic currents
	6	Atmospheric instabilities and mid-latitude weather systems
	8	Tropical dynamics and tropical cyclones
	13	Climate and climate impacts on extreme weather events

Part 5: Student Presentations

Nov.	15	Discussion of student presentations
	20	Student talks, part 1
	22	*Thanksgiving – University Closed*
Nov.	27	Student talks, part 2
	29	Student talks, part 3

Weekend Field Trips

Two weekend field trips in November, provisionally Nov. 10 and 17: Miami's limestone outcrops, local geology and karst topography. We will use the field guides at https://earthenvironment.fiu.edu/resources/

- Nov. 10 – Different processes, conditions, and sea level changes exposed at Brickell Metro station, Montgomery Center, Alice Wainwright Park: Dr. Draper and Dr. Sukop

- Nov. 17 – Fossil and living corals, mollusks and sediments of the Florida Keys: Windley Key Quarry and John Pennecamp State Park: Dr. Collins and Dr. Zhu

Recommended Readings for Background in Areas of Lecture

Fish, J. E., and M. Stewart. 1991. Hydrogeology of the surficial aquifer system, Dade County, Florida. 90-4108, USGS Water-Resources Investigations Report. 50 p. - internet

Lutgens, Frederick K., and Tarbuck, Edward J. The Atmosphere, An Introduction to Meteorology. ISBN-10: 0321833589, ISBN-13: 978-0321833587

Introduction to Meteorology. ISBN-10: 0321833589, ISBN-13: 978-0321833587

Stanley, Steven, 2015, Earth System History, W.H. Freeman Pr., NY, 549 pp. – course reserves in library