GEO101: Earth Systems Science I, Fall 2018
Course Information and Syllabus

Schedule:	M-W-F, 9:00-9:50 am	Instructor:	Dr. Sean J. Bennett
Location:	170 Fillmore	Office:	126 Wilkeson Quad
Email:	seanb@buffalo.edu	Office Hours:	MW 10:00 am-12:00 pm

Course Description: Earth Systems Science examines modern environmental problems through quantitative methods, analysis, and modeling grounded in basic and applied science and research. The goal of the course is to introduce students to the fundamental processes that dominate the atmosphere, hydrosphere, lithosphere, and biosphere, their characteristics and complex interactions, and their impact on human life and society.

Course Learning Objectives

No.	*Program Learning Outcome*	*Depth**	*Specific outcome objectives for GEO101*	*Assessment instrument*
1	Demonstrate that scientific knowledge applies across multiple scales of size and/or time	1	Understand the fundamentals of the energy-atmosphere system, global temperature, and atmospheric circulation	Exam 1
			Understand the fundamentals of atmospheric moisture, weather, water resources, and global climate systems	Exam 2
			Understand the fundamentals of plate tectonics and Earth surface processes	Exam3
			Understand the fundamentals of glacial processes, soils, ecosystems, and terrestrial biomes	Exam 4
2	Demonstrate understanding of and employ the scientific method	1	The scientific method will be presented and consistently applied in each part of the course	N/A
3	Demonstrate an understanding that science is a continuous process and that our understanding of scientific phenomena has changed across time	2	The course will address four major milestones (global atmospheric circulation patterns, Earth's climate, plate tectonics, and terrestrial biomes), which requires integration of many related concepts and principles	Exams 1-4
4	Recognize key ethical issues in scientific practice	1	Critically examine the role government policy plays in the environment, specifically with regard to the Clean Air Act and climate change	Exams 2 and 3
			Present the hypotheses for continental drift and the evidence in support of plate tectonics	Exam 3
5	Demonstrate an understanding of how scientific principles are used to solve tangible problems	1	Present and discuss relevant topics in real-time (e.g., weather phenomena, natural disasters, planetary exploration) using information available on the internet	Media discussions, video presentations
			Present case studies of local interest (e.g., Love Canal, Niagara Falls) as it relates to course material	Media discussions, video presentations
6	Distinguish scientific information from pseudo-scientific information and demonstrate an understanding of the nature of legitimate scientific debate	2	Apply the basic principles of atmospheric science, chemistry, physics, Earth science, and ecology to the understanding of topics relevant to society	Exams 1-4

*Depth: 0 - not covered; 1 - moderately covered; 2 - extensively covered

Required Textbook: *Geosystems: An Introduction to Physical Geography*, 10/E, Robert W. Christopherson and Ginger H. Birkeland, 2017, 605 pp., Prentice Hall, (ISBN: 9780134597119). **Please note that any edition of *Geosystems* by Robert W. Christopherson after the 3rd edition will suffice.**

Course Format: Lecture presentations using computer-projected course notes and figures and complemented with computer animations, video recordings, and discussions of relevant Earth Systems Science issues. All lecture

presentations will be available on UB*learns*, in both PowerPoint and PDF format, typically posted before the lecture. Note that animations will not work in PDF format.

Course Schedule

Date	No.	Topic	Reading	Date	No.	Topic	Reading
8/27	1	Introduction & Essentials	1: 2-15	10/17	20	The Dynamic Planet	11: 332-343
8/29	2	Essentials of Geography	1: 15-31	10/19	21	Plate Tectonics	12: 348-358
		Part 1: The Energy-Atmosphere System		10/22	22	Plate Tectonics	12: 359-377
8/31	3	Solar Energy to Earth	2: 36-53	10/24	23	Weathering Processes	13: 380-396
9/3		NO CLASS—Holiday		10/26	24	Weathering Processes	13: 397-405
9/5	4	Earth's Atmosphere	3: 56-66	10/29	25	River Systems	14: 408-420
9/7	5	Earth's Atmosphere	3: 66-75	10/31	26	River Systems	14: 420-435
9/10	6	Earth's Energy Balances	4: 78-90	11/2	27	Eolian Processes	15: 438-459
9/12	7	Earth's Energy Balances	4: 90-95	11/5	28	Oceans and Coasts	16: 462-471
9/14	8	Global Temperatures	4: 95-115	**11/7**		**EXAM 3: Topics 19 through 27**	
9/17	9	Air/Sea Circulation	5: 118-127	11/9	29	Oceans and Coasts	16: 472-487
9/19	10	Air/Sea Circulation	5: 128-149	11/12	30	Glacial Processes	17: 490-503
		Part 2: Water, Weather, and Climate Systems		11/14	31	Periglacial Processes	17: 503-517
9/21	11	Atmospheric Moisture	6: 154-163			*Part 4: Soils, Ecosystems, and Biomes*	
9/24		**EXAM 1: Topics 1 through 10**		11/16	32	Geography of Soils	18: 522-531
9/26	12	Atmospheric Moisture	6: 163-178	11/19	33	Geography of Soils	18: 531-547
9/28	13	Weather	7: 182-198	11/21		NO CLASS—Holiday	
10/1	14	Weather	7: 198-213	11/23		NO CLASS—Holiday	
10/3	15	Water Resources	8: 216-229	11/26	34	Ecosystem Essentials	19: 550-564
10/5	16	Water Resources	8: 230-244	11/28	35	Ecosystem Essentials	19: 564-577
10/8	17	Global Climate Systems	9: 248-275	11/30	36	Terrestrial Biomes	20: 580-595
10/10	18	Global Climate Systems	10: 278-311	12/3	37	Terrestrial Biomes	20: 596-603
		Part 3: Earth-Atmosphere Interface		12/5	38	Earth and Humans	
10/12	19	The Dynamic Planet	11: 316-331	**12/7**		**EXAM 4: Topics 28 through 37**	
10/15		**EXAM 2: Topics 11 through 18**		**12/12**		**Make-up Exams (ONLY), 8:00-11:00 am**	

Reading refers to chapter numbers and approximate pages.

Course Evaluation: Four exams, each consisting of 50 multiple-choice questions, and fifteen (15) "pop-quizzes" will be administered. Exams from previous years will not be made available.

Exams will be given on: September 24, October 15, November 7 and December 7 (refer to the table for the material covered by each exam). There will be no comprehensive final exam. The fourth exam on December 7 does not constitute a final exam; students will not be excused from this exam due to other academic commitments. The Instructor reserves the right to change the dates of the exams, the content of the exams, the syllabus, etc., should it become necessary. Exam results will be posted on Ub*learns*.

Fifteen (15) "Pop-quizzes" will be administered during the semester. Each quiz will be worth 1% of your total grade (for a total of 15%). The dates of these quizzes will be determined at the discretion of the instructor. "Pop-quiz" results will be posted on UB*learns*.

Student Performance

To promote class attendance and student performance, five mechanisms will be employed.

1. While the lectures will be posted on UB*learns*, these will not contain all of the material presented and discussed. By attending lectures, students will be able **to obtain and construct a complete set of notes** for each topic.
2. A **study guide** will be prepared by the instructor to facilitate student preparation for each exam, which will be posted on UB*learns*.
3. Class time will be allocated prior to each exam **to review** all material and to answer all questions.
4. By attending all lectures, students will be present for all "pop-quizzes" and should **earn full credit** toward their final grade.

5. I will **count only the highest three (3) exam grades** to determine your final grade. You may sit all four of the exams, and I will count the three (3) highest scores to determine your final grade (each exam will be worth 28.3% of your grade), or you may sit any three (3) exams of your choosing, assuming that the missed exam will be dropped from further consideration.

Make-up Exams: Any student missing an exam can sit a make-up. If a student can provide written documentation of severe illness or extenuating circumstance from a medical doctor or similar professional, s/he shall write a make-up exam comprised of multiple-choice questions (an "Excused Make-up"). All others shall write an exam comprised of multiple-choice and short-answer questions (an "Unexcused Make-up"). The Instructor reserves the right to refuse any documentation of illness or circumstance.

All make-up exams shall be administered on Wednesday, December 12, from 8:00 to 11:00 am in Fillmore 170. No exceptions to this date will be given. Failure to take a make-up exam on the prescribed date will result in a "0" grade for the exam, which may be dropped to determine your final grade.

Grades: Below is a table that lists the range of percentages (first and second column) and the equivalent University letter grade (last column) I will use for grading. For example, should your weighted cumulative average for your top three (3) exams ($0.85 \times \frac{1}{3}(E_1 + E_2 + E_3)$; a maximum of 85%) plus your pop-quiz results (a maximum of 15%) equal 72%, you will receive a final grade of B– (72% is greater than or equal to 70% and less than 73%). All numerical grades will be rounded up or down to the nearest integer. The Instructor reserves the right to adjust the scores of any exam or the cumulative average, if necessary, to boost the performance of the entire class. This will be done numerically and of equal weight to every student. An "Incomplete" grade will not be given to students who have missed exams.

Greater than or equal to (%)	Less than (%)	Equivalent University letter grade
85	100	A
80	85	A–
77	80	B+
73	77	B
70	73	B–
67	70	C+
63	67	C
60	63	C–
55	60	D+
50	55	D
0	50	F

Classroom Policies: As described in the Undergraduate Catalog, I shall follow and strictly enforce the policies on *Academic Integrity* (see https://catalog.buffalo.edu/policies/integrity.html) and *Obstruction or Disruption in the Classroom* (see https://catalog.buffalo.edu/policies/obstruction.html).

Information about UB's *Accessibility Resources Office* can be found at: http://www.buffalo.edu/studentlife/who-we-are/departments/accessibility.html. All students wishing to receive assistance must register with this office.