GLY 102 – Climate Change

Scientific Literacy & Inquiry

Instructor Name: Dr. James Boyle
Course Location: Knox 104
Office: Cooke 453
Course Time: MWF 10:00-10:50AM
Student Hours: Tu/F 11AM-12PM or by appointment (over zoom available as well by request)
Email: jamesboy@buffalo.edu

COVID-19 continues to be a threat in our community with the current variant XBB.1.5 (aka 'Kraken') being highly contagious. Please follow sensible health precautions, including masking in order to make the classroom more inclusive to all, especially individuals who have, live with, or care for those with compromised immune systems. Everybody must follow the UB and New York State health guidelines and remember that those rules are to protect others as well as yourself.

Public Health Compliance in Classroom setting:

The most current health guidelines can be found here (https://www.buffalo.edu/coronavirus/health-and-safety/health-safety-guidelines.html). Completion of the primary vaccination sequence is **required** for all students and those found not to be in compliance will be blocked from registering in future terms.

If you are unable to attend class you should contact the professor (Dr. Boyle) about accommodations to complete any work you might miss.

Course Description:

This Scientific Literacy and Inquiry course offers an interdisciplinary discussion of both natural and human-induced global environmental and climate change at various scales (space and time). Provides a comprehensive description of how advances in the physical, biological, and geological sciences are being integrated to understand the interplay between the Earths components (atmosphere, hydrosphere, lithosphere, and biosphere). Topics include glaciers, basic oceanography and atmospheric science, natural hazards, natural resources, and Earth system cycles (such as weather, climate change, and atmospheric pollution).

This course partially fulfills a General Education requirement in Natural sciences. However, completing all three courses, GLY 101 LEC, GLY 102 LEC and GLY 105 LAB, with this courses lab sequence would fulfill the Scientific Inquiry and Literacy Requirement as well as the Natural Sciences General Education requirement.

Student Learning Outcomes:

Having completed the Scientific Literacy and Inquiry sequence, students will be able to:

Learning Outcomes	Student Achievement of this Learning Outcome will be Assessed by:
1. Demonstrate that scientific knowledge applies across multiple scales of size and/or time.	Quizzes 1-6 & 8, Short Answer HW 1-4, In-class exercises, Exams I & II
2. Demonstrate understanding of and employ the scientific method.	Quizzes 1, 5-8, & 10, Short Answer HW 1-6, In-class exercises, Exam I-III
3. Demonstrate an understanding that science is a continuous process and that our understanding of scientific phenomena has changed across time.	Quizzes 5-10, Short Answer HW 2-6, Exam 2 & 3
4. Demonstrate an understanding of how scientific principles are used to solve tangible problems.	Quizzes 1, 5, & 8-11, Short Answer HW 5 & 6, In-class exercises, Exam III
5. Recognize key ethical issues in scientific practice.	Quizzes 7-11, Short Answer HW 5 & 6, In-class exercises, Exam III
6. Distinguish scientific information from pseudo-scientific information and demonstrate an understanding of the nature of legitimate scientific debate.	Quizzes 7-11, Short Answer HW 5 & 6, In-class exercises, Exam III

Course Materials:

Materials: There are no required textbooks for the class. However, I will be drawing lecture information largely from the source below. If you intend to continue in this vein of geology and have the capacity to purchase this text it is an excellent reference.

Introduction to Modern Climate Change, 3rd edition, by Andrew E. Dessler (2021) [ISBN-1108793878]

Top Hat: Top Hat is a learning software platform that we will be using during the course. Student's must create an account and subscribe at TopHat.com, once that is completed students can join the course using the course code (805552). Additional details for signing up on Top Hat can be found here. In addition to homework assignments being found there I will be using the platform to take attendance and get live feedback during lectures.

Lecture: Lectures slides will be made available on Top Hat and UBLearns the night before the lecture will be given under the "Course Documents/Lectures" folder. In addition, the live lectures will be recorded and the recordings made available on UBLearns the day after each lecture. These recording can be found under the "Classroom Recordings" tab.

Grading Policy: (see course schedule at the end of this document)

Final grades are letter-based (see here for more information on UB grade policy) and are a weighted average of attendance, quizzes, discussion board assignments, and exams throughout the semester. There is no final exam during final exam week at the end of the semester.

Learning assessments will be graded based on rubric criteria and weighted according to the following break-down.

Weighting	Assessment / Assignment
10%	Attendance
20%	Eleven Quizzes (2% each, with the lowest quiz grade dropped at the end of the semester)
15%	Six Short Answer Homeworks (2.5% each)
10%	Three In-class Exercises (3.33% each)
45%	Three Exams (15% each)

Attendance: Attendance will be taken each day through Top Hat. As there are always life events which may prevent you from attending at least a few days each semester you will receive the full 10% portion of the attendance grade if you attend 27 lectures (=75% of all classes excluding the drop/add period and exam days). For every lecture missed after that you will lose 0.37% of your total grade. This policy covers all kinds of absences (including illness). If you have extended issues that mean you are unable to make it to 27 total lectures you should contact my (Dr. Boyle).

Weekly Quizzes: These will be a series of multiple choice, matching, or other short-form questions covering materials from the previous week's lectures due at 11:59PM on each Sunday, except the week when we have an exam. These quizzes will be found on Top Hat and become available each Friday after class. You will have three attempts per question and will be able to see whether you answered a question correctly or not after each attempt. Each quiz which will pull from a pool of questions (i.e. only some questions may overlap between different attempts of the same quiz). Your lowest quiz grade at the end of the semester will be dropped when calculating your final (but not mid-term) grade.

Short Answer Homeworks: There will be six short answer homeworks posted to Top Hat. These will require a few sentences to answer questions about case studies and more open-ended questions dealing with the uncertainties and trade-offs inherent in topics like climate policy, mitigation, and resource distribution. These assignments are due at 11:59PM on February 12th, February 26th, March 12th, April 2nd, April 23rd, and May 7th. The short answers will be posted a week before they are due.

In-Class Exercises: On the Monday before each exam (February 27th, April 3rd, and May 8th) there will be an in-class exercise. There will be a hard-copy worksheet to hand in, but we will also use Top Hat during the class for discussion and feedback. The purpose of these in-class exercises will be to allow open discussions about the complicated and often uncomfortable realities of climate change and society. The points for these assignments are largely participatory. The hard copy worksheets (with your name on them please!) are due at the start of that Friday's class (i.e. exam day). A pair of collection boxes will be at the back entrance to each room to hand them in.

Exams: There will be three exams taken during class time in person. These will occur on March 3rd, April 7th, and May 12th. The exams will be paper and pencil and be a combination of multiple choice, matching, fill-in-the-blank, and short answer. You will have the whole class period to complete each exam. **You are allowed to bring a half-sheet double-sides of handwritten notes to use during the exam, which will be handed in at the time of submission**. Exams will focus on the material covered in the course since the previous exam and thus are not explicitly cumulative. However, the

material does build on itself and so ideas from earlier in the semester will still need to be applied in many cases. Make sure to bring your UB ID to each exam day to confirm your identity when you hand in your exam.

Additionally, after each exam an extra-credit assignment will be made available on Top Hat which can be taken to improve your exam score. There will be 25 questions worth 1 point each and you may earn back up to 20 points toward your associated exam score, to a maximum of 100. Example: you score a 73 on exam I, complete the extra credit and get 23/25, your new exam score is a 93 (73+20). These extra credit assignments will typically be due one week after the exam date and become available immediately after the in-person exam.

Make-up Policy:

If you are unable to complete an assignment before the due date due to unavoidable circumstances (ex. car accident) email me (jamesboy@buffalo.edu) when you can safely do so (i.e. do not worry about emailing me the day of an exam if you are in a car accident and have to go the hospital).

Final Grades:

Grade	Quality Points	Percentage
A	4.0	94.0+
A-	3.67	90 – 93
B+	3.33	87 - 89
B	3.00	84 – 86
B-	2.67	80 - 83
C+	2.33	77 – 79
C	2.00	74 – 76
C-	1.67	70 - 73
D+	1.33	67 – 69
D	1.00	65 - 66
F	0	< 65

Academic Integrity:

Academic integrity is a fundamental university value. Through the honest completion of academic work, students not only advance their educational objectives, they sustain the integrity of the university and facilitate the transmission of knowledge and culture based upon the generation of new and innovative ideas. The Undergraduate Academic Integrity Policy provides additional information about what UB considers to be academic dishonesty and the possible consequences for violating UB's policies on academic integrity. In particular, you should be sure that you are aware of what UB considers to be academic dishonesty and that you understand how to avoid academic dishonesty. If you are unsure about the meaning of any of this information please talk to me or your academic advisor about them and we will try to clarify our expectations.

Available Resources on Sexual Assault:

UB is committed to providing an environment free of all forms of discrimination and sexual harassment, including sexual assault, domestic and dating violence and stalking. You may call UB's Office of Equity, Diversity and Inclusion at (716) 645-2266 for more information or visit their website.

Accessibility Resources:

If you have any disability which requires reasonable accommodations to enable you to participate in this course, please contact the Office of Accessibility Resources, 60 Capen Hall, 645-2608, and also the instructor of this course as soon as possible. The Office of Accessibility Resources will provide you with information and review appropriate arrangements for reasonable accommodations.

Student Wellness:

As a student you may experience a range of issues that can cause barriers to learning or reduce your ability to participate in daily activities. These might include strained relationships, anxiety, high levels of stress, alcohol/drug problems, feeling down, health concerns, or unwanted sexual experiences. Counseling, Health Services, and Health Promotion are here to help with these or other issues you may experience. You learn can more about these programs and services by contacting:

Counseling Services:	120 Richmond Quad (North Campus), phone 716-645-2720 202 Michael Hall (South Campus), phone: 716-829-5800
Health Services:	4350 Maple Road, phone: 716- 829-3316
Health Promotion:	114 Student Union (North Campus), phone: 716- 645-2837

UB Curriculum Capstone:

If you are completing this course as part of your UB Curriculum requirements, please select an 'artifact' from this course that is representative of your learning and upload it to your UBPortfolio account. Templates have been created for this purpose. Artifacts include homework assignments, exams, research papers, projects, lab reports, presentations, and other course materials. Your final UB Curriculum requirement, UBC 399: UB Curriculum Capstone, will require you to submit these 'artifacts' as you process and reflect on your achievement and growth through the UB Curriculum. For more information, see the UB Curriculum Capstone website.

***All the information stated above is subject to change as required. Students will be informed of any changes in class and via email for minor changes (ex. change in deadlines, skipping a quiz). In cases where a more substantial change occurs the class will be informed as above and the posted syllabus will be updated.**

Course Schedule

1/30-2/3	1	A	B	C
2/6-2/10	2	D	E	F
2/13-2/17	3	G	H	I
2/20-2/24	4	J	K	L
2/27-3/3	5	M	N	**Exam I**
3/6-3/10	6	O	P	Q
3/13-3/17	7	R	S	T
3/20-3/24	8	**Spring Recess**		
3/27-3/31	9	U	V	W
4/3-4/7	10	X	**Y**	**Exam II**
4/10-4/14	11	Z	AA	BB
4/17-4/21	12	CC	DD	EE
4/24-4/28	13	FF	GG	HH
5/1-5/5	14	II	JJ	KK
5/8-5/12	15	LL	MM	**Exam III**

A	Introduction
B	Weather, Climate, and Stats
C	Understanding Noise in Data
D	Planetary Energy Budgets
E	Solar System Comparison
F	Earth's energy Budget
G	Atmospheric Circulation
H	Oceanic Circulation
I	Climatic Forcing
J	Carbon Cycle I
K	Carbon Cycle II
L	Carbon Cycle III
M	Carbon Cycle Exercise
N	Exam I Review
Exam I	
O	Proxies of Paleoclimate I (biology)
P	Proxies of Paleoclimate II (geochemistry)
Q	Proxies of Paleoclimate III (isotope curves)
R	Earth's Climate History
S	Ordovician and Permian Mass Extinction
T	K-Pg Mass Extincton and the PETM
Spring Recess	
U	Modern Climate Change Drivers I
V	Modern Climate Change Drivers II
W	Modern Climate Change Drivers II
X	Modern Drivers Exercise
Y	Exam II Review
Exam II	

Key for sequence of lecture topics. Colors correspond to material for each exam.

Z	Climate Change Projections I
AA	Climate Change Projections II
BB	Model Uncertainty
CC	Financial Impacts of Climate Change
DD	Human Health Impacts of Climate Change
EE	Societal Impacts of Climaet Change
FF	Climate misinformation & diversion
GG	The way out I
HH	The way out II
II	Climate Policy I - Geoengineering
JJ	Climate Policy II - Markey Approaches
KK	Climate Policy III - Local community
LL	Policy Exercise
MM	Exam III Review
Exam III	