SCI 102-03: Understanding the Physical World

Monday and Wednesday 4:00 – 5:40 pm
Spring 2020

Instructors
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Course Description

A one semester foundational science course intended to provide students with: 1. An understanding of the scientific process; 2. Fundamental scientific literacy; 3. Background knowledge in geological concepts and the physical world; 4. An understanding of how to collect, analyze, and interpret scientific data. This course is a combined lecture and lab course and will cover contemporary issues within the field of physics and environmental science. The course will include lectures, in-class activities, lab experiments, readings from journal articles and supplemental materials, online assignments, quizzes and exams.

This semester, we will be approaching these learning objectives through the topic of climate change. Climate change is one of the most significant phenomena occurring in our physical environment, with profound impacts for your future life. You will learn about the process by which scientists gather and analyze data and develop theories and predictions through our exploration of short and long-term atmospheric processes. Moreover, we hope that what you learn in this class is applicable to your life going forward.

Required Materials: Pencil and eraser, calculator, notebook.

There is no textbook to purchase. Readings will be assigned using online materials, principally the Intergovernmental Panel on Climate Change's Fifth Assessment Report ("5AR"): https://www.ipcc.ch/reports/

Desire2Learn: We will be using Desire2Learn (D2L) to make lecture materials available, to post grades, to collect assignments, and to make some announcements (note that some announcements may be made only in class). You will find the link to D2L and information on how to login and D2L support under mySRU on the SRU homepage.

Student Learning Outcomes

Outcome 1: Understand the Scientific Process

This course will provide students with an understanding of the scientific process including experimental design to answer questions in contemporary issues in geology, environmental science, astronomy and physics. Activities that support this outcome may include, but are not limited to, class discussions, evaluation of articles, literature, and experimental design, and analysis of experiments in classroom setting. (Assessment: Class activities)

Outcome 2: Become Scientifically Literate

This course will provide students with basic scientific literacy skills. Activities that support this outcome will include review of non-peer reviewed literature, an appreciation of the peer-reviewed process, and reflection on these reviews in terms of scientifically sound arguments. These literature reviews are restricted to real world phenomena in the field of geology, environmental science, astronomy, space science and physics. (Assessment: Critical analysis)

Outcome 3: Learn Basic Physical Science Concepts Related to Contemporary Issues

This course will provide background knowledge in geology, environmental science, astronomy, space science and physics that relate to real-world phenomena. Activities that support this outcome may include, lectures, in-class activities including laboratory experiments and demonstrations, quizzes and exams. (Assessment: Exams)

Outcome 4: Collect, Analyze, and Interpret Data

This course will provide students with an understanding of how to collect, analyze, and interpret scientific data. Activities that support this outcome will include physical and/or digital laboratory experiments directly tied to the fields of geology, environmental science, astronomy and physics. (Assessment: Project)

Assignments

Grading Policy:

- Class activities (1% each) 20%
- Project 20%
- 3 exams (15% each) 45%
- Critical analysis (5% each) 15%

89.5 -100%	A
79.5-89.4%	B
69.5-79.4%	C
59.5-69.4%	D
0 – 59.4%	F

Class activities: Each class day (aside from test and project days), we will have some sort of interactive in-class activity. Most of these will be completed with your group that you sit with. You will get credit for successfully completing each day's activity. There are a total of 24 activity days, and your four lowest grades will be dropped. These dropped days include excused absences -- you can't get credit for work you didn't do, even if you had a good reason not to do it! If you have a valid excuse for your absence (illness, athletics, etc.), talk to the professor and you will be able to arrange a make-up activity.

Project: At the end of the semester, you will put your knowledge of climate change together to produce a report on the impacts of climate change on western Pennsylvania (your home for at least the next few years).

Exams: For exams you will be taking a “Pyramid” or Two-Step exam. These exams are designed to help you learn during the testing process. You will receive a traditional exam that is to be completed individually, which will account for 2/3 of your test grade. After the class has completed and turned in the exam, you will receive a second copy of the exam to be completed in groups. You will be free to talk with your fellow classmates and use your notes during the group phase of the exam. This will give you the opportunity to teach and learn from each other. You will complete and hand this second version of your exam, which will account for 1/3 of your overall grade on the exam.

Critical analysis: Over the course of the semester, you will critically evaluate three pieces of media about climate change. For each piece of media that you evaluate, you will break down the claims that it is making, identify the ones that are based on the natural sciences, and evaluate the validity of these natural science claims and how they affect the overall validity of the argument. You will also comment on your classmates' analyses.

Classroom Policies

Classroom Participation: Your grade depends on completion of activities during our class time. It is your responsibility to inform the instructor through email of an excused absence as soon as possible. All blue cards, doctor's excuses and emails sent regarding your absence must include the date of your absence. If you miss class, it is your responsibility to ask a fellow classmate or one of your instructors what you missed. You will not be able to make up an assignment if you have an unexcused absence.

Use of Personal electronic devices: In order to do well in this class, you must bring your full attention to class and remain focused on the material during the entire period. Cell phones, pagers, or similar communication devices must be turned off or put in a silent mode and should not be taken out during class. Laptops and tablets may be used in this class in lieu of using the classroom computers, but we expect that you will not become distracted by non-class work when using a personal computer or tablet. In the event of misuse of electronics, you may be asked to put them away.

During exams and quizzes, all electronics must be stored. This includes cell phones, smart watches, Bluetooth and wired earpieces, etc. Failure to adhere to this policy may lead to charge of academic dishonesty and a grade of F for that particular exam.

Behavior: We will not tolerate a lack of civility or respect in the classroom. Class disruptions are defined as activities that distract the instructor or other students from the course content. Such activities include talking or whispering during lectures or videos, cell phones ringing, tardiness or whispering about another tardy student, noisily preparing to leave the class prior to the end of the period, etc. Disruptive students will be asked to leave the class. Continued disruptive or disrespectful behavior of any sort will be first discussed outside of class if possible, and then, if appropriate, documented and reported to the chair of the department for further review.

Academic honesty: Cheating (obtaining correct answers through means other than knowing the material or a lucky guess) and plagiarism (representing others' work as your own) will not be tolerated. On the first instance of cheating or plagiarism, you will receive a 0 for that assignment. On the second instance, you will receive an F in the course.

Disability accommodation: Your ability to master the class material should not be hindered by anything other than your own effort. If you have a disability, health issue, outside responsibility, or other concern that may affect your ability to succeed in this class, do not hesitate to contact me or the university's Office of Disability Services (738-4877, 105 University Union), and we will work together to find an accommodation for you.

Title IX compliance: Slippery Rock University and its faculty are committed to assuring a safe and productive educational environment for all students. In order to meet this commitment and to comply with Title IX of the Education Amendments of 1972 and guidance from the Office for Civil Rights, the University requires faculty members to report incidents of sexual violence shared by students to the University's Title IX Coordinator. The only exceptions to the faculty member's reporting obligation are when incidents of sexual violence are communicated by a student during a classroom discussion, in a

writing assignment for a class, or as part of a University-approved research project. Faculty members are obligated to report sexual violence or any other abuse of a student who was, or is, a child (a person under 18 years of age) when the abuse allegedly occurred to the person designated in the University protection of minors policy. Information regarding the reporting of sexual violence and the resources that are available to victims of sexual violence is set forth at: http://www.sru.edu/offices/diversity-and-equal-opportunity/sexual-misconduct-and-victim-resources.

Gender identity: I hope to create a space where students have the opportunity to bring all aspects of their selves into the classroom in order to fully engage in this course. I support people of all gender expressions and gender identities and encourage students to use the name and set of pronouns which best reflect who they are. In this spirit, I welcome and expect all students to also use the correct name and pronouns of their classmates. I will do my best to respect and use the language you use to refer to yourself and will encourage other members of our classroom community to do the same. Please inform me if my documentation reflects a name or set of pronouns different from what you use, and if you have any questions or concerns, please contact me after class, by email, or during office hours.

Schedule of Topics
(subject to change)

Module 1: The Atmospheric System

Jan 22: Introduction to the scientific method (SD)
Activity: Testing assumptions and making predictions

Jan 27: Weather versus climate (SD)
Activity: Reading and creating climographs

Jan 29: Energy Model of Interactions Day 1 (DH)
Activity: Interactions, Motion, and Energy

Feb 3: Energy Model Day 2 (DH)
Activity: Energy, Slowing and Stopping

Feb 5: Energy Model Day 3 (DH)
Activity: Warming and Cooling

Feb 10: Energy Model Day 4 (DH)
Activity: Energy in Electric Circuits

Feb 12: Moisture and precipitation (SD)
Activity: Evaporation and condensation

Feb 17: Review

Feb 19: Exam 1

Module 2: The Process of Climate Change

Feb 24: Temperature anomalies (SD)
Activity: Calculating trends in Excel

Feb 26: Theorizing climate change (SD)
Activity: Combining and comparing data sets

March 2: The carbon cycle in nature (SD)
Activity: Modeling ecological cycles

March 4: Anthropogenic changes to the carbon cycle (SD)
Activity: Measuring human impacts

SPRING BREAK

March 16: The greenhouse effect (SD)
Activity: Radiative forcing

March 18: Geospatial technology (SD)
Activity: Introducing GIS

March 23: Climate modeling (SD)
Activity: Running a simple climate model

March 25: Reconstructing past climate (SD)
Activity: Examining paleoclimate records

March 30: Review

April 1: Exam 2 (no foolin')

Module 3: Consequences of Climate Change
April 6: Pressure Day 1 (DH)
Activity: Introduction to Pressure

April 8: Pressure Day 2 (DH)
Activity: Pressure Changes

April 13: Sea level rise (SD)
Activity: Mapping coastal land loss

April 15: Storms and hurricanes (SD)
Activity: Are Atlantic hurricanes increasing?

April 20: Growing seasons and the monsoon (SD)
Activity: Changing food supplies

April 22: Wildfire (SD)
Activity: Predicting increased fire danger days

April 27: Project: Climate change in Western PA

April 29: Project: Climate change in Western PA

May 4: Review

May 8, 3:30-5:30 pm: Exam 3