Environmental Physics ENV 202 and ENV 202L Spring 2019
Chaminade University
January 14 – May 3, 2019; Final Exams May 6-9, 2019
Class Schedule: MWF 9:30-10:20 in Behavioral Science 102
Lab: Fri 2:30-5:20 in Henry Hall Lab 10
Instructor: Dr. Jerelyn Watanabe
Email: jerelyn.watanabe@chaminade.edu
Office: TBD
Office Hours: Friday, 10:30 - 11: 20 am and by appointment

> *"Hey Jerelyn,*
> *What's environmental physics? I suppose I should just google it, rather than being a bum and hope you spoon-feed me the answer. If I speculate wildly, I imagine it may be the scientific explanation behind, for instance, how increased carbon emissions and greenhouse gasses are causing a rise in air temperature, which might be increase the volume of the ocean (in addition to the melting glaciers), and how maybe the warming waters and increasing pH of the ocean from the diffusion of carbon dioxide into the water create algae blooms and alter nutrient content of the ocean, thus affecting all the other organisms in the sea... Or maybe it's about how transforming forests into suburbia and breaking up wild spaces into little chunks of parks is killing off all the large predators that normally control the population of deer and rodents, thus resulting in a surge in number of those grazers and rodents, which serve as vehicles for ticks that carry lyme disease…. You know what, I'm going to be lazy and wait for you to tell me what environmental physics is. Such a well-trained scientist I am…"*
> *Yvonne Chan, PhD Microbiology, Cancer Researcher*

Course Description from the 2018-2019 Undergraduate Catalog

ENV 202 Environmental Physics (3)
A detailed study of matter and energy in our environment and the transformations that they undergo. Thermodynamics and the sources of energy; the uses of energy and the consequences of such uses. Particular emphasis on the environments of island ecosystems such as Hawaii. Cross-listed with PHY 111. Course must be taken concurrently with ENV 220L.

ENV 202L Environmental Physics Laboratory (2) One three-hour laboratory period per week to accompany ENV 202. Students investigate matter and energy in our environment and the transformations that they undergo in order to learn firsthand the application of the relevant physical principles to environmental issues and sustainable solutions. Activities are conducted in the laboratory and in the field. Cross-listed with PHY 111L. Course must be taken concurrently with ENV 202.

Required Text/Materials

The Blue Planet: An Introduction to Earth System Science, 3rd ed., by B. J. Skinner & B. W. Murck; John Wiley & Sons, 2011. ISBN: 9780470914021

Selected readings pdf/online

You will need to bring a computer/ipad to class every day.

Advice for success

My hope is that you will consider yourself to be an active agent in designing and implementing creative solutions to environmental challenges that are important to you. Think of each experience, reading, lab, problem set, discussion, etc. as a resource for developing these creative solutions.

> *Again, you can't connect the dots looking forward; you can only connect them looking backwards. So you have to **trust** that the dots will somehow connect in your future.*
> *Steve Jobs, Apple*

Engage with the readings through your dialectical journal. I encourage you to talk with me and your peers about the ideas presented. Some may make more sense than others in terms of the science; and you may have a strong emotional reaction to some of the topics. It's important to keep track of your questions and reactions because they will help you understand yourself better. And the better you understand yourself, the better you are able to communicate and connect with others. This is essential when talking about important issues such as the ones we will be learning about in this class. To be a an agent of change you will need to inspire others through your actions and communication.

Engage with the concepts of physics in class. It may be extremely difficult and uncomfortable, especially if you haven't had positive experiences with math and science in the past. We will do the physics in class where you will be supported by your peers and your instructor. You will choose the level of mathematics that you engage with in the activities without penalty.

Communicate with me – ask questions, share your understandings and frustrations, let me know what's going on in your life. I would like to know if there is anything that I can do to help you learn the physics that impacts your study and stewardship of the environment.

> *"Showing up is half the battle"*
> *"Never forget anyone's birthday"*
> *Adrianna Tan, CEO and Founder, Wobe*

Email me if you will be late or miss class. Your presence makes a huge difference to the class dynamic and discussion and we will all miss out when you are not in class.

Note: This syllabus will need to be updated during the semester as needed.

Environmental Studies Program Mission Statement

Chaminade University is a Marianist Institution committed as an extension of Marianist values to producing local, state, national and international servant-leaders adept at the multidisciplinary acts of understanding, communicating, ameliorating and preserving or developing more harmonious interactions with the environment. The University's major in Environmental Studies produces skilled intellectual pre-professionals considerate of the spiritual, ethical, scientific, economic, political, legal, historical and cultural aspects of environmental issues. Students in the Environmental Studies Program benefit from a learning experience which prepares them for the real world through coursework, fieldwork, research, service and apprenticeship in the community.

Environmental Studies Program Objectives and Skills addressed by ENV 202 and 202L

Students graduating with a baccalaureate degree in Environmental Studies will:

Possess problem-solving skills from diverse disciplines for diverse populations

- Be familiar with the process of conflict resolution
- Know the difference between fact and opinion
- Take a balanced outlook
- Be aware of the perspectives and value systems of others
- Be able to arrive at creative solutions

Possess a solid scientific foundation

- Understand Earth Systems Science (Lab)
- Know the major material causes of environmental degradation (Lab)
- Know the benefits of recycling
- Be able to assess the veracity of information
- Have experience reading the primary scientific literature
- Be able to conduct research (Lab)
- Understand the role science plays in environmental problem-solving (Lab)

Know the roles and importance of laws, politics and economics in environmental issues

- Know the economic challenges of recycling

Possess good written and oral communication skills

- Be able to write a scientific research report (Lab)

Know the major environmental issues and their potential solutions

- Be familiar with some of the proposed solutions to each of the major global and local environmental issues

Topics: Readings & Assessments

1. Earth Systems Science and the Language & Process of Science
    a. The Earth System (Blue Planet Ch 1) and Changing the Earth System (Blue Planet Ch 19)
    b. Readings: Numeracy & Language of Science: Observations, Models, Algorithms, Fact & Opinion

Assessment: Create a model of yourself as an environmental scientist - What issues matter most to you personally & why? How do you participate in the solution? What information do you need to arrive at other creative solutions? How do you talk about this with others who have different perspectives and value systems? (5 minute presentation with a 2D visual or 3D object)

2. Energy & Recycling
    a. Reading: Blue Planet Chapter 2
    b. Conservation of energy
    c. Global context: Heat and Climate Change
    d. Local context: Recycling

3. Water
    a. Reading: Blue Planet Chapter 8 - The Hydrological Cycle
    b. Physical properties of water - specific heat, water pressure
    c. Local context - rising sea level
    d. Global context - rising sea temperature

Exam 1: Energy and Water

4. Forces
    a. Reading: Blue Planet Chapter 5 - The Tectonic Cycle
    b. Newton's Laws, electromagnetic forces
    c. Local context: king tides
    d. Global context: great garbage patch, ocean circulation
    description of forces that affect ocean circulation (geophysical fluid dynamics)

5. Waves
    a. Reading: Blue Planet Chapter 10 - The World Ocean
    b. Waves (period, amplitude, etc.) sound waves, sonar, decibel scale
    c. Local example: sonar affecting cetaceans

    d. Global example: rogue waves

Exam 2: Forces and Waves

6. The Atmosphere
    a. Reading: Blue Planet Ch 11 - The Atmosphere
    b. Global example - air quality
    c. Global example - air conditioners
    d. Lab: Student Research Project

7. Wind and Weather
    a. Blue Planet Chapter 12 - Wind and Weather Systems
    b. Local example - Puna weather caused by eruptions
    c. Global example - weather linked to global warming (& creative solution)
    d. Lab: Student Research

8. Climate
    a. Reading: Blue Planet Chapter 13 - The Climate System
    b. Global example: Climate reality check from the Pope
    c. Lab: Student Research

Assessment: Choose a environmental science issue important to you, conduct a research project, and write a scientific research report that includes existing, proposed solutions to the issue and your own creative solutions. (10 min presentation of your project with 2D visual or 3D object)
Assessment (Lab): Scientific Research Report (due during Finals Week)
No Final Exam

Field Trips

We will use our Friday afternoon lab period to be in the field as often as possible. You may meet the class at the field trip site and transportation from campus will also be provided if needed.

Dialectical Journal (with Template)

Templates will be provided and/or designed by the class to document your understanding of the assigned readings. You might assess whether the reading is more factual or more of an opinion, record direct quotes, rewrite the important ideas in your own words, write a response to the ideas (What does this mean to you? Why is this important?), and write your questions.

Conceptual Physics Problem Sets, Labs, & Exams

Completing the physics problem sets and labs will be required for your success and is an extremely important way for you to communicate your understanding of physics concepts to me. Expect to be challenged and feel uncomfortable as you gain understanding, however, we will do most of this in class so that you will be supported by your instructor and your peers during the process.

Two In-Class Exams will consist of several written problems based on the assigned problem sets and labs.

You may use a scientific or graphing calculator on problem sets and the exams (but you won't need it). If you want to use a calculator on the exams, you will need one that is not your phone.

Other Assessments

You will create and present a model of yourself as an environmental scientist.

You will choose a environmental science issue, conduct a research project, and write a scientific research report that includes existing, proposed solutions to the issue and your own creative solutions. Presentation of your research project will be in place of a final semester exam for ENV 202. The research report will be a large part of your final grade in ENV 202L.

Attendance

Attendance in class and lab is required to earn credit for that particular assignment. However, I will offering extra credit opportunities. If you know ahead of time that you will need to be absent, please let me know as soon as you know. Excused absences will require evidence - Dr's note, etc.

Extra credit

Extra credit opportunities will be available to make up missed points due to an excused and/or pre-approved absence from class.

Grading

ENV 202 (3 credits)	**ENV 202L (2 credits)**
Problem Sets (in class) - 40%	12 Labs (in class) - 60%
Dialectical Journal (some in class) - 20%	Research Project & Paper - 40%
2 Exams - 40%	
Presentations - Model & Research Project - 20%	

A: 90 − 100% of points earned
B: 80 − 89%
C: 70 − 79%
D: 60 − 69%
F: below 60%

Please refer to the Student Code of Conduct in the Student Handbook 2018-2019

ADA Policy from the Student Handbook 2018-2019

studentaffairs.chaminade.edu/counseling-center/counseling-services
email: counselingcenter@chaminade.edu
Counseling Center, Student Support Services Building, Room 101
(808) 735-4845

Pursuant to several federal and state laws, including the Americans with Disabilities Act of 1990, as amended by the ADA Amendments Act of 2008, and Section 504 of the Rehabilitation Act of 1973, all qualified students with disabilities are protected from discrimination on the basis of disability and are eligible for reasonable accommodations or modifications in the academic environment to enable them to enjoy equal access to academic programs, services, or activities. If a student would like to determine if they meet the criteria for accommodations, they should contact the Counseling Center at (808) 735-4845 or email: counselingcenter@chaminade.edu for further information.

Laboratory Usage Policy from the Student Handbook 2018-2019
naturalsciences.chaminade.edu
Wesselkamper Science Center
(808) 440-4204

Division of Natural Sciences and Mathematics Laboratory Usage & Safety Policy
Introduction
The following guidelines are established to provide instructions in maintaining safety for students, staff, and faculty while using any of the science laboratories at Chaminade University. The Division of Natural Sciences and Mathematics (NSM), along with the University Environmental Safety Office are responsible for enforcing the regulations set forth in this manual. Queries should be addressed to:
Dean of Natural Sciences and Mathematics: (808) 440-4204
Executive Director for Compliance and Human Resources: (808) 739-8597

General Guidelines
All faculty, staff, and students must know and practice the safety guidelines at all times while using the science laboratories at Chaminade University. Failure to adhere to general guidelines

will result in disciplinary action including, but not exclusive to, fines, removal from the laboratory, and academic sanctions.

Students should be knowledgeable of the care, handling, and proper use of equipment prior to using it in the laboratory.
Students are requested to report pregnancies, physical handicaps, recent injuries, illnesses, surgeries, or communicable diseases to their instructors as soon as possible so that necessary precautions may be taken. A medical clearance from a physician is required before a student with physical injuries, illness, surgery, pregnancy, or who has a reported communicable disease will be allowed to participate in a laboratory setting.

It is the right of the instructor to determine whether a student in any of the situations above is capable of safely performing the necessary tasks in a laboratory.

Working alone in the lab can be unsafe and should be avoided whenever possible. Undergraduate students are not permitted to work alone with hazardous materials (chemical or biological) or equipment. When this cannot be avoided, someone else with required safety training (Principal Investigator, Lab Assistant, Lab Manager) must be in the lab or adjacent to the lab and be able to check on their safety.

Access to the doorway in the labs will be evident at all times. Furniture will not be placed to obstruct the exits.

All doors and cabinets shall remain closed when not in actual use.

Children or unauthorized personnel may visit laboratories only with advance permission of the Dean of NSM. Injury to unauthorized personnel in the lab will not be considered the responsibility of Chaminade University or its employees.

Students should report any misconduct occurring in the laboratories and may be held responsible if misconduct is not reported.

Physical Safety
There shall be no eating, drinking, or smoking in the labs at any time under any circumstances. Food and drink must not be visible at any time while in a lab. There shall be no application of makeup while in the laboratory at any time. Cellphones are not to be used in laboratories while hazardous chemicals or materials are present, as they are both a distraction to general safety and can become contaminated with hazardous materials. Cellphones may be used when instructors authorize their use for pedagogical reasons or in-class activities. They may not be used to make or receive personal calls or messages during a class as a matter of safety and courtesy.

Closed-toed shoes are required to be worn prior to entering any Chaminade University laboratory, regardless of the duration or content of the class/use.

Proper personal protective equipment (PPE) must be worn before entering a laboratory.

Gloves are to be worn by students and faculty during any potential contact with hazardous materials. Gloves are utilized for safety and practice for application in a professional setting. Gloves for student use will be provided by the University at no additional cost. Remember that if you are wearing gloves, there is a reason for it, and it is not permissible to go outside of the lab with them on. Likewise, wearing gloves during an experiment and then continuing to wear them while using a phone or eating or drinking is a direct safety violation and a health hazard. If you need to leave, please discard your gloves before exiting the lab and then reapply upon re-entering.

Lab coats worn in lab are not to be worn outside of the laboratories under any circumstances unless a specific experiment requires it, which will be designated by your instructor. This is both for your safety and the safety of others on campus.

Failure to adhere to these policies will result in disciplinary action, including but not limited to monetary fines, immediate removal from the laboratory until the violation is amended, and/or academic sanctions. Citations will be given for each violation regardless of the ability to amend the situation. Multiple citations will include escalated and multiple sanctions.

Lecture
If you have a lecture scheduled in a laboratory, you must wear closed-toed shoes, and clothes appropriately covering your body. Even though there is not actual lab work going on, the previous classes and activities pose potential threats to your safety and health if proper PPE is not worn.

Lab
If you have a lab class, you must wear closed-toed shoes, appropriate attire covering your body, and a lab coat. Safety glasses and gloves must be worn when instructed.

Schedule of Fines
First Violation: $25
Second Violation: $25 and mandatory meeting with NS&M Dean
Third Violation: $100 and withdrawal from class

Fines will be assessed to the student's account and unpaid fines may result in delay of registration, graduation, and processing of transcripts.

Students may appeal the fine in writing to the Dean of Natural Sciences and Mathematics within 15 days of receipt of the citation. The Dean of Natural Sciences and Mathematics will review the appeal and provide a written decision within 30 days of receipt of the appeal. All correspondence will take place between the Administration and students via email using only the student's Chaminade University email account. In case of appeals, after the Dean of Natural Sciences and Mathematics has been approached, final appeals will be evaluated and ruled upon by the Executive Director for Compliance and Personnel Services. Final appeals must be made within 30 days of receipt of a decision by the Dean of Natural Sciences and Mathematics.

Reporting of an Injury/Incident

Any injury/incident occurring in the laboratories must be reported to the faculty, Lab Manager (if appropriate), University Safety Officer, and Department Head immediately.

An incident report (located in each laboratory) must be filled out for the injury. The report must be signed by the faculty member and the student involved as soon as possible after the incident.

The faculty/staff/student will be assisted to the appropriate facility, or personal physician depending upon the nature of the injury. Campus Security may be called to assist in facilitating a 911 response depending on the severity of the injury. When in doubt, always call 911 first.

JTW ENV 202 and ENV 202 L Timeline (Subject to Change)

Week	Day 1	Day 2	Day 3	Lab
1	1/14 Introductions, Syllabus	1/16 Systems, Language and Process of Science	1/18 Systems, Language and Process of Science	1/18 Models & Scientific Notation
2	1/21 MLK Day No class	1/23 Systems, Language and Process of Science	1/25 Systems, Language and Process of Science	1/25 Energy Lab
3	1/28 Present Models Assessment	1/30 Present Models Assessment	2/1 Library research	2/1 Library research
4	2/4 Energy	2/6 Energy	2/8 Energy	2/8 Energy Lab
5	2/11 Energy	2/13 Energy	2/15 Energy	2/15 Forces Lab
6	2/18 President's Day No class	2/20 Forces	2/22 Forces	2/22 Forces Lab
7	2/25 Forces	2/27 Forces	3/1 Forces	3/1 Water Lab
8	3/4 Exam 1 - Energy and Forces	3/6 - Water	3/8 Water	3/8 Water Lab
9	3/11 - Water	3/13 Water	3/15 Water	3/15 Waves Lab
10	3/18 Water	3/20 Waves	3/22 Waves	3/22 Waves Lab
Spring Break				
11	4/1 Waves	4/3 Waves	4/5 Waves	4/5 Research Project
12	4/8 Waves	4/10 Exam 2 - Water and Waves	4/12 The Atmosphere	4/12 Research Project
13	4/15 - The Atmosphere	4/17 - The Atmosphere	4/19 Good Friday No class	4/19 Good Friday No class
14	4/22 - Wind and Weather	4/24 - Wind and Weather	4/26 - Wind and Weather	4/26 - Research Project
15	4/29 - Climate	5/1 - Climate	Final Presentations	Final Presentations
Exam Week - No class this week - Research Papers Due				

12/29/2018