COURSE OUTLINE		
TERM: Spring 2024	**COURSE NO:** PHYS 310	
INSTRUCTOR:	**COURSE TITLE:** Energy Technologies Lab	
OFFICE: **LOCAL:** **E-MAIL:** @capilanou.ca	**SECTION NO(S):**	**CREDITS:** 4.0
OFFICE HOURS:		
COURSE WEBSITE:		

Capilano University acknowledges with respect the Lil̓wat7úl (Lil'wat), xʷməθkʷəy̓əm (Musqueam), shíshálh (Sechelt), Sḵwx̱wú7mesh (Squamish), and Səlílwətaʔ/Selilwitulh (Tsleil-Waututh) people on whose territories our campuses are located.

COURSE FORMAT
Six hours of lab time, divided between two classes consisting of demonstration of theory, active learning, and lab work for a 15 week semester, which includes two weeks for final exams.

COURSE PREREQUISITES
PHYS 203 or PHYS 210 or PHYS 211; OR STAT 101 and [MATH 108 or MATH 116] and one of [CHEM 211, BIOL 203, BIOL 208, BIOL 214, or GEOG 214]

CALENDAR DESCRIPTION
Students will pursue several open-ended experiments, relevant to Clean Technology, Environmental Science, and Energy technologies, to investigate a phenomenon as far as desired or as time permits. The methods and procedures of experimental physics are emphasized. Students will perform several experiments from four modules: three of the modules will contain a list of prepared experiments and the final module will have the student create a new experiment of their own conception.

COURSE NOTE
PHYS 310 is an approved Quantitative/Analytical course for baccalaureate degrees.
PHYS 310 is an approved Science course.
PHYS 310 is an approved Laboratory Science course.
PHYS 310 is an approved Science and Technology course for Cap Core requirements.

REQUIRED TEXTS AND/OR RESOURCES
- Lab Manual
- Selected Online Readings

COURSE STUDENT LEARNING OUTCOMES

On successful completion of this course, students will be able to do the following:

- Utilize conceptual methods to solve problems efficiently.
- Use graphs and computational resources for solution and visualization of word problems and real-life events.
- Develop problem-solving and communication skills – esp. in scientific and environmental context.
- Demonstrate measurement techniques and verify physical principles.
- Perform error analysis and data analysis on real data.
- Utilize and familiarize with industry relevant equipment.
- Demonstrate independent time management and research skills.
- Formulate and compose an experimental design for individual experiments.

Students who complete this Science and Technology course will be able to do the following:

- Apply numerical and computational strategies to solve problems
- Evaluate scientific information (e.g., distinguish primary and secondary sources, assess credibility and validity ofinformation)
- Demonstrate how a problem, concept, or process can be modelled numerically, graphically, or algorithmically
- Participate in scientific inquiry and communicate the elements of the process, including making careful andsystematic observations, developing and testing a hypothesis, analyzing evidence, and interpreting results

COURSE CONTENT

Topics	# of Weeks (Approx.)
Introduction	0.5
Module 1: Electronics and Power Generation	2.5
Module 2: Thermodynamics	3.0
Module 3: Automation and Climate Science	3.0
Module 4: Student designed project	3.0
Presentations	1.0
Final Exam Period	2.0

Students will work independently and in small groups to complete various experiments in the first three modules before designing and completing their own experiments. The contents of each module are:

- Module 1 Electronics and Power Generation: Students will get an introduction to circuit elements, Digital Multimeters and Oscilloscopes. How power is generated using Wind energy and Solar energy will also be covered.
- Module 2 Thermodynamics: Basics of thermodynamic process and efficiency, how heat engines work.

- Module 3 Automation and Climate Science: Students will use Arduinos to create an automated system. Effects of greenhouse gases on atmospheric temperature.
- Module 4: Student designed project. The choice of experiments can be, but are not limited to, the following topics: Air quality assessment, Sediment core samples, Palynology, Polarization of Optically Active Substances, Environmental Radioactivity (muon experiment), Mapping local variations of the Earth's magnetic field, accurate determination of 'g' (gravimetric methods), Contaminant diffusion, and adiabatic constant of real gasses.

EVALUATION PROFILE

Final grades for the course will be computed based on the following schedule:

Module Reports (x4, 20% each)	80%
Presentation	20%
TOTAL	**100%**

Module reports will be submitted as formal lab reports covering all topics in each module. A presentation will be given to report on and highlight the work done in Module 4, the student designed project.

GRADING PROFILE

A+ = 90-100	B+ = 77-79	C+ = 67-69	D = 50-59
A = 85-89	B = 73-76	C = 63-66	F = 0-49
A- = 80-84	B- = 70-72	C- = 60-62	

Incomplete Grades

Grades of Incomplete "I" are assigned only in exceptional circumstances when a student requests extra time to complete their coursework. Such agreements are made only at the request of the student, who is responsible to determine from the instructor the outstanding requirements of the course.

Late Assignments

Assignments are due at the beginning of the class on the due date listed. If you anticipate handing in an assignment late, please consult with your instructor beforehand.

Missed Exams/Quizzes/Labs etc.

Normally, a score of zero will be given for a missed exam, test, quiz, lab, etc. In some exceptional situations, the student will be permitted to write a make-up test, defer the lab to a later date or to replace the score by other marks.

The situations in which a score of zero may be avoided are those for which the student meets all of the following conditions:

1. Circumstances are beyond the control of the student which resulted in the exam, test, quiz, lab, etc. to be missed. Such circumstances include serious illness or injury, or death of close

family member. They do not include forgetting about the test, lack of preparation for the test, work-related or social obligations.
2. The student has notified the instructor (or the School of STEM office staff, if the instructor is not available) about the missed exam, test, quiz, lab, etc. Such notification must occur in advance, if possible, or at the latest, on the day of the exam, test, quiz, lab, etc.
3. Proof of the circumstances must be provided. Proof of illness or injury requires a note from a doctor, who may also be consulted.
4. The student has been fully participating in the course up until the circumstances that prevented the writing of the exam, test, quiz, lab, etc. Fully participating means attending almost all classes and turning in almost all assignments in the course.

The options offered to the student who meets the four conditions are decided by the instructor. They will not necessarily meet the convenience of the student.

Accommodations can be made to honour community needs and traditional practices.

Attendance
Students are expected to attend all classes and associated activities. If classes are missed, it is the student's responsibility to become aware of all information given out in the classes or tutorials, including times of examinations and assignment deadlines.

English Usage
Students are expected to proofread all written work for any grammatical, spelling and stylistic errors. Instructors may deduct marks for incorrect grammar and spelling in written assignments.

Electronic Devices
Students may use electronic devices during class; however an instructor may ask for devices to be put away if they become a distraction to other students or interfere with classroom learning.

On-line Communication
Outside of the classroom, instructors will (if necessary) communicate with students using either their official Capilano University email or eLearn; please check both regularly. Official communication between Capilano University and students is delivered to students' Capilano University email addresses only.

UNIVERSITY OPERATIONAL DETAILS

Tools for Success
Many services are available to support student success for Capilano University students. A central navigation point for all services can be found at: https://www.capilanou.ca/student-services/

Capilano University Security: download the CapU Mobile Safety App

Policy Statement (S2009-06)
Capilano University has policies on Academic Appeals (including appeal of final grade), Student Conduct, Academic Integrity, Academic Probation and other educational issues. These and other policies are available on the University website.

Academic Integrity (S2017-05)
Any instance of academic dishonesty or breach of the standards of academic integrity is serious and students will be held accountable for their actions, whether acting alone or in a group. See policy and procedures S2017-05 Academic Integrity for more information:
https://www.capilanou.ca/about-capu/governance/policies/

Violations of academic integrity, including dishonesty in assignments, examinations, or other academic performances, are prohibited and will be handled in accordance with the Student Academic Integrity Procedures.

Academic dishonesty is any act that breaches one or more of the principles of academic integrity. Acts of academic dishonesty may include but are not limited to the following types:

Cheating: Using or providing unauthorized aids, assistance or materials while preparing or completing assessments, or when completing practical work (in clinical, practicum, or lab settings), including but not limited to the following:

- Copying or attempting to copy the work of another during an assessment;
- Communicating work to another student during an examination;
- Using unauthorized aids, notes, or electronic devices or means during an examination;
- Unauthorized possession of an assessment or answer key; and/or,
- Submitting of a substantially similar assessment by two or more students, except in the case where such submission is specifically authorized by the instructor.

Fraud: Creation or use of falsified documents.

Misuse or misrepresentation of sources: Presenting source material in such a way as to distort its original purpose or implication(s); misattributing words, ideas, etc. to someone other than the original source; misrepresenting or manipulating research findings or data; and/or suppressing aspects of findings or data in order to present conclusions in a light other than the research, taken as a whole, would support.

Plagiarism: Presenting or submitting, as one's own work, the research, words, ideas, artistic imagery, arguments, calculations, illustrations, or diagrams of another person or persons without explicit or accurate citation or credit.

Self-Plagiarism: Submitting one's own work for credit in more than one course without the permission of the instructors, or re-submitting work, in whole or in part, for which credit has already been granted without permission of the instructors.

Prohibited Conduct: The following are examples of other conduct specifically prohibited:

- Taking unauthorized possession of the work of another student (for example, intercepting and removing such work from a photocopier or printer, or collecting the graded work of another student from a stack of papers);
- Falsifying one's own and/or other students' attendance in a course;
- Impersonating or allowing the impersonation of an individual;
- Modifying a graded assessment then submitting it for re-grading; or,
- Assisting or attempting to assist another person to commit any breach of academic integrity.

Sexual Violence and Misconduct

All Members of the University Community have the right to work, teach and study in an environment that is free from all forms of sexual violence and misconduct. Policy B401 defines sexual assault as follows:

> Sexual assault is any form of sexual contact that occurs without ongoing and freely given consent, including the threat of sexual contact without consent. Sexual assault can be committed by a stranger, someone known to the survivor or an intimate partner.

Safety and security at the University are a priority and any form of sexual violence and misconduct will not be tolerated or condoned. The University expects all Students and Members of the University Community to abide by all laws and University policies, including B.401 Sexual Violence and Misconduct Policy and B.401.1 Sexual Violence and Misconduct Procedure (found on Policy page https://www.capilanou.ca/about-capu/governance/policies/)

Emergencies: Students are expected to familiarise themselves with the emergency policies where appropriate and the emergency procedures posted on the wall of the classroom.