

**PHYS 4BL Laboratory in Electricity, Magnetism,
and Heat
Syllabus**

Fall 2026

(Updated on 8/31/2026)

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Instructor Information

Instructor Name: Pei-Chun Ho

Department: Physics

Email / Telephone: peiho@mail.fresnostate.edu / (559) 278-5990

Office: McLane 255 (Doorbell on McLane 254)

Student Support Hours: (days/times)

- Monday & Wednesday at McLane 255: 12:15 PM – 1:15 PM
Tuesday & Thursday at McLane 162 or 255: 7:45 PM – 9 PM

Course Information

Course Modality: face-to-face

Course ID: PHYS4BL-09-75779-2267

Units: 1 (combination of lab 1 unit and lecture 3 units, total units of PHYS2A 4)

Lab Meeting Location & Time: McLane 167 & Monday 6 PM – 8:50 PM

Canvas: fresnostate.instructure.com

Prerequisites:

- **Course description:** This one-unit lecture course will introduce the experiments associated with fundamentals of electromagnetism, heat (i.e., thermal energy), and thermodynamics, which students learn from PHYS 4B.
- ♦ It is usually expected that students will spend approximately 2 hours of study time outside of class for every one hour in lecture. Since this is a PHYS4BL is 1-unit laboratory class, you should expect to study an average of 2 hours outside of class each week.

Required Course Materials

- PHYS 4BL Laboratory Manual can be purchased at the University Bookstore. Please do so ASAP and BEFORE the first lab session. Pre-laboratory activities are expected to be turned in right before each lab session begins.
- Students have to bring lab manual to each laboratory session.
- Scientific Calculator (Graphing Calculator is “Not” allowed for this course).
- A Fresno Stat email account. Instructor will not respond to the emails not sent through the Fresno State system.

Course Specifics

This course will include assigned readings in your lab manual that should be **completed “before” each lab**. Prelab activities need to be completed **before** each session starts. During the lab session there will be typically a quiz at beginning of the session, short review of material, demonstration how to set up apparatus, and experiments and data analysis will be performed by students.

- **If you cannot make to a certain lab due to medical reason, you must contact your lab instructor with doctor’s note the previous week before the start of the lab for any groups to make arrangement.**

Course goals: The main goal of the laboratory course will be to assist students in learning to describe, analyze, and predict the experiments associated with heat (thermal energy), thermodynamics, electrostatics, electric fields and potential, currents and AC and DC electric circuits, magnetic fields, and electromagnetic induction. From actually performing the experiments and analyzing the data, students will be able to associate physics concepts with real-world phenomena and understand the application of the physics laws they learn in lectures.

Student Learning Outcomes: Students will develop a strong foundation to identify, analyze, and solve problems with physical models within the core disciplines described in the textbook of University Physics, which are universally recognized as standards in undergraduate physics education.

Primary Learning Outcomes:

- Students will be able to analyze thermal expansion and specific heat of a material.
- Students will be able to describe and analyze basic properties of thermodynamics
- Students will be able to apply Coulomb's Law to determine electric field and equipotential lines.
- Students will be able to apply conservation laws in Physics to simple analysis of motions.
- Students will be able to analyze simple electric circuits.

- For the writing requirement for each PHYS 4BL laboratory report is a minimum of 1,000 words of original writing based on [Writing \(APM 216\)](#)

Course Requirements/Assignments:

Policy on Prelab Activity

Each student must have the prelab activity finished when he/she arrives for the lab, otherwise the student will not be allowed to stay and do the lab activity, thus receiving a score of zero for that lab week. Without completing the prelab activity in advance, the student will be asked to leave the class. This policy will be strictly enforced. Each student must also finish the "Introduction and theoretical background" part of the lab report before coming to the lab, otherwise the student will receive "zero" point for this part of the lab report. Each student is required to show his/her prelab activity and introduction and theory to the lab instructor at the beginning of each lab session.

Lab Reports and Quizzes

Lab Reports

Standard Format and Required Contents of Scientific Report for PHYS 2BL

- (0) Pre-Lab Activity (needed to be stamped at the beginning of the lab)
- (I) Introduction and theoretical background:
- (II) Data Collection and Report

- (III) Data analysis and Graphs
- (IV) Questions and Problems
- (V) Conclusion
- (VI) Pre-Lab Activity (needed to be stamped at the beginning of the lab)

Grade distribution for each lab report:

Grade of a lab report will be determined base on the following criteria:

Pre-Lab Activity	3/20
Introduction and theoretical background	3/20
Data Collection/Reporting, Units, Analysis, Graphs	6/20
Questions and Problems	4/20
Conclusions	4/20

- ◆ Each report must have a cover sheet attached, which will be provided to you by the instructor.
- ◆ All reports must be turned in before you leave the lab.
- ◆ There are no dropped labs, but if you miss a lab you can either make it up in a different lab section **with approval of both lab instructors**. Also there will be a make lab option for **one lab** during the final three days of the semester.

Quizzes

Six quizzes will be given during the semester starting in Week 4 (see lab schedule in this document).

Quiz will be given at the beginning of the lab session and will need to be completed within 10 mins. *No additional time will be allowed for those arriving late for the quiz.*

Your lowest quiz grade will be dropped so your score will be determine

Policy about Quizzes

Early or make-up quizzes will not be allowed.

Study Expectations

- **Prior to the Lab session.** Students are required to read and understand the pertinent section(s) in the lab manual before you come to the lab. Seek help from your instructor or the Physics Department tutors if you have questions about the lab or the lecture. In particular, you are expected to have read and understand the section on Laboratory Policy as well as the appropriate sections in the University Catalog.
- **Attendance to the lab is mandatory.** A student is not allowed to enter the lab room if he/she is more than 10 mins late for the lab and it will be counted as a missing lab. If a student misses more than two labs, he/she will automatically fail the course. Each student will submit one's own lab report at the end of each lab although students will work in groups of three people. Students may not use any

data or reports from other lab sessions or years or copy data from lab mates, which are not taken by the student's participation. If one does so, it will be considered as cheating and plagiarism. Anyone caught cheating and plagiarism will be dealt with in accordance to the Policies and Regulations as spelled out in University Catalog,

www.fresnostate.edu/catalog/

There is also free Physics tutoring provided by the Learning Center: visit <https://studentaffairs.fresnostate.edu/lrc/>

Grading policy:

Grading (100%)

Reports: 70%
Quizzes 30 % (No final exam)

- ◆ You are allowed to waive “one” worst grade from lab reports
- ◆ Grade will “not” be curved. If you have questions about any quiz or lab report, you need to contact the instructor **within one week** you receive your graded quiz or lab report.
- ◆ **If you miss more than 2 labs (including the one dropped lab) you will automatically fail the course.**

Table 2 Distribution of Letter Grade to Percent and Points

Letter Grade	Percentage (%)
A	100 - 90
B	89.99 - 80
C	79.99 - 70
D	69.99 - 55
F	54.99 - 0

Course Policies & Safety Issues

Laboratory Behavior

Both the instructor and the students are to adhere to high standards of professionalism, common courtesy, and respect for others. Please refrain from the following behaviors, bearing in mind that if your behavior interrupts the class you may be asked to leave the class for the rest of the period:

- Coming to lab session late is not tolerable (no later than 5 minutes after a session starts).
- Using cell phones in class. Please turn off your phone before class.
- Disruptive behavior. This includes talking to others, reading newspapers, etc. Please be ready to attend to the subject of the class; if you are not motivated to learn please do not come and distract those who are motivated.

- Talking out of turn during laboratory instruction period. This can be rude and disruptive. However, I am very interested in what you have to say, and will be happy to entertain questions and comments if you wait your turn.
- Speaking to anyone in a rude or aggressive fashion or speaking of others in a disrespectful fashion.
- The [University Policy on Disruptive Classroom Behavior](#) is well worth reading and can be found in the Class Schedule and the Academic Policy Manual.

If you are absent from class, it is your responsibility to check on announcements made while you were away.

Audio/video recording of course lectures and the general guidelines for usage of electronic devices are not allowed in the lab session (Note: federal and state laws on student disability supersede your class policy on access to lecture/material). Also, if you allow recordings of course lectures, you need to make it clear that they are not to be shared with individuals who are not officially registered for the course and that they should be destroyed at the end of the semester.

Students with Disabilities

Upon identifying themselves to the instructor and the university, students with disabilities will receive reasonable accommodation for learning and evaluation. For more information, contact Services to Students with Disabilities in University Center Room 5 (278-2811).

In addition to defining disruptive behavior and detailing formal procedures for dealing with it, the policy contains a useful description of the learning environment.

Late work and make-up work policy. Give your make-up work policy due to student absence. Finally, include your late work policy if that is separate from the make-up work policy, and make clear the requirements for attendance at the final examination and the impact on the student's grade. Please note that APM 232 requires that students be allowed to make up work missed during absences up to a single week for serious and compelling reasons that are documented. Therefore, a policy of "no late work" is out of compliance with the policy. APM 241 requires that these make-up policies be described in the syllabus.

Address safety issues if relevant. (labs, hazardous materials, shops, field work, etc.).

Fresno State has continually focused on the safety and well-being of our campus community by following state and local public health guidelines as well as California State University policies. Any COVID-19-related questions or concerns can be directed to campus Office of Environmental Health & Safety/Risk Management at 559.278.8422

Additionally, listed below are resources and quick links regarding updates on the coronavirus, campus and community resources, testing sites and more.

- Visit the [Center for Disease Control \(CDC\) website for the latest updates on the virus](#)
- For updated regarding the Fresno State campus community and response, click [Fresno State Coronavirus Updates](#).

Please remember that the same student conduct rules that are used for in-person classroom instruction also apply for virtual/online classrooms. Students are prohibited from any unauthorized recording, dissemination, or publication of any academic presentation, including any online classroom instruction, for any commercial purpose. In addition, students may not record or use virtual/online instruction in any manner that would violate copyright law. Students are to use all online/virtual instruction exclusively for the educational purpose of the online class in which the instruction is being provided. Students may not re-record any online recordings or post any online recordings in any other format (e.g., electronic, video, social media, audio recording, web page, internet, hard paper copy, etc.) for any purpose without the explicit written permission of the faculty member providing the instruction. Exceptions for disability-related accommodations will be addressed by Student Disability Services working in conjunction with the student and faculty member.

The course policies that appear below are not required, though they reflect common student concerns and issues that arise at the Student Academic Petitions Committee. Responding to those that apply in the course syllabus has generally been found to be helpful.

Plagiarism Detection: The campus subscribes to Turnitin, a plagiarism prevention service, through Canvas. You will need to submit written assignments to Turnitin. Student work will be used for plagiarism detection and for no other purpose. The student may indicate in writing to the instructor that they refuse to participate in the plagiarism detection process, in which case the instructor can use other electronic means to verify the originality of their work.

Course AI Policy: Use of Artificial Intelligence in PHYS4BL lab session and on assignments and lab reports are **NOT** allowed.

Dispute Resolution: If there are questions or concerns that you have about this course that you and I are not able to resolve, please feel free to contact the Chair of the department to discuss the matter.

Chair's name: Doug Singleton

Department name: Physics

Chair's email: dougs@mail.fresnostate.edu

Department phone number: (559) 278-5281

Intellectual Property: All course materials, including but not limited to the syllabus, readings, quiz questions, exam questions, and assignments prepared by the instructor are property of the instructor and University. Students are prohibited from posting course materials online (e.g., Course Hero) and from selling course materials to or being paid for providing materials to any person or commercial firm without the express written permission of the professor teaching this course. Doing so will constitute both an academic integrity violation and a copyright violation. Audio and video recordings of class lectures as well as images of chat or messages shared during course sessions are prohibited unless I give you explicit permission in advance. Students with an official letter from the Services for Students with Disabilities office may record the

class if SSD has approved that service. Otherwise, recordings of lectures are included in the intellectual property notice described above. These provisions exist regardless of the modality of the course. That is they apply to in-person, hybrid and online courses.

Student Ratings of Instruction: In the final weeks of the semester, you will be asked to complete a short survey to provide feedback about this class. The primary goal of student ratings is to help your instructor improve the class. Feedback will also be reviewed by the department chair and the college dean. You will be given 15 minutes of class time to complete student ratings. Please offer feedback honestly and thoughtfully. Your participation is appreciated. You can access your student rating surveys and get more information at [Fresno State Student Ratings for Instruction \(SRI\)](#)

University Policies

Students with Disabilities: Upon identifying themselves to the instructor and the university, students with disabilities will receive reasonable accommodation for learning and evaluation. For more information, contact Services to Students with Disabilities in the University Library, Room 1202 (278-2811).

Financial Aid Satisfactory Academic Progress Standards and Appeals Process:
<https://studentaffairs.fresnostate.edu/financialaid/policies/sap/index.html>

The following University policies can be found on the web at:

- [Adding and Dropping Classes](#)
- [Cheating and Plagiarism](#)
- [Computers](#)
- [Copyright Policy](#)
- [Disruptive Classroom Behavior](#)
- [Honor Code](#)
- [Title IX](#)

Fresno State is committed to fostering a safe, productive learning environment for all students. Title IX and CSU policy prohibit discrimination on the basis of sex, which includes sexual harassment, domestic and dating violence, sexual assault, sexual exploitation, and stalking. We understand that sexual violence can impact a students' *ability to be successful* in the learning environment. We encourage students who have experienced sexual misconduct *to seek information on where to report from any member of our faculty or staff in order to ensure that the university can provide students with the necessary resources and supportive measures.*

As an instructor, I have a mandatory reporting responsibility as a part of my role. It is my goal that you feel comfortable sharing information related to your life experiences in classroom discussions, in your written work, and in our one-on-one meetings. I will seek to keep the information you share private to the extent possible. However, I am required to report any information I receive regarding sexual misconduct or information about a crime that may have occurred during your time at Fresno State.

Students can report incidents of alleged sexual misconduct to either or both of the following resources:

Office of Compliance and Civil Rights | occr.fresnostate.edu | 559.278.5003
Fresno State Police Department | fresnostate.edu/police | 559.278.8400

Students can also report other incidents of discrimination or harassment to:

Office of Compliance and Civil Rights | occr.fresnostate.edu | 559.278.5003

Students can access *confidential support* from two separate resources on campus:

Counseling Services | studentaffairs.fresnostate.edu/health/counseling | 559.278.2734
Survivor Advocacy Services | fresnostate.edu/survivoradvocate | 559.278.6796

Pregnancy or Related Conditions:

Pregnant Students or those with related conditions should contact the Title IX Coordinator in the Office of Compliance and Civil Rights for assistance. The Title IX Coordinator can coordinate specific actions to prevent sex discrimination and ensure the student's equal access to educational programs or activities.

Office of Compliance and Civil Rights | occr.fresnostate.edu | 559.278.5003

Parent scholars provides information on priority registration and other support for parenting students.

Services for Students with Disabilities can also provide assistance with accommodations.

If you have concerns and you are unsure who to contact, please visit the [Concern & Action Guide](#).

Emergency Information: In the event of an emergency, everyone in the campus community becomes a partner in the response. To ensure you are prepared and remain calm you must make yourself familiar with campus protocols. To contact the Fresno State Police Department call 559.278.8400 from your cell phone or 911 from a campus phone. Prior to an emergency, assess your environment for options depending on the emergency. Identify all possible exit routes, in an emergency always use the closest most safe exit. Once you exit the building go to the predetermined evacuation assembly point, if that is unavailable then go to an open safe space away from the emergency. Identify where and how you can secure yourself inside if you need to shelter in place or hide from a threat. Be prepared to help guide those around you and assist individuals who may be in need. Additional information can be found at www.fresnostate.edu/emergency

University Services

The following University services can be found on the web at:

- [Associated Students, Inc.](#)
- [Students with Disabilities](#)

- [Dream Success Center](#)
- [Library](#)
- [Learning Center Information](#)
- [Student Health and Counseling Center](#)
- [Academic Success Coaching](#)
- [Survivor Advocacy](#)
- [Writing Center](#)
- [Project Rebound](#)

Laboratory Schedule

(May be given as a separate document)

Following are schedules showing class meeting dates for Fall 2026 for Monday and Wednesday courses, Monday, Wednesday, and Friday courses, and Tuesday and Thursday courses.

Table 5 Fall 2026 Tentative Course Schedule: Monday PHYS 4BL Laboratory.

*Please note that **all quizzes should be taken at the Bulldog Testing Center (BTC).***

Week	Date	Topic of PHYS 4BL Laboratory	Quiz #
2	M., Aug. 31	Introduction to PHYS4BL Policies	
3	M., Sep. 7	No Lab due to Labor Day	
4	M., Sep. 14	Lab 1: Thermal Expansion	
5	M., Sep. 21	Lab 2: Specific Heat	W., 9/23, Quiz 1 at BTC
6	M., Sep. 28	Lab 3: Mechanical Equivalent of Heat	
7	M., Oct. 5	Lab 4: Latent Heat of Vaporization of Liquid Nitrogen	Tu., 10/6, Quiz 2 at BTC
8	M., Oct. 12	Lab 5: Electrical Equivalent of Heat and Light Efficiency	
9	M., Oct. 19	Lab 6: Electric Equipotential Equipotential Mapping	Tu., 10/20, Quiz 3 at BTC
10	M., Oct. 26	Lab 7: Resistance (Ohm's Law)	

Week	Date	Topic of PHYS 4BL Laboratory	Quiz #
11	M., Nov. 2	Lab 8: Simple Circuits (Kirchhoff's Rules)	Tu., 11/3, Quiz 4 at BTC
12	M., Nov. 9	Lab 9: Capacitor Discharge Measurements	
13	M., Nov. 16	Lab 10: Magnetic Field Measurements	Tu., 11/17, Quiz 5 at BTC
14	M., Nov. 23	No Lab due to Thanksgiving	
15	M., Nov. 30	Lab 11: e/m Measurements	F., 12/4, Quiz 6 at BTC
16	M., Dec. 7	Lab 12: Faraday's Law of Induction	
17	M., Dec. 14	Final Exam Week: Dec. 14-17	

1) Prior to the lab session

You are required to read and understand the pertinent section(s) in the lab manual before you come to the lab. Seek help from your instructor or the Physics Department tutors if you have questions about the lab or the lecture. In particular, you are expected to have read and understood the section on Laboratory Policy as well as the appropriate sections in the University Catalog

2) Finish your lab reports and hand them in before you leave

- a) This is advantageous from your point of view in that you will not have to spend a lot of time preparing a cosmetically attractive, extensive lab report. However, you should put in more time in preparation so that you can finish comfortably in 2 hours and 50 mins.
- b) Check any procedure you are unsure of with the TA. You will have to repeat procedures which are incorrect.
- c) All partners must write up their own reports - you will find that having your personal report will facilitate studying for subsequent quizzes.

3) Lab Reports

- a) See the first few pages of the laboratory packet for suggestions about report organization!
- b) You do not need to prepare your own cover page. A cover page will be provided to you at each lab.

- c) You do not have to reproduce theory which is presented in the lab manual. Derivations are not necessary unless called for.
- d) Your data sheet must include all data with appropriate units.
- e) When doing repetitive calculations, only one must be shown explicitly.
- f) Answer all questions and solve all problems.
- g) Try to estimate uncertainties and calculate errors when called for. If your calculator will perform linear regressions, read your instruction manual so that you can do them.

4) Graphing

- a) When graphing F vs. C, F is plotted on the y-axis and C on the x-axis.
- b) Estimate the range of the variables you're plotting before you start so that you end up with reasonably scaled axes.
- c) Label both axes, specify the units, and title your graph.
- d) Do all graphing requested on engineering paper (or better). If available, use the laboratory computer for plotting data.

5) Significant Figures

Generally, you will be able to use at least three significant figures legitimately.

Table 6 Finals Week Schedule

Finals week	Days	Dates
Final Exam Preparation & Faculty Consultation Days:	Thursday and Friday	Dec. 10 and 11
Final Semester Examinations	Monday – Thursday	Dec. 14 - 17
No Final Exam for PHYS 4BL Lab		

Physics Laboratory Report Cover Sheet

Instructions: Staple this to the front of your lab report before turning it in. Fill out the top portion, and your lab instructor will use the bottom half for grading purpose.

Table# _____

Lab partner names:

Your Name: _____

Lab Activity Title: _____

Date turned in: _____

<Report due time: best same day of the lab (can be handwritten),
or no later by 12 PM on Wednesday of the same week (must be typeset)>

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Arrange your lab report in the following order:

Cover sheet $\Rightarrow$ Prelab Activity $\Rightarrow$ Introduction $\Rightarrow$ Data $\Rightarrow$

Data Analysis (including graphs) $\Rightarrow$ Questions $\Rightarrow$ Conclusion

The following is to be used only by the lab instructor:

Pre-lab Activity _____/3

Introduction and theoretical background _____/3

Data Collection/Reporting, Units, Analysis, Graphs _____/6

Questions and Problems _____/4

Conclusion written with organization, legibility _____/4

Total Points for this lab: _____/20