HOUSTON COMMUNITY COLLEGE Northwest
SYLLABUS FOR PHYS 2126 Lab
Summer 2019
Class Number 10907

Course Identification: PHYS 2126-0014 Physics Laboratory II, CRN 10907
Time and location
3:00 – 6:02 pm TuWeTh, West Houston Institute, Room 345.

Instructor
G. Raymond Brown, Ph.D.
Office Hours: by appointment.
E-mail: g.brown@hccs.edu
Web site: http://learning.hccs.edu/faculty/g.brown.
https://eagleonline.hccs.edu. (This last site is the web site for the course.)
Online Tutoring Link http://hccs.upswing.io.

Laboratory Manual: Handouts for each lab meeting will be posted on the web site for the course prior to the lab meeting time.

Course Catalog Description: For science and engineering majors. Selected experiments in technical physics. Core curriculum course. Credit 1 (lab 3)

Course Prerequisites/Co requisite: Physics 2326

Course Intent: This course is intended for students majoring in engineering, physical or life sciences, or for those who are intent on preparing themselves for higher level science courses in their chosen curricula. Experiments have been selected to reinforce the material presented in Physics 2326, which may be taken concurrently.

Course Content: Laboratory exercises (experiments) are performed as listed in the tentative schedule below. These experiments cover topics associated with Physics 2326. The purpose of the lab course is to support the topics covered in the corresponding lecture course. Labs on these topics may be conducted before being addressed in the lecture classroom.

The laboratory exercises are performed by teams of 4 students. Grading depends on student videos of the experiments, use of tracking software downloaded from the web, simulations from the web, and problem-solving aids from supplemental materials – the Blender Algorithm©. The material emphasizes skills necessary in engineering practice: vector analysis, propagation of uncertainty through calculations, mathematical problem

solving, and electronic communications. If time permits, there will be a capstone term project. Development of the term project constitutes 3 of the experiments in the course. Oral presentation of the term project and submission of the term project video constitutes the capstone final exam of the course.

Student Learning Outcomes (SLOs)

SLOs are the Texas state specifications of what students passing this course should have learned to do. Upon successful completion of this course the student should be able to:

1. Prepare laboratory reports that clearly communicate experimental information in a logical and scientific manner.
2. Conduct basic laboratory experiments involving electricity and magnetism.
3. Relate physical observations and measurements involving electricity and magnetism to theoretical principles.
4. Evaluate the accuracy of physical measurements and the potential sources of error in the measurements.
5. Design fundamental experiments involving principles of electricity and magnetism.
6. Identify appropriate sources of information for conducting laboratory experiments involving electricity and magnetism.

Course Learning Objectives (CLOs)

Meeting the objectives below is the process needed to attain the SLOs:

1. Prepare laboratory reports that clearly communicate experimental information in a logical and scientific manner.
   1.1. Follow the laboratory report format provided by the instructor.
   1.2. Analyze experimentally measured quantities (data) by performing appropriate calculations.
   1.3. Compare calculated results with hypotheses of the experiment using uncertainties.
   1.4. Justify stated conclusions by the report results.
2. Conduct basic laboratory experiments involving electricity and magnetism.
   2.1. Analyze the experimental hypotheses for the physical meaning.
   2.2. Compose a procedure to test the hypotheses.
   2.3. Compare the procedure with the procedure guidelines given in the laboratory manual.
   2.4. Measure data that allows testing the hypotheses by calculations.

3. Relate physical observations and measurements involving electricity and magnetism to theoretical principles.
   3.1. Write equations that relate the data of the experiment to the relevant theoretical principles.
4. Evaluate the accuracy of physical measurements and the potential sources of error in the measurements.
   4.1. Describe sources of systematic error in measurement and analysis of experimental data.
   4.2. Apply quantitative estimates of the uncertainties in measured data.
   4.3. Apply quantitative estimates of the uncertainties in calculated results.
   4.4. Justify the level of agreement between results and hypotheses via the combined uncertainties.
5. Design fundamental experiments involving principles of electricity and magnetism.
   5.1. Criticize the experimental procedures presented in the laboratory manuals.
   5.2. Create experimental procedures from knowledge of the hypotheses and the available apparatus.
6. Identify appropriate sources of information for conducting laboratory experiments involving electricity and magnetism.
   6.1. Use web search tools to find data measured in experiments by others.
   6.2. Find alternative descriptions for E&M concepts.
   6.3. Search journal articles for experimental techniques.

The Final Grade Is Computed As Follows:

Lab reports ---------- 80%
Final Exam ---------- 20%

The overall score is calculated as follows:
Overall score = 0.80 (lab report average) + 0.20 (final exam score)

Letter Grading Scale:
A = 90 –100% B = 80 – 89% C = 70 – 79% D = 60 – 69% F < 60%

For the most up-to-date information on Student Services and HCCS policies, check the following link: http://www.hccs.edu/resources-for/current-students/student-handbook/ .

Attendance: The HCCS attendance policy is stated in the HCC Schedule of Classes. A fast paced curriculum should be expected. Accordingly, regular class attendance is required; you cannot get credit for an experiment you did

not perform during the class meeting time. Should a student miss a class for any reason, that student is responsible for all the materials covered during her/his absence. The instructor checks class attendance at each meeting. Although it is the student's responsibility to drop a course for non-attendance, the instructor has full authority to drop a student for excessive absences. (Dr. Brown will ***not*** administratively drop any student from this class.) For this course, absences are limited to two class-periods.

Other Information: Free physics tutoring may be made available. If so, a tutoring schedule will be posted in the laboratory room and posted on the course Eagle Online web site.

Last Day for Administrative and Student Withdrawals: The last day for withdrawals is July 29, 2019. Please contact the instructor prior to withdrawal. Jointly we may be able to arrive at a plan to help you succeed in the course.

NOTICE: Students who repeat a course three or more times may soon face significant tuition/fee increases at HCC and other Texas public colleges and universities. If you are considering course withdrawal because you are not earning passing grades, confer with your instructor/counselor as early as possible about your study habits, reading and writing homework, test-taking skills, attendance, course participation, and opportunities for tutoring or other assistance that might be available.

Disability Support Services (DSS): *HCC strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic or temporary medical conditions), please meet with a campus Abilities Counselor as soon as possible in order to establish reasonable accommodations. Reasonable accommodations are established through an interactive process between you, your instructor(s) and Ability Services. It is the policy and practice of HCC to create inclusive and accessible learning environments consistent with federal and state law. For more information, please go to* http://www.hccs.edu/district/students/disability-services/

Academic Honesty: Students are expected to conduct themselves with honor and integrity in fulfilling course requirements. The college may initiate Penalties and/or disciplinary proceedings against students accused of scholastic dishonesty. Possible punishments may include a grade of "0" on the particular assignment, failure in the course, and/or recommendation for probation or dismissal from the college system. "Scholastic dishonesty" includes, but is not limited to, cheating on a test, plagiarism, and collusion. The biggest temptation in this course will be copying other student's lab results. This practice results in penalties for both students.

HCCS Sexual Harassment Policy

Houston Community College is committed to cultivating an environment free from inappropriate conduct of a sexual or gender-based nature including sex discrimination, sexual assault, sexual harassment, and sexual violence. Sex discrimination includes all forms of sexual and gender-based misconduct and violates an individual's fundamental rights and personal dignity. Title IX prohibits discrimination on the basis of sex-including pregnancy and parental status-in educational programs and activities. If you require an accommodation due to pregnancy please contact an Abilities Services Counselor. The Director of EEO/Compliance is designated as the Title IX Coordinator and Section 504 Coordinator. All inquiries concerning HCC policies, compliance with applicable laws, statutes, and regulations (such as Title VI, Title IX, and Section 504), and complaints may be directed to:

David Cross
Director EEO/Compliance
Office of Institutional Equity & Diversity
3100 Main
(713) 718-8271
Houston, TX 77266-7517 or Institutional.Equity@hccs.edu

Important Dates:

Classes begin/system	July 11, 2019
Official day of record	July 11, 2019
Last date for administrative and student withdrawals	July 29, 2019
Final Examination	August 8, 2019 3:00 pm

Laboratory Policy: The instructor will review General laboratory rules and safety instructions. Experiments are performed by teams of 4 students. Lab reports consist of single video or electronic text files prepared by each lab team describing the purpose, procedure, results and conclusions of each experiment, submitted on the day that the next experiment is performed. Each report is graded on a 100-point basis. Come on time and **be prepared**. Read the experiment before coming to class and complete any pre-lab questions. If you follow this practice, you will be much better organized when doing the experiments and your lab experience will be much more rewarding. Detailed laboratory manuals and formats for lab reports are provided on the course web site. Students must keep current with materials placed on the EO/Canvas web site.

Examination: Each lab team orally presents their video of the term project and invites questions from the class. Each student team relates their term project activity to one or more physics principles addressed in the course.

Assignments: Outside of lab reports and the term project there are no special assignments.

General Suggestions for Learning Physics:
Physics, the most fundamental physical science, is concerned with the basic

principles of the Universe. It is the foundation on which the other physical sciences are based. The beauty of physics lies in the simplicity of its fundamental theories in which a small number of basic concepts, equations, and assumptions can expand our view of the world.

In this course, we cover the topics of classical electromagnetism. Following are some general tips, which may be helpful:

* Learning physics takes time! A reasonable guide is to allow you a minimum of three hours of study time for the preparation of each lab report. Heavy work and/or class loads are not compatible with learning physics.
* Attend class regularly! Take generous notes during class. Ask questions.
* Read each of the assigned experiments before you come to class. This makes the labs more meaningful for you.
* Good math skills are a must! To be successful you must be comfortable with vector algebra, exponentials, logarithms, differentials, and integration. Give yourself this comfort.
* You must have a good scientific calculator or math software with the necessary trigonometric, logarithmic, and exponential functions. Know how to use it and have it with you at all class periods. You are expected to use it during the execution of the experiments. A good inexpensive way to handle this is to become familiar with use of the free Wolfram Alpha web site. To sensibly report your work, also get familiar with a good equations editor. The one included with Microsoft word is adequate for reporting your work. Use of the Mathematica software or free Jupyter notebook is good for all of this.
* Go to the school sponsored tutoring sessions if you are having trouble keeping up. Remember that nobody can teach you physics the night before a test.

Lab Report Format:

All lab reports are made by the student lab teams. Lab report requirements will be provided for each of the lab experiments. Students perform experiments and prepare lab reports in teams of 4. Students who miss the performance of an experiment will not receive credit for the lab report. Deadlines for report submissions are absolute; no credit will be given for late reports.

Lab experiments and reports cannot be made up.

Video submissions must be in the form of a **single editable electronic file**, in one of the standard video formats, such as MP4 or AVI. Proprietary formats,

such as your camera may use, are not acceptable. Tables, graphs or images may be created in other software (for examples, a spreadsheet graph or png image) and made part of the video file. **Multiple files for a single report are not acceptable**. **Single image, PowerPoint and PDF files are not acceptable**. Similar requirements apply for optional MS Word online lab reports submissions. Online submission requirements are posted on the course web site.

PLEASE OBSERVE ALL SAFETY RULES

Tentative Schedule of Laboratory Experiments:

Dates, Lab #s	Exp. Name
July 9, Lab 01	Course Introduction, Uncertainty Review
July 10, Lab 01	Specific Heat Example, Uncertainty Calculations
July 11, Lab 02	Field Measurements and Calculations
July 16, Lab 03	The Ohm Law
July 17, Lab 04	The Wheatstone Bridge
July 18, Lab 05	The Kirchhoff Rules
July 23, Lab 06	RC Circuit and LR Circuit, both DC
July 24, Lab 07	LRC Circuit, AC
July 25, Lab 08	Motors and Generators
July 30, Lab 09	Geometric Optics
July 31, Lab 10	Interference
Aug 1, Lab 11	Modern Physics
Aug 6, Lab 12	Open Lab Experiment, Analyze a PhET Simulation.
Aug 7	All Lab Reports Must Be Submitted.
Aug 8	Final Exam at Discretion of Instructor.

Syllabus Disclaimer

It is the instructor's right to modify the class schedule when necessary and cover course topics as he/she wishes, therefore this syllabus is subject to change.