Electricity, Sound, Light and Optics
PHY 242 Section __

Name:
Email:
Phone:
Office:
Office Hours:
Department: Department of Physics and Astronomy
Class meeting time and place:

Course Description:
Presentation of the principles of sound, electricity, magnetism and optics. Lecture and laboratory grades are computed into one grade and the same grade is recorded for both lecture and lab. Prerequisite: MTH 233, PHY 241. Co-requisite: PHY 242L.

Program Learning Outcomes:
1. Knowledge: The student will demonstrate knowledge and comprehension of the basic and applied fields of physics (PLO 1)
2. Problem Solving: The student will develop independent problem solving skills (PLO 2)
3. Lab Work: The student will develop good experimental technique, including proper setup and care of equipment, conducting experiments and analyzing results in order to observe physical phenomena, assess experimental uncertainty, and make meaningful comparisons between experiment and theory (PLO 3)
4. Written Communications: The student will develop effective written communication skills by clear and concise problem solving, well-structured laboratory reports, and accepted formatting of research papers (PLO 4)

General Education Core Curriculum Objectives/Outcomes:
Critical Thinking: to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information, (CO 1)
Communication Skills: to include effective development, interpretation and expression of ideas through written, oral and visual communication, (CO 2)
Empirical and Quantitative Skills: to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions, (CO 3)
Teamwork: to include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal, (CO 4)

Student Learning Outcomes:
By the end of the course, successful students will be able to:
1. Solve problems using principles derived from Maxwell's Equations (**SLO 1**)
2. Construct and analyze DC and AC circuits (**SLO 2**)
3. Demonstrate an understanding of fundamental wave motion as applied to mechanical and electrical waves (**SLO 3**)
4. Solve problems involving geometrical and physical optics (**SLO 4**)
5. Demonstrate skills developed in critical thinking, communication (written and visual), empirical and quantitative analysis, and teamwork. (**SLO 5**. Includes COs 1, 2, 3, 4)

Text and Materials:
Essential University Physics (2nd edition) by Richard Wolfson
PHY 242 Lab Manual (produced by the Department of Physics and Astronomy and sold only in local bookstores)

Course Requirements:

- Students are required to study the following chapters from the course text: 20-22 (Exam 1), 23-25 (Exam 2), 26-28 (Exam 3), 29-32 (Final Exam, comprehensive with more emphasis on 29-32).
- Students will complete 12 laboratory exercises in the co-requisite lab and take a final exam over them at the end of the semester.
- Homework assignments (math oriented problems that involve learned physics principles) will be given to illustrate the principles covered in lecture. The assignments will be found on the WEB at http://webassign.net. They are due after the completion of the lectures on each chapter and involve approximately ten problems per chapter.
- There will be four major tests including the final. Students should become familiar with the policies on cheating and plagiarism.

The RC Circuits Investigation

This investigation is a specially designed experiment in the co-requisite lab that will allow students to demonstrate their mastery of **critical thinking skills**, **communication skills**, **empirical and quantitative skills**, and **teamwork skills**. It will involve measuring time varying voltages and currents in RC circuits, obtaining results, and developing mathematical models that fit the data. Available equipment will include multimeters, resistors, capacitors, breadboards, and DC power supplies. Unlike other experiments performed during the semester, students will (1) design part of this experiment and will (2) be given two weeks to submit a formal, detailed write-up of the experiment. They will make use of word documents and spreadsheets to complete the investigation. Prior to this investigation students will be doing experiments in the lab as members of teams of no less than three students and no more than five. They will have experienced **teamwork** practice for at least 1-4 weeks prior to this investigation. These earlier experiments will allow students to also hone their skills in **critical thinking**, **communication**, and **empirical and quantitative** analyses. **The RC Circuits Investigation** will allow students to demonstrate their **critical thinking skills** through the design of a simple experiment (inquiry) to determine the circuit time constant from their mathematical models, through the modeling of relevant data, and through the drawing of conclusions (evaluation and synthesis) from the results. They will do this during their regular scheduled lab time which is two hours and fifty minutes in length. The formal lab write-up associated with this investigation will require each student to determine his/her own results and draw his/her own conclusions (**written communications**) based on data tables and graphs (**visual communications**) produced in the exercise. Students' **empirical and quantitative skills** will be demonstrated by accuracy of measurements, manipulation and analysis of numerical data, needed calculations, error analyses and informed conclusions. This investigation involves an experiment where successful **teamwork** is required for students to set-up and conduct the experiment. Each team member must be willing to consider other's points of view and to work effectively with other members of the team to develop a proper experimental procedure to accomplish their goal. Data will be collected as a team. Each team member must complete the take-home part of this investigation independently of his/her teammates.

Grading Policy:
Each student's grade is based on an 800 point scale. These points come from four major exams (including the final) worth 100 points each for a total of 400 points. The lab experiment average is worth 158 points. (27% of these points will come from **The RC Circuits Investigation**.) The lab final is worth 42 points. Homework is worth 200 points. This gives a total of 800 points possible in the course. (For each student, lecture and lab scores will be combined to determine an overall grade in PHY 242. Each student will then receive this overall grade for both lecture and lab.) The grading scale is

720-800 – A
640-719 – B
560-639 – C
480-559 – D
0-479 – F

Attendance Policy:
If you are going to miss class for a university excused absence you should notify the instructor in advance. It is your responsibility to make arrangements to make up any missed work. If you are sick it is your responsibility to abide by university guidelines in dealing with your absence. If you have three or more unexcused absences your final grade will be lowered one letter grade. You must provide appropriate written documentation of your absence within one week of the absence for it to be considered excused.

Academic Integrity (*A-9.1*)
Academic integrity is a responsibility of all university faculty and students. Faculty members promote academic integrity in multiple ways including instruction on the components of academic honesty, as well as abiding by university policy on penalties for cheating and plagiarism.

Definition of Academic Dishonesty
Academic dishonesty includes both cheating and plagiarism. Cheating includes but is not limited to (1) using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class; (2) the falsification or invention of any information, including citations, on an assigned exercise; and/or (3) helping or attempting to help another in an act of cheating or plagiarism. Plagiarism is presenting the words or ideas of another person as if they were your own. Examples of plagiarism are (1) submitting an assignment as if it were one's own work when, in fact, it is at least partly the work of another; (2) submitting a work that has been purchased or otherwise obtained from an Internet source or another source; and (3) incorporating the words or ideas of an author into one's paper without giving the author due credit.

Please read the complete policy at http://www.sfasu.edu/policies/academic_integrity.asp

Withheld Grades *Semester Grades Policy (A-54)*
Ordinarily, at the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the course work because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or the grade automatically becomes an F. If students register for the same course in future terms the WH will automatically become an F and will be counted as a repeated course for the purpose of computing the grade point average.

Course Calendar (Lecture): (PLOs 1, 2, and 4 are addressed continuously in the lecture)

Week	***Topics Covered***
Week 1	*Course Introduction* ***Lecture and assigned reading on critical thinking in physics (CO 1)*** *Electric Charge, Force, and Field* ***Instructor led discussion on critical thinking (CO 1)***
Week 2	*Homework problems due* *Gauss's Law*
Week 3	*Homework problems due* *Electric Potential* ***Lecture and instructor led discussion on written and visual communications (CO 2)***
Week 4	*Electrostatic Energy and Capacitors* ***Exam 1*** *Homework problems due*
Week 5	*Electrostatic Energy and Capacitors* *Homework problems due* *Electric Current*
Week 6	*Electric Current* ***Lecture and assigned reading on teamwork (CO 4)*** *Homework problems due* ***(SLO 2)*** *Electric Circuits* ***Instructor led discussion on teamwork (CO 4)***
Week 7	*Electric Circuits* *Homework problems due* ***(SLO 2)*** *Magnetism: Force and Field*
Week 8	***Exam 2 (SLO 2)*** *Magnetism: Force and Field* *Homework problems due* ***(SLO 2)***
Week 9	*Electromagnetic Induction* *Homework problems due* ***(SLO 2)***
Week 10	***The RC Circuits Investigation begins in lab (SLO 5 and COs 1, 2, 3, 4)*** *Alternating-Current Circuits* *Homework problems due* ***(SLO 2)***
Week 11	*Alternating-Current Circuits* *Homework problems due* ***(SLOs 1-3)*** ***(SLOs 1, 3)***
Week 12	***Exam 3 (SLO 1-3)*** *Homework problems due* ***(SLO 3)***
Week 13	*Reflection and Refraction* *Homework problems due* ***(SLO 4)***
Week 14	*Images and Optical Instruments* *Homework problems due* ***(SLO 4)***
Week 15	*Homework problems due* ***(SLO 4)*** *Interference and Diffraction*
Week 16	*Final Exam Week –* ***Exam 4 (SLOs 1-4)***

Course Calendar (Laboratory): (PLOs 3 and 4 are addressed continuously throughout the lab)

Lab	Week of	Lab Experiments
1	**Jan. 28th**	**Simulation of Radioactivity (CO 3)***
2	Feb. 4th	Counting of Nuclear Radiation
3	Feb. 11th	The Vibrating String
4	Feb. 18th	Organ Pipe
5	Feb. 25th	The Cathode Ray Oscilloscope
6	Mar. 4th	Ohm's Law
7	Mar. 18th	Series and Parallel Circuits
8	Mar. 25th	**The RC Circuits Investigation** (COs 1-4)**
9	Apr. 8th	The Ray Box
10	Apr. 15th	Properties of Converging Lenses
11	Apr. 22nd	The Telescope
12	Apr. 22nd	The Diffraction Grating
--	Apr. 29th	Lab Final Exam in Room 321

*Instruction on how to correctly collect and analyze scientific data will begin here and will continue throughout the laboratory experience. By the time students get to **The RC Circuits Investigation** they will have adequate development of **empirical and quantitative skills** to satisfactorily complete the investigation

This experiment is more comprehensive than the others and will count as 27% of the lab experiment grade. It is designed to allow students to demonstrate their skills in **critical thinking, **communication**, **empirical and quantitative** analyses, and **teamwork**. Students will have two weeks to complete a formal report using word processors and spreadsheets.

Students with Disabilities

To obtain disability related accommodations, alternate formats and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, and Room 325, 468-3004 / 468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services in a timely manner may delay your accommodations. For additional information, go to http://www.sfasu.edu/disabilityservices/.