

## **COURSE SYLLABUS FORM**

**American University of Beirut  
Faculty of Arts and Sciences  
Department of Physics**

**Course Number and Title: Physics 210L Introductory Physics Lab. II**

### **1. Course Description and Learning Outcomes**

#### *a- Course description:*

Physics 210L is one credit 2½ hour/week laboratory course designed primarily for students majoring in physics and engineering. This course has Physics 210 (Introductory Physics II) as a pre- or co-requisite. The experiments deal with: Fluids, Thermodynamics, Wave phenomena, Geometrical and Physical Optics.

#### *b- Intended Learning Outcomes:*

The student should be able to:

- i- Perform experiments related to the material taught in Physics 210.
- ii- Collect and analyze experimental data that are used to investigate physical phenomena during an experiment.
- iii- Demonstrate the validity of physical principles through the comparison of the experimental results to the mathematical/theoretical description.
- iv- Determine experimentally various physical properties of substances and compare them to the accepted literature value.
- v- Learn the function of various sorts of instruments and devices used in experimental physics such as pressure sensors, lenses and lasers.
- vi- Represent graphically a set of data using linear regression analysis.
- vii- Analyze quantitatively the importance of experimental errors and uncertainties using statistical analysis tools such as standard deviation and root mean square error calculation or the theory of propagation of error.
- viii- Acquire scientific and intellectual abilities such as critical thinking, scientific data reporting and team work.

### **2. Resources Available to Students**

#### *Laboratory manual and reports:*

The Physics 210L laboratory manual should be purchased at the beginning of the semester from Room 206 in the Physics Department.

#### *Textbook (Physics 210):*

*Physics for Scientists and Engineers* (Volume I & II), By Serway and Beichner, Brooks/Cole Publishing (5<sup>th</sup> Ed.)

### **3. Grading Criteria**

There will be a written final exam at the end of the course. The final grade will be weighted average of the average laboratory report grades (45%, with the lowest lab. report grade deleted), the evaluation of the instructor (10%, based on your preparedness, laboratory work, attitude and discipline in the laboratory) and the final exam (45%).

### **4. Schedule**

Laboratory experiments are performed once a week according to the following schedule.

Week 1	Introduction and analysis of experimental results
Week 2	Standing waves on a stretched string
Week 3	Standing sound waves in air columns
Week 4	Properties of liquids: Surface tension & Viscosity
Week 5	Geometrical Optics I: Reflection and refraction.
Week 6	Geometrical Optics II: Mirrors and lenses.
Week 7	Michelson interferometer
Week 8	BREAK
Week 9	Interference and diffraction.
Week 10	Thermal expansion of solids.
Week 11	Mechanical equivalent of heat.
Week 12	Boyle's law.
Week 13	Adiabatic compression of gases.
Week 14	<i>Final Exam.</i>

### **5. Course Procedure and Policies**

- i. *Attendance:* Attendance of all the experiment sessions is mandatory. You will be given a grade of zero for a missed experiment and you will be responsible, in the final exam, for the material covered in that experiment. Any student missing *more* than two experiments will have to drop the course otherwise he/she will be given a failing grade. After taking attendance, a ten minutes briefing about the experiment will be presented to the students at the beginning of the session. If a student comes late *during* the briefing, he/she

should wait outside until the end of the briefing after which he/she can enter the lab. to perform the experiment. Such students coming late will be issued a warning, and this may affect their final evaluation. No student will be allowed to perform the experiment if he/she comes *after* the end of the briefing. In that case, the student will be considered as absent.

- ii. *Performing an experiment:* The assigned experiment should be thoroughly studied before you come to the laboratory session. In each experiment, students will work in pairs, as each student will be assigned to one of six groups. Students should exchange partners every fortnight. After spending two hours in the lab., the students have 30 minutes to finish up the lab. report. For that purpose, they should go to Rooms 219 and 217 and will be supervised by the lab. technicians.
- iii. *Handling of equipment:* Extreme care must be taken when doing the experiments in order to avoid the misuse or the damage of the laboratory equipment, some of which can be very expensive. Any deliberate misuse and damage of a piece of equipment will be reported to the course coordinator for action to be taken. Any problem with the equipment that arises during the course of an experiment should be immediately reported to the lab. instructor for fixing. If the problem can't be solved *promptly*, the instructor will move you to the "extra" set-up that has been installed for such emergencies. Before leaving the lab, make sure that the apparatus is in good working condition and the table is neat and clean.
- iv. *Safety:* The students should use the equipment very carefully and strictly as directed in the laboratory manual to avoid any possible injury. Any peculiar behavior of an instrument should be reported to the lab. instructor for inspection.
- v. *Laboratory discipline:* No eating, drinking, smoking or use of mobile phones is permitted in the laboratory. The instructor reserves the right to dismiss from class, any student acting in a manner that is considered disruptive or counter productive to the teaching/learning process in the laboratory.
- vi. *Laboratory reports:* At the beginning of each experiment, you will be handed a laboratory report form that you will have to fill out, along with your laboratory partner (*one report per group*), as neatly and as clearly as possible. Each experiment should last no more than *two hours* and you will be given an additional *half hour* to finish up the laboratory report, before handing it in to your laboratory instructor. The laboratory report usually includes the "raw" data that you have collected during the experiments, the corresponding data analysis and end results, graphs, and discussion and answers to the questions found in the report. Data and results should be reported according to the guidelines presented in the introductory session that are also found in the "Analysis of Experimental Data" of the laboratory manual. A scientific calculator is an essential tool for the completion of the laboratory report. You will be able to consult the corrected laboratory report a week after the corresponding experiment, during the following laboratory session or the office hours of your instructor.

- vii. *Missing the Final Exam:* A make-up for a missed final exam will be given only after the Administrative Committee of the Faculty of Arts and Sciences approves the request for such a make-up. Medical reports will be considered only if, they are issued by the University Health Services of AUB or the AUB Medical Center. Additional information about make up examinations can be found on pages 115 and 116 of the 2002-03 AUB catalogue.
- viii. *Cheating:* Any use of previous laboratory reports during the experiment or during the writing of the lab. report will be considered as an act of cheating and will be promptly dealt with by giving the student a zero on the corresponding experiment. Any student caught cheating or attempting to cheat during the final exam will be dismissed on the spot and will receive a failing grade in the course. In any of these cases, the infringement will be immediately reported to the Student Affairs Committee for further disciplinary action, which may include expulsion from the University.
- ix. *Office Hours:* The coordinator of the course and the laboratory instructors will hold regular weekly office hours that will be announced at the beginning of the semester. The students are urged to make use of the availability of the teaching staff, during these office hours for any questions or comments they have about the course and the material covered. If you cannot attend any of the posted office hours, call or e-mail the person you would like to see.