2014

355-01 Advanced Physics Lab

Heidrun Schmitzer

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I. General Information

<table>
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<th>Instructor:</th>
<th>Dr. Heidrun Schmitzer</th>
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<tbody>
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<td>Office:</td>
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<td>Office Hours:</td>
<td>Wed. 10:50- 11:50 and by appointment</td>
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II. Goals of the Course: Learn to study and work independently and process new scientific information, learn to manage time and to write a scientific paper.

III. The course requirements are as follows:

| Lab reports | 80% |
| Formal Paper | 20% |

Please be aware that managing your own time is part of this course. Typically you have two weeks for one lab experience. In week 1 you will first meet with me for 30 min to discuss the lab and introduce the devices. Come prepared. You start you experiment the same day and you have one more lab session to do the lab. Lab reports are due in the first week of your next experiment. Not turning in lab reports in time and not being able to do the required lab experience in time will result in a lower grade. The departmental grade policy can be found in the Programs section of the Xavier Physics Department website (http://www.xu.edu/physics_dept)

LABs HAVE TO BE COMPLETED DURING SCHEDULED LAB TIME, NOT AT ANY OTHER TIME.

You will write a formal paper about one of the labs. It will be given a grade for the first version that is turned in. After suggested improvements are made a second grade will be given. The final grade for this paper is then the arithmetic mean of these two grades.

IV. Attendance

Attendance at the meeting sessions is mandatory. All labs must be completed within by the end of November. The grade *incomplete* is not an option in this course.

V. Scale

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Advanced Lab Topics

1. Viscosity of fluids: Reynold’s number and Stokes’ Law. This lab supports material that you learn in Theoretical Mechanics and puts the emphasis on the understanding of fluid mechanics.

2. Magnetic torque and magnetic dipole moment: This lab supports material that you learn in Electrodynamics and gets you acquainted with the differences between Magnetism and Electricity.

3. Polarisation of Light: Raleigh scattering and Birefringence: This lab is a general knowledge lab; it helps you understand why the sky is blue based on the dipole interaction between light and matter.

4. Electric Potential of various conductor configurations: This lab supports material that you learn in Electrodynamics and helps you visualize electric potential. It also requires you to learn basic MAPLE commands.

5. Choice lab: Polarisation measurements OR Efficiency of an Otto engine: The polarimeter allows you to measure the polarization of laser light and to control how you change it. The Ideal gas apparatus allows you to understand the principles of a heat engine.

The lab reports should have the following structure:

Title
Purpose/goal of the lab (What do you want to do or show or prove?)
Procedure
Description of Equipment/set up (can be drawing)
Data: use graphic representation of data and theory where ever possible
Conclusions (Why is this lab important? What did you learn?) and error analysis

Points to consider for a paper or a talk:
Is the talk/paper prepared to the appropriate audience?
Are scientific conventions used correctly?
Does the article/talk flow logically?
Does the article/talk give a concise abstract or introduction?
Does the article/talk give a concise summary of results?
Do the graphs make scientific sense and are they labeled correctly?
What parts of the talk/paper need more explanation?