Class Description and Objectives:
The purpose of the physics laboratory is to allow students to witness the concepts and physical laws that are introduced in lecture. You will also be exposed to elementary laboratory techniques. Every class will have a short lecture introducing the procedures, concepts, formulas and instructions relevant to the experiment. The lecture will also cover what is expected in your lab-report; don’t be late. Attendance and participation is mandatory. Experiments will usually be performed in groups, but each student will turn in an individual lab report.

Student Learning Outcomes:

The purpose of the course is to provide the practical knowledge necessary for a well-rounded understanding of the physical world. This laboratory experience partially satisfies the Silver Core Objective CO4: Physical & Natural Phenomena. Students that successfully complete this course should be able to:

i. The student will demonstrate problem solving skills in various types of problems in physics using quantitative reasoning, critical thinking and appropriate mathematical techniques.

ii. The student will demonstrate the ability of use scientific methods to understand and explain concepts in physics.

iii. The student will be able to connect physics concepts and problems to their world experience.

iv. The student will demonstrate skills in collection and interpretation of data from laboratory experiments

v. Properly use and read: scales, calipers, digital voltimeters, micrometer and balances.

vi. Develop proper habits that minimize uncertainty in physical measurements.

vii. Set up and solve problems related to the propagation of errors and uncertainties.
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viii. Understand and properly use significant figures.
ix. Plot and fit experimental data to a given mathematical model.
x. Proficiency in troubleshooting, problem-solving and interpreting the results of physical measurements.
xi. Develop effective written and verbal communications skills to ensure accurate transfer of technical information.

Course Requirements: Lab notebook (see bookstore for required notebook), and copy of lab to be performed.

Lab Etiquette:
• No FOOD/DRINKS/SMOKING/APPLYING of COSMETICS in the labs.
• Please turn off your cell phone.
• You and your partners must clean up and shut off equipment after you are finished with your lab. Failing to leave your station complete, organized and working can affect your grade.
• Please report all damaged equipment so it can be replaced.

The Ground Rules:
• Students are allowed to drop their lowest lab grade. For example, if eleven labs are performed during the semester, the T.A. will use the ten best lab grades to calculate a student’s final grade.
• Students that must miss their assigned lab section can arrange to take the lab in a different lab section (during the same week); if the student receives permission from both T.A.s It is the student’s responsibility to make prearrangements to turn in their lab report to their normal TA.
• Labs reports are due at the end of each class period. Students that complete labs outside their normally scheduled lab section must make prearrangements with their regular TA, to turn in their report, (see above). Late labs are not accepted.
• A single make up lab will be given at the end of the semester. Only students that have a documented, justifiable absence will be eligible for the makeup lab. Students will be required to submit proof of the justifiable absence.
• Make sure you know where your TA’s mail box is located!! The department cannot guarantee that anything, placed in the wrong mailbox or some other “novel” location, will make it to the proper instructor for grading.
• You are expected to read the lab experiments before class and have a copy of the lab with you in the class.
• Students will keep and maintain an individual lab notebook. All notebook entries must be in ink.

Lab reports:
• The objective and theory section of your lab report should be completed prior to class.
• Your original data must be recorded in your lab notebook, it is the student’s responsibility to make sure that the original data is signed or initialed by the instructor, before leaving the lab.
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This signature will be counted as attendance. Lack of signature on original data is grounds for a grade of zero.

• Lab reports are due at the end of each class period. Students will turn in individual reports.
• Lab reports are due at the end of the class period; late labs will not be accepted without good cause and prior permission from the instructor.
• Lab reports that contain copied and or plagiarized material will be given a zero. Lab reports that are not written in your own words will be given a zero. Lab reports for lab experiments the student did not perform will be given a zero.
• The first lab report that contains copied or plagiarized material will be given a grade of zero. The second occurrence will drop your final grade by one letter grade. The third lab that contains copied or plagiarized material will get you an F for the class.
• Neatly, hand-written lab reports are accepted. Illegible lab reports are unacceptable and will be given a grade of zero.
• You can turn in graphs on graph paper or printed out. Hand-drawn graphs on anything other than graph paper will not be accepted.
• Follow the rubric when writing up lab reports. This format can be found on the lab manual website. Lab reports that do not follow the rubric will be graded down.

Attendance:
You are required to attend all the classes. If you must miss a lab due to a justifiable excuse (you must document your: illness, emergency, court date... or pre-arranged absence), you should arrange to make up the lab during a different lab session that week (the week of your absence). You must contact both instructors before attending another lab section. No more than two labs may be made up in another section. If you are missing or fail to turn in three or more lab reports you will receive a failing grade for the lab. Lab reports that are turned in for experiments which you did not attend/perform will be given a grade of zero. There are no mulligans, rewrites or do-overs. You are expected to be in class (in body and mind) on time.

Laboratory safety:
Experimental work can expose one to various kinds of hazards (electric shocks, burns, cuts, defenestration...), every person working in the laboratory should maintain “situational awareness” of their surroundings, so as to avoid possible injury. Be aware and reduce the risk of injury and/or damaging the equipment. Report any accident immediately.

http://www.realclearscience.com/lists/worst_lab_accidents_in_history/
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Schedule:

<table>
<thead>
<tr>
<th>Week of</th>
<th>Experiment</th>
<th>Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 September</td>
<td>Orientation/normal distribution</td>
<td>DMS 208</td>
</tr>
<tr>
<td>11 September</td>
<td>Accuracy of Measurements</td>
<td>DMS 208</td>
</tr>
<tr>
<td>18 September</td>
<td>Force Table</td>
<td>DMS 208</td>
</tr>
<tr>
<td>25 September</td>
<td>Understanding Motion I &amp; II</td>
<td>DMS 212</td>
</tr>
<tr>
<td>2 October</td>
<td>Equilib. Of Non-concur. Forces</td>
<td>DMS 212</td>
</tr>
<tr>
<td>9 October</td>
<td>Conservation of Momentum</td>
<td>DMS 208</td>
</tr>
<tr>
<td>16 October</td>
<td>Uniform Circular Motion</td>
<td>DMS 210</td>
</tr>
<tr>
<td>23 October</td>
<td>No Lab</td>
<td>--</td>
</tr>
<tr>
<td>30 October</td>
<td>Archimedes’ Principle</td>
<td>DMS 208</td>
</tr>
<tr>
<td>6 November</td>
<td>No Lab</td>
<td>--</td>
</tr>
<tr>
<td>12 November</td>
<td>Gas Law</td>
<td>DMS 210</td>
</tr>
<tr>
<td>20 November</td>
<td>No Lab</td>
<td>--</td>
</tr>
<tr>
<td>27 November</td>
<td>Heat of Fusion</td>
<td>DMS 210</td>
</tr>
<tr>
<td>12 December</td>
<td>Linear Harmonic Motion</td>
<td>DMS 210</td>
</tr>
</tbody>
</table>

Grading and percentage of total reports:
100 - 90 A
89 – 80 B
79 – 70 C
69 – 60 D
Below 60 F

Disability Statement: Any student with a disability needing academic adjustments or accommodations is requested to speak with me or the Disability Resource Center (Thompson Building Suite 101) as soon as possible to arrange for appropriate accommodations.

Academic Success Services: Your student fees cover usage of the Math Center (784-4433 or www.unr.edu/mathcenter/), Tutoring Center (784-6801 or www.unr.edu/tutoring/), and University Writing Center (784-6030 or www.unr.edu/writing_center). These centers support your classroom learning; it is your responsibility to take advantage of their services. Keep in mind that seeking help outside of class is the sign of a responsible and successful student.

Statement on Academic Dishonesty: For example, "Cheating, plagiarism or otherwise obtaining grades under false pretenses" constitute academic dishonesty according to the code of this university. Academic dishonesty will not be tolerated and penalties can include canceling a student’s enrollment without a grade, giving an F for the course or for the assignment. For more details, see the University of Nevada, Reno General Catalog.

Statement on Audio and Video Recording: Surreptitious or covert video-taping of class or unauthorized audio recording of class is prohibited by law and by Board of Regents policy. This class may be videotaped or audio recorded only with the written permission of the instructor. In order to accommodate students with disabilities, some students may have been given permission to record class lectures and
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discussions. Therefore, students should understand that their comments during class may be recorded.

Name:
Lab Partner’s Name:
TA’s Name:
Date:

Title of the Experiment
(1 point for proper heading)

Objective (2 points): A concise statement (a sentence or two, in your own words*) that summarizes the objective of the experiment. This section must be completed prior to class.

2 points for summarizing objectives

Theory (8 points): Summarize in your own words*, the theory of the physics involved in the experiment (a couple of paragraphs), as well as an outline of the procedures. Explain, in your own words*, any unfamiliar terms you find in the lab manual. This section must be completed prior to class.

4 points for summarizing the theory
4 points for outlining procedures

Notes/Computations (3 points): You should be recording notes from the discussion before the experiment, as well as any observations or questions you have. Any calculations should also appear in your notebook. Think of these notes as a reference for you to look back at. Record what will help you later and structure it however works best for you, but keep them neat and legible. Though this is not necessarily a contiguous “section,” these notes should be clearly separated from and not mixed in any other section.

Equations (2 points): Present the key/working equations. Define all variables and provide their units.

1 point for expressing relevant equations
1 point for defining variables
1 point for proper units

Data (9 points): An orderly display of the data, preferably in tabular form. Your original data sheet must be signed by the TA. All entries should be clearly identified and include their proper units.

1 points for a data section
2 points original data (signed by instructor)
2 points for proper/clear labeling of data
2 points for proper units of data
2 points for numerical results
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**Conclusions & Questions:** There are typically five questions, each correctly answered question is worth 5 points.

**Grade** = \( \frac{\text{total points earned}}{\text{total point available}} \times 100 \)

**Note:** Your instructor will consider the above format important when grading your lab report. The following may be taken into consideration (Worth ≈ 10%)

1. Neatness
2. Composition
3. Grammar
4. Spelling
5. Thought and originality in performing and presenting the lab
6. Behavior that is disruptive to the labs (which includes but not limited to: being late to class, not leaving a clean work area for the following class…)
7. Ability to follow instructions.

**In your own words***: this means in your own words! Labs that contain material copied or plagiarized from the lab instruction or elsewhere will be given a grade of zero.

*Bonus point will be given for finding and reporting errors in lab manual not all labs will conform exactly to the lab report format, given above. Some labs may not require a certain section of the lab format. While another lab may require an additional section be added to the write-up. For nonconforming labs, check with the instructor as to what they expect for a write up.*