PHYS 211H – General Physics I (Classical Mechanics)

Linear and rotational dynamics, conservation laws, waves

Fall Semester 2020

August 5, 2020

Instructor: Robert Streubel

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Office Hours: Tuesdays and Thursdays after class, or by appointment

Prerequisites: High school Physics or PHYS 141 or 151, and Math 106

Lectures: Tuesdays and Thursdays, 12:30 thru 13:45, JH 247

Recitations: Wednesdays, 11:30 thru 12:20, JH 145

Course Objectives: PHYS 211 is the first semester of the calculus-based introductory Physics sequence, aimed mostly at science and engineering majors. This course focuses on Classical Mechanics, including linear and rotational kinematics, dynamics and statics, conservation laws, and mechanical waves. It gives an illustrative introduction to daily-life Physics and lays the foundation for more advanced courses by fostering both conceptual understanding and problem-solving skills.

Pedagogical research into Physics learning has shown that active engagement in a class (rather than a passive listening role) enhances students learning and long-term retention. We will rely quite heavily on in-class participation during lectures and solving problems in recitation.

This course will be in-person only. We will meet for classes and recitations in JH 145, with the exception of the *first week of classes, August 18 thru 20, which will be remote only*.

Course Content

Set 1

1. Units, Physical Quantities, and Vectors
2. 1-D Kinematics
3. 2-D Kinematics
4. Newton's Laws of Motion
5. Applying Newton's Laws
6. Work and Kinetic Energy
7. Potential Energy and Energy Conservation

Set 2

8. Momentum, Impulse, and Collisions
9. Rotation of Rigid Bodies

10. Dynamics of Rotational Motion
11. Equilibrium and Elasticity

Set 3

12. Fluid Mechanics
13. Gravitation
14. Periodic Motion
15. Mechanical Waves

Course Material

Mastering Physics (online access required). The online material in Mastering Physics will be the main resource for formative and summative online assessment of the class. See `https://pearsoncustomersuccess.co/324b2` on how to register for Mastering Physics in Canvas (MyLab and Mastering tab). Mastering Physics includes the following components:

- Online pre- and post-lecture assignments,
- Online homework,
- Videos of demonstrations and problem solving,
- Quizzes and comprehensive online textbook.

Textbook (highly encouraged, included in Mastering Physics). University Physics with Modern Physics, Hugh Young and Roger Freedman (2020).

Complementary reads. FlipItPhysics for University Physics: Classical Mechanics, Tim Stelzer; Mats Selen; Gary Gladding (2016). Physics for Scientists and Engineers, Paul Tipler and Gene Mosca (2020).

Learning Catalytics (part of Mastering Physics). We will use Learning Catalytics instead of i>Clickers in class as a way to make the lectures more interactive and flexible. Scroll down at your home screen of Mastering Physics to access Learning Catalytics.

Canvas. Class information, including syllabus, announcements, materials etc. will be posted on the UNL Canvas Page.

Recitations. Recitation sections will consist of homework discussions and group work, focusing on developing problem solving skills, guided by the instructor.

Exams and Grading

Mid-term exams (in-class): Thursday, September 17 and Thursday, October 22

Final exam: 7:30 thru 9:30 on Wednesday, November 25

The exams will be a combination of multiple choice and "open" questions evaluating your understanding and problem-solving skills of basic Physics problems.

Grading Scale

Prelecture assignments, and class participation	5%
Recitation	10%
Quizzes	10%
Homework	10%
Two mid-term exams (15% each)	30%
Final exams	35%

The grades will be determined from your final score using the table below. The table shows the lower cutoff for a grade. For example, if your score is greater or equal to 80% but less than 85% you will get a B+.

Score	95	90	85	80	75	70	65	60	57	53	50
Grade	A+	A	A-	B+	B	B-	C+	C	C-	D+	D

A single instance of academic dishonesty may result in a failing grade for the course. Academic dishonesty includes copying solutions for homework, recitations, or exams either from another student or from existing solutions, whether published or not. Students are allowed to discuss homework with each other, but copying is considered cheating. For more examples of what is considered academic dishonesty, see the Student Code of Conduct (`http://stuafs.unl.edu/ja/code/three.shtml`).

Classroom Guidelines Regarding COVID-19

Campus custodians are following enhanced cleaning and disinfection protocols across campus; instructors will wipe down shared classroom surfaces and equipment before and after use. Disinfection supplies will be available in each instructional space, and hand sanitizer stations are positioned within building entryways. *Students are expected to wipe down their own tablet desk or tabletop. Instructors and students are required to wear face covering while in class, buildings, and on campus. Failure to comply with this policy is interpreted as a disruption of the classroom and may be a violation of UNL's Student Code of Conduct. See official announcement at the end of the syllabus.* Please pay attention to restricted door entry.

Students with disabilities are encouraged to contact the instructor for a confidential discussion of their individual needs for academic accommodation. It is the policy of the University of Nebraska-Lincoln to provide flexible and individualized accommodation to students with documented disabilities that may affect their ability to fully participate in course activities or to meet course requirements. To receive accommodation services, students must be registered with the Services for Students with Disabilities (SSD) office, 132 Canfield Administration, 472-3787 voice or TTY.

ACE Certification

The ACE Outcome(s) for which the course is certified:
Student Learning Objective 4: Use scientific methods and knowledge of the natural and physical world to address problems through inquiry, interpretation, analysis, and the making of inferences from data, to determine whether conclusions or solutions are reasonable.

The opportunities the course will give students to acquire the knowledge or skills necessary to achieve the Learning Outcome(s):
The students will have the opportunity to learn how to analyze physical systems through a combination of exposition, directed inquiry, and problem solving. The main focus of the course is on the appraisal of physical systems arrived at a thorough understanding of the relationship between the system and its behavior. This process can be separated into four distinct phases. The first phase consists of an inquiry into what is the system and its essential components, what are the available data (which are given in the statement of the problem, or in diagrams, graphs, or reference tables, or some combination of these), and what are the key physical principles and laws governing the system. The second phase is to interpret the physical principles and laws and data in order to develop a plan – what inferences can be drawn from the data, what is the best way to approach the problem, what mathematical relations and methods are required, what intermediate information must be obtained – and define goals for a solution. This plan is implemented in the third phase through detailed analysis, with careful attention to accurate execution of the mathematical relations representing the underlying physical principles. Critical evaluation of the reasonableness of the solutions and conclusions is the essential fourth and final phase of problem solving. This evaluation includes checking units, recalculating some quantities by a different route, and judging whether the magnitude of the answer is within reasonable physical limits.

The graded assignments which the instructor will use to assess the student' achievement of the Outcome(s):
Student abilities for appraising physical situations is assessed in several ways. The course grade is based on a cumulative score that is derived from the following components, which are all graded and weighted according to the breakdown given in the syllabus. For each lecture assessment activities include student responses to homework exercises and problems and occasional quizzes if necessary. For the weekly recitations students are assessed based on their performance in team problem-solving exercises. Progress in the course as a whole is assessed with midterm exams and a comprehensive final exam. Some of the homework exercises and quizzes focus on specific knowledge, basic computational skills, and grasp of key concepts. The students' integrative understanding of physical principles and problem-solving is assessed with the more complex homework problems, recitation group problems, and the exams.

Sampling of outcomes for purposes of curriculum review:
The purpose of this review is to help faculty improve student learning outcomes. A small sampling of student work will be selected, identifying information removed, and archived for later review. Any students in ACE courses do not wish their work selected should notify their instructor.

FACE COVERINGS SYLLABUS STATEMENT

Approved by the Faculty Senate Executive Committee

July 14, 2020

Required Use of Face Coverings for On-Campus Shared Learning Environments[1]

As of July 17, 2020 and until further notice, all University of Nebraska–Lincoln (UNL) faculty, staff, students, and visitors (including contractors, service providers, and others) are required to use a facial covering at all times when indoors except under specific conditions outlined in the COVID 19 face covering policy found at: `https://covid19.unl.edu/face-covering-policy`. This statement is meant to clarify classroom policies for face coverings:

To protect the health and well-being of the University and wider community, UNL has implemented a policy requiring all people, including students, faculty, and staff, to wear a face covering that covers the mouth and nose while on campus. The classroom is a community, and as a community, we seek to maintain the health and safety of all members by wearing face coverings when in the classroom. *Failure to comply with this policy is interpreted as a disruption of the classroom and may be a violation of UNL's Student Code of Conduct.*

Individuals who have health or medical reasons for not wearing face coverings should work with the Office of Services for Students with Disabilities (for students) or the Office of Faculty/Staff Disability Services (for faculty and staff) to establish accommodations to address the health concern. Students who prefer not to wear a face covering should work with their advisor to arrange a fully online course schedule that does not require their presence on campus.

Students in the classroom:

1. If a student is not properly wearing a face covering, the instructor will remind the student of the policy and ask them to comply with it.
2. If the student will not comply with the face covering policy, the instructor will ask the student to leave the classroom, and the student may only return when they are properly wearing a face covering.
3. If the student refuses to properly wear a face covering or leave the classroom, the instructor will dismiss the class and will report the student to Student Conduct & Community Standards for misconduct, where the student will be subject to disciplinary action.

Instructors in the classroom:

1. If an instructor is not properly wearing a face covering, students will remind the instructor of the policy and ask them to comply with it.
2. If an instructor will not properly wear a face covering, students may leave the classroom and should report the misconduct to the department chair or via the TIPS system for disciplinary action through faculty governance processes.

[1] Courses that have been granted an exception to the Face Covering Policy for pedagogical reasons are excluded. Exceptions to the Face Covering Policy are only granted after an approved health safety plan is developed.