Syllabus
Physics 211
Mechanics, Gravitation, and Waves
Spring Semester 2023

Instructor: Ilya Kravchenko
Office: Jorgensen Hall, Room 258C
Phone: 472-6014
Email: ikrav@unl.edu
Office Hours: Wednesdays 13:00-15:00

Prerequisites: High-school physics or PHY 141 or 151; Math 106 or equivalent;
(Math 107 or equivalent preferred)

Lecture for section 150:
Tuesday, Thursday 12:30-13:45, Jorgensen Hall 136

Course Objectives:

Physics 211 is the first semester of the calculus-based introductory physics sequence, aimed mostly at science and engineering majors. This course focuses on topics of mechanics including kinematics, dynamics, gravitation, and the mechanical properties of waves. We will emphasize developing both conceptual understanding and problem-solving skills for these topics and understanding how they fit into the broader picture of science. Calculus will be used extensively in this course.

Textbook

*University Physic*s, 15th Edition (Vol. 1), Young and Freedman (Pearson 2016) is the primary reference textbook for this course. Note that one can use instead an e-text of this textbook that can be obtained with the online homework system (see below), or use older editions, 14 or 13, that can be purchased at a lower price. For much older editions (e.g. Ed. 12), one should be aware that chapter and problem numbering is a bit different. The physics is the same, however. You can even get other college physics calc-based textbooks, there are many good ones on the market, or a free open-source textbook from the internet. They all cover pretty much the same material. You will only need to map the required chapters between the textbook of your choice and the "main" textbook YF Edition 15.

Online course components: Canvas and Modified Mastering Physics

Canvas Much class information including the syllabus, sample exam questions, *etc.* will be posted on the UNL Canvas pages of this course. You are expected to read the relevant sections in the textbook **before** attending lectures. See the course schedule in a separate document "Reading and Lecture Schedule" posted on Canvas under "Modules".

Mastering Physics® (MP) The weekly homework problems as well as the pre-lecture assignments (see below) will be accessed online at the MP web site, and graded by the MP. Details of gaining MP access can be found on Canvas under "Modules" in the area "Instructions for getting started with Mastering Physics …". You must purchase this access from Pearson in addition to the physical textbook (note: if the UNL Bookstore runs out of access cards for MMP it is faster to just register and pay online than to wait for the bookstore to backorder the cards). As an alternative to the physical textbook, you can get access to

the e-text of the textbook via the MP web site. The Canvas page of this course has the "MyLab and Mastering" link on the left that gives you the direct link to that system. If you are not totally sure that you will stick with the course, there is a "free trial" with the MP system for two weeks. When creating an account on MasteringPhysics, please enter your name as it appears on Canvas and, if prompted, your UNL student ID (if you already have an old MP account with a significantly different name spelling, let the instructor know).

If your textbook with MP access is on backorder/delayed: get "free trial" access on MP during first week of classes. You can convert it into regular account once you get your order with its access code. The free trial has the e-book.

Pre-lecture assignments (due one hour before each lecture)

Before coming to class, you are expected to read the relevant sections in the textbook. Beginning on Thursday, January 26, and for every lecture from then on, you will have a short online assignment on the material that will be covered on that lecture (see the Reading and Lecture Schedule document for which chapter to read for which date). You will be completing these assignments on the MP system, you can access them through the Canvas home page of this course, in the "MyLab and Mastering" tab following the "Mastering Assignments" link. The quizzes will open soon after the end of each lecture, and will be due at 11:30am on the day of the next lecture. The credit for the quizzes will count toward the final grade.

The assignment may contain simple concept questions or mini-problems for credit, short video prelectures for (typically) extra credit, and the feedback question for extra credit.

These quizzes help you prepare for lecture, so do them *after* you complete your reading assignment for the upcoming lecture. The quizzes also help *me* find out which topics are difficult for the group as a whole and may need more attention.

Homework

There will be a homework assignment due roughly each week consisting of six to ten Mastering Physics problems, some for credit and some for extra credit. The homework assignments are accessed just like the pre-lecture assignments as explained in the previous section. Each homework will cover a single chapter of the textbook discussed at the most recent lectures. Normally, the homeworks will be due on Mondays at 11:59pm. The due time will always be midnight. Modified Mastering Physics will clearly display the due date and time, please pay attention because these may change.

Late homework submissions in MP have a penalty of 20% credit lost per day past due. Students who are not able to complete the homework by the due date should talk to Professor Kravchenko in advance.

You are strongly recommended to carefully go through the Introduction to Mastering Physics available on the MP website as an assignment for this course. It is well worth the time, and it is also worth extra credit with the weight of one full homework in the course!

iClickers

We will be using a Student Response System at all lectures: the "iClicker" system to make the lectures interactive. The full instructions are found on Canvas in Modules in the document "iClicker Cloud Instructions for Students.pdf". In brief, you need to go to http://iclicker.com and create a (free) account for yourself, if you don't already have one. The account settings need to have your UNL email, and your student/Canvas ID for linking between the iClicker and Canvas systems. Then, during the class, you have an option of using "iClicker Student" app (free for download for a phone or a tablet) or the web page mentioned above, or a physical iClicker remote if you have one. You need to add this course to your

iClicker account via the app or the web page. The course name is **PHYS211sec150spring23.** Most of you will be added to the course automatically, or you can join the course through the + button on the app and entering University of Nebraska Lincoln, after which you will see the course. Before the initial two-week period expires you will need to pay for a subscription (unless possibly you are using a physical remote).

You will be asked to answer questions during the lecture using the clickers. Your answers will be graded, yet you will get half the credit even for a wrong answer (no credit for not answering). This will help *you* to stay focused on the lecture and it will help *me* to identify if there are any problems with the material and expand if needed.

Lectures and Recitation

The course will have two lectures a week each lasting 75 minutes. Each lecture will consist of a mix of presentations and demonstrations led by the instructor along with active discussion and problem-solving by the students. Participation in the lectures and reading the text **before** class is essential for success in the course. The iClicker system will be used both for instructor assessment of where the class is at in terms of understanding, but also to collect answers to "mini-quizzes" which will be graded for credit.

Each student must also enroll in one of the recitation sections for this course. The recitation sections will focus on problem-solving and applying the course material in a variety of new situations. Participation in recitations is important as well. Recitation grades will be based on team-based problem solving and pop quizzes.

Extra help

It is strongly recommended that you do as much of the homework as possible by yourself. However, sometimes you will run into a "brick wall" that prevents you from making further progress on a specific problem. Do not spend more than one-half hour (per problem) bashing your head against this wall. After half an hour get help: at the "Physics Resource Center", or Prof. Kravchenko during his office hours. At the Center, TAs are available every day for most of the regular working hours. The details and schedule for the Physics Resource Center will be announced around the second week of classes.

Examinations

There will be three 75-min midterm tests and a two-hour final exam scheduled as follows (this is a preliminary schedule, subject to changes depending on the availability of rooms):

Midterm Test I	Wed Feb 22, 7:30pm-8:45pm
Midterm Test II	Wed Mar 22, 7:30pm-8:45pm
Midterm Test III	Wed Apr 19, 7:30pm-8:45pm
Final Exam	Mon May 15, 6:00pm-8:00pm

All exams will be in-person. You will need an electronic calculator during the exams, calculators cannot be shared. **Cellphones, smartphones, tablets or any other electronic devices are not allowed.** Electronic translators for foreign students, however, are allowed.
Before each exam, exam samples for practice will be provided through Canvas under the Modules area.

There will be one comprehensive make-up examination given at the end of the semester (date TBA). In order to be eligible to take this test, you must receive permission from Professor Kravchenko ideally before the test you miss (but no later than 3 days after the missed exam). The make-up test may not be used to replace a midterm test grade. *If you miss an exam because of serious illness or some other (e.g. family) emergency, you* must *contact me at your first opportunity. An unexcused absence will result in 0 score for the exam and that score will not be dropped.*

Grading

The following weightings will be used in determining your grades:

Prelecture assignments on MasteringPhysics	7.5 %
Lecture participation (clickers)	5 %
Recitation (Team problems and Quizzes)	15 %
Homeworks on MasteringPhysics	17.5 %
Three midterm exams (10% each)	30 %
Final exam	25 %

In calculation of the final grade, a certain number of lowest scores will be dropped. Specifically: the two worst homeworks, the four worst pre-lecture quizzes, and the two worst recitation grades will be dropped. Also, the four worst lecture (clicker) sessions for each student will be dropped.

Any request for grade changes **must** be made within **2 weeks** after the graded work is made available. Grading will **not** be done on a "curve." The grades will be determined from your final score using the table below. The table shows the lower cutoff for a grade (total 100%). For example, if your score is greater or equal to 80% but less than 83% you will get a B.

95 %	A^+
90 %	A
87 %	A^-
83 %	B^+
80 %	B
77 %	B^-
73 %	C^+
70 %	C
67 %	C^-
63 %	D^+
60 %	D
50 %	D^-
less than 50 %	F

For Students with Disabilities

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.

Instruction continuity

If in-person classes are canceled (for example, due to weather), you will be notified of the instructional continuity plan for this class by a class-wide email through Canvas. Under certain circumstances, a lecture or a recitation section may be conducted online via Zoom at the regular class time slot, and a recording would be made available as well.

UNL-wide policies

UNL has several the University-wide policies that are not repeated here but can be found on the following web site:

https://executivevc.unl.edu/academic-excellence/teaching-resources/course-policies

Please refer to that web site as needed. These policies include: University-wide Attendance Policy, Academic Honesty Policy , Accommodations for Students with Disabilities Policy, Resources for students seeking mental health help, Final Exam Week Schedule, Emergency Procedures, Diversity and Inclusiveness, Title IX Policy.

ACE CERTIFICATION
(UNL standard, not written by IK)

This Course has been certified by the Achievement Centered Learning program at UNL to satisfy 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 main focus of the course is on the appraisal of physical systems through a comprehensive process of problem solving designed to arrive at a thorough understanding of relationships between the systems and their behavior. This process can be separated into four distinct phases. The first phase consists of an inquiry into the system and its essential components, 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 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, that 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.

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 (i) pre-lecture quizzes, (ii) Peer Instruction (PRS) questions posed during the lectures, and (iii) follow-up homework exercises and problems. For the weekly recitations students are assessed based on their performance in (iv) team problem-solving exercises, and (v) occasional quizzes. Progress in the course as a whole is assessed with (vi) three 1-hour midterm exams and (vii) a 2-hour comprehensive final exam. The pre-lecture quizzes, PRS questions, and some of the homework exercises 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, recitation quizzes, and the exams.

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.