

Engineering Physics 1 (Physics 1135)

Syllabus and Schedule Spring 2024 (Last updated 12/27/2023)

COVID-19 Safety: Do not come to campus if you feel sick or or tested positive for COVID-19. Follow the university's procedures outlined at <https://coronavirus.mst.edu/>.

Course coordinator: Dr. Agnes Vojta, 206 Physics, vojtaa@mst.edu

Required materials: Textbook *University Physics* (11th, 12th, 13th or 14th edition) by H.D. Young & R.A. Freedman; Laboratory Manual. Computer with internet access. Scanner or scanning app.

Course information: All course information, handouts, lecture notes and video lectures will be available through Canvas. If corrections to this syllabus are required, the official version will be the one posted on Canvas.

Course goals: The main goals of this course are to develop an understanding of the basic principles of mechanics (statics and dynamics) and to acquire the proper techniques for the solution of physical problems.

Prerequisite: Calculus 1 (Math 1214 or Math 1211)

Major Components of the Course

Lecture (Tuesday & Thursday - required) reviews important concepts and ideas in the reading assignment. One objective of the lecture is to elaborate on concepts that are difficult to master or understand on a first reading of the material. Example problems will be solved to illustrate physical principles and problem-solving techniques. You are expected to have read the **reading assignment** before lecture (see schedule p. 5-8). The online lectures will remain available for viewing for the duration of the semester.

Recitation (Wednesday & Friday - required) will be an additional source of instruction on the important concepts with particular emphasis on the problem solving. You will demonstrate your mastery of the material and your problem-solving skills by showing how to solve the assigned problems. Assigned homework is due at the beginning of recitation; instructors may will ask you to upload it to Canvas several times a semester. Instructors may also assess your skills by other means, such as worksheets and quizzes.

The instructors for the recitation sections will be announced on the first day of class. Your recitation instructor is your first contact for all questions and concerns regarding the course.

Laboratory (every other week - required) is designed to reinforce concepts learned in lecture and recitation, to connect those concepts to physical experience, to illustrate scientific method, and master measurement theory. Details see separate lab instructions. The professor in charge of the laboratory is Dr. Waddill.

Physics Learning Center (Tuesday & Thursday 2-4:30 and 6-8:30pm in 129+130 Physics - recommended). Run by the LEAD program, this is an open learning environment where you can solve problems and prepare for your recitation with the help of peer-learning assistants, which are students who have successfully completed the course and are trained to help you. Attending the PLC is voluntary, and there are no points associated with it.

Sources of Course Points and Grading

Exams. There will be three one-hour tests given only at **5:00pm** on the Wednesdays listed in the *Schedule of Classes* and a Final Exam given during Finals week. The exams are taking place in person; rooms will be announced later. Each of these four exams is worth 200 points. Your lowest exam score (out of the three tests and the final) will be dropped. **Do not come to campus if you are ill or quarantined on a test day.** Contact Dr. Vojta to arrange for a makeup.

End-Material Test worth 50 points covering material presented after test 3 will be given concurrent with the Final Exam during Finals week.

Recitation. For graded recitation work, your instructor may:

- call on you to solve a homework problem or one similar to it without your notes. Your solution must follow the procedure outlined in the [Problem Solving Procedures](#).
- have you submit assigned homework on paper or through Canvas. To get full credit, you must follow the procedure outlined in the [Problem Solving Procedures](#).
- give quizzes
- collect, or have you submit through Canvas, solutions to worksheets.

There will be no excused absences from recitation, except for illness and quarantine. In those cases, you need to contact your recitation instructor **before class** and await their instructions. The three lowest recitation scores will be dropped.

Laboratory Reports. There will be six laboratories during the semester. Your reports are to be turned in to your lab instructor after each of the labs. The lowest lab score will be dropped. Lab reports will be graded on the basis of 100 points.

Course points: Tests	=	600
End-Material Test	=	50
Recitation	=	200
Laboratory	=	<u>150</u>
Total Possible Points		1000

One exam score will be dropped. Your recitation points will be your average recitation percentage after the three lowest recitation scores have been dropped. Your lab points will be 1.5 times your average lab percentage after the lowest lab grade is dropped

Absolute Grading Scale: The grade cuts are (to four significant figures):

- A** for 89.50% of total possible points \geq 895.0
- B** for 79.50% of total possible points \geq 795.0
- C** for 69.50% of total possible points \geq 695.0
- D** for 59.50% of total possible points \geq 595.0
- F** for less than 59.50% of possible pts $<$ 595.0

The grade cuts are absolute and will not be lowered. Points will not be added to a student's grade to bring it above the cutoff.

Accessing Grade Spreadsheets

Grades for recitations and labs may be posted separately in the Canvas gradebook; however, those will be raw scores only and not suitable for a calculation of your overall grade. Periodically, the scores will be aggregated in an Excel spreadsheet and posted as a file on Canvas. There will be an Excel spreadsheet for each recitation section. In **Column A** (Student Personal Identification Number), find the PIN that was assigned to you by your recitation instructor. The row with that number gives all the scores that your instructor has recorded for you prior to the last update of the course spreadsheet. Verify that your scores entered for the reported assignments are correct and notify your recitation instructor about any errors. **The final grade will be calculated through the Excel spreadsheet.**

Some Course Rules

Those participating in a major university or intercollegiate event on the day of an exam may request an alternate exam date. To do this, you must submit a typed request to Dr. Vojta, signed by the event's university Faculty Sponsor, *no later than the Tuesday the week before the test*. You will receive an exam that is comparable, but not identical to, the one taken by the class. You must take the exam within ten days from the common exam date.

There are NO makeups of exams, recitation assignments, labs or the end material test. If you miss any assignment, a zero will be recorded for that assignment. The only exceptions are illness or quarantine; in those cases you must contact Dr. Vojta or your recitation instructor beforehand and await their instructions. The three lowest recitation scores, the lowest lab score, and the lowest exam score will be dropped.

Your lowest exam score will be dropped. This accommodates students who under perform on, or miss, one test for a reason beyond their control. If you did well on all three tests, you may decide to skip the final.

Requests for re-grades must be submitted no later than the next recitation after the general return of the assignment in class. Compose a detailed written statement on a separate sheet of paper explaining your request, attach it to the assignment, and submit it to your recitation instructor. The physics in your written argument needs to be correct. The entire problem will be re-evaluated; a serious mistake that was not noticed by the original grader *could* result in a lower grade than the one originally given.

Requests for spreadsheet corrections. In case a score is not entered correctly in the spreadsheet, notify your recitation instructor. Corrections must be requested no later than two weeks after the scores have been posted online. All requests for spreadsheet corrections must be made before the start of the Final Exam.

Communication. Contact information for all instructors is posted on the course website. We will try to respond to your emails within 24 hours during the week. Announcements will be made through Canvas.

Students with too many missed assignments will be dropped. Any student who has missed a total of 5 assignments of any kind (tests, homework, quizzes, boardwork, and labs) can be dropped from the course. Students with 5 or more missed assignments will not be allowed to switch to Hearer status.

Conduct in class. Students are required to follow the university procedures at <https://coronavirus.mst.edu/>. Do not engage in disruptive behavior. An instructor may request the campus Judicial Officer to take effective disciplinary action after issuing a single warning (see *Student Code of Conduct* at <http://registrar.mst.edu/academicregs/>).

Academic Dishonesty will not be tolerated. See <http://registrar.mst.edu/academicregs/>.

Emergency exit: Egress maps for campus buildings can be found at <http://designconstruction.mst.edu/floorplan/>

Appeals. In extremely rare cases, you may believe an exception to a course rule should be made. In this case, you may file a written appeal with your recitation instructor. Appeals must be filed within one week of the occurrence of the circumstance that causes your appeal, or by the end of your last recitation in the semester, whichever comes first. Your appeal will be carefully considered by the entire Physics 1135 teaching staff. This appeals policy applies to course rules given in this handbook but does not apply to laboratories. Lack of preparation, non-emergency family events, oversleeping, forgetting a test date or poor performance etc. are not reasons for filing an appeal.

Unresolved complaints about laboratory or recitation instructors. It is hoped that all conflicts can be resolved in a collegial manner through discussion between student and instructor. However, if such a situation continues or remains unresolved, please feel free to discuss it with Dr. Vojta. If you have complaints about your lab instructor, please contact the lab coordinator, Mr. Joel Peacher (peach@mst.edu).

Unresolved complaints about the course: It is hoped that any complaints about the course can be resolved through discussions with Dr. Vojta. However, if there are any complaints that cannot be resolved, you may contact Dr. Klaus Woelk, Associate Dean for Academic Affairs (woelk@mst.edu).

Class and exam cancellation policy. If classes are officially cancelled, a media advisory will be issued. If lecture is cancelled, the online version will be available and replace the in-seat lectures for that day. It is not possible to reschedule an exam. If campus is closed during the time an exam would have been given (which is extremely rare and never happened before), the exam will be cancelled and not rescheduled. The total number of course points will be reduced by the number of points the exam would have been worth, and grades assigned on the usual percentage basis. If campus is closed on the day before, or the morning of, an exam, do **not** assume the exam will be canceled – if campus is open at exam time, the exam will take place as scheduled.

COVID-19 Contingency Plans. If it becomes necessary to change the delivery mode of one or more components of the course, we will strive to adhere to the syllabus and schedule as far as possible. We will communicate all details through Canvas. If you become ill or need to quarantine, let your recitation instructor know and await their instructions. If an instructor is ill or quarantined, their class will be conducted online.

Course assistance

If you have a disability and anticipate needing accommodations in this course, you are encouraged to meet with Dr. Vojta early in the semester. You will need to request a letter from Student Accessibility and Testing (<http://saat.mst.edu>, 203 Norwood Hall, 341-6655, dss@mst.edu) verifying your disability and specifying the accommodation you need and have this sent to Dr. Vojta before we can arrange your accommodation. **Testing accommodations require seven days notice.** If you are unable to perform boardwork because of a disability or condition that hampers your public performance, you need to discuss this with your recitation instructor to determine an alternative way of assessing your mastery.

Academic assistance is available in the Physics Learning Center (see <http://lead.mst.edu/> for details) and through the Student Success Center (<https://studentsuccess.mst.edu>). Contact your recitation instructor or Dr. Vojta if you have concerns or need additional assistance.

Title IX policies, resources and reporting options are available at <https://equity.mst.edu/>

Additional university policies see Course Information module on Canvas.

Physics 1135 Schedule of Assignments Spring 2024

An assignment listed on a given date is due at the beginning of class on that day. Homework assignments are posted on the course website. **Subject to change. Changes in RED.**

Lectures	Recitation/Exam	Lab
<p>1. Tuesday, January 16 Course Orientation. Motion in One Dimension - Position, velocity and acceleration in 1-D Read 1.1-1.6; 2.1-2.3. Read <i>Syllabus</i></p> <p>2. Thurs, Jan 18 - Motion in One Dimension -Constant acceleration - Free Fall Read 2.4-2.6, <i>Litany for Kinematics</i></p>	<p>1. Wednesday, January 17 <i>Homework #1</i></p> <p>2. Friday, Jan 19 <i>Homework #2</i></p>	No labs
<p>3. Tues, Jan 23 – Vectors - Magnitudes - Unit vectors and vector components - Vector addition Read 1.7-1.9</p> <p>4. Thurs, Jan 25 - Motion in Two Dimensions - Position, displacement, velocity, acceleration - Components of motion in 2-D - Projectile motion Read 3.1-3.3, 3.5</p>	<p>3. Wed, Jan 24 <i>Homework #3</i></p> <p>4. Fri, Jan 26 <i>Homework #4</i></p>	Odd Lab 1: Capstone
<p>5. Tues, Jan 30 - Newton's 1st and 2nd Laws of Motion - Force, mass, and acceleration. Weight. Read 4.1-4.4, 4.6, 5.1 [<i>only Example 5.3</i>], 5.2 <i>Litany for Force Problems</i></p> <p>6. Thurs, Feb 1 - Newton's Third Law of Motion - Action-reaction pairs - Tilted coordinate systems Read 4.5, 5.1 (Examples 5.1, 5.2, 5.4, 5.5)</p>	<p>5. Wed, Jan 31 <i>Homework #5</i></p> <p>6. Fri, Feb 2 <i>Homework #6</i></p>	Even Lab 1: Capstone
<p>7. Tues, Feb 6 - Friction - Relationship to normal force and velocity - Applications to physical situations Read 5.3</p> <p>8. Thurs, Feb 8 - Circular Dynamics - Centripetal and tangential acceleration & forces - Force components \parallel & perpendicular to velocity Read 3.4, 5.4</p>	<p>7. Wed, Feb 7 <i>Homework #7</i></p> <p>8. Fri, Feb 9 <i>Homework #8</i></p>	Odd Lab 2: Constant acceleration

<p>9. Tues, Feb 13 - Problem Solving Review for Test 1</p> <p>Review Assigned Reading: Chapters 2, 3, 4, 5</p> <p>10. Thurs, Feb 15 - Work</p> <ul style="list-style-type: none"> - Vector dot product - Work done by a force, Work-KE theorem - Power <p>Read 1.10 (scalar product only), 6.1-6.4, <i>Litany for Work-KE Problems</i></p>	<p>9. Wed, Feb 14 <i>Test 1 Preparation HW</i></p> <p>Test 1 5:00 PM Ch. 2 – 5</p> <p>10. Fri, Feb 16 <i>Homework #10</i></p>	<p>Even Lab 2: Constant acceleration</p>
<p>11. Tues, Feb 20 - Mechanical Energy</p> <ul style="list-style-type: none"> - Conservative and non-conservative forces - Potential energy and mechanical energy - Conservation of mechanical energy <p>Read 7.1-7.3, <i>Litany for Energy Problems</i></p> <p>12. Thurs, Feb 22 - Energy Methods</p> <ul style="list-style-type: none"> - Relationship between force and potential energy - Graphical Analysis of 1-D motion - Nonconservative forces, internal energy, dissipation - Conservation of total energy <p>Read 7.4-7.5</p>	<p>11. Wed, Feb 21 <i>Homework #11</i></p> <p>12. Fri, Feb 23 <i>Homework #12</i></p>	<p>Odd Lab 3: Friction</p>
<p>13. Tues, Feb 27 - Universal Gravitation</p> <ul style="list-style-type: none"> - Kepler's Laws of planetary motion - Universal gravitational force - Satellite motion <p>Review Reading: 5.4 Read 13.1, 13.2, 13.4 (to eq. 13.12), 13.5 (skim 2nd law)</p> <p>14. Thurs, Feb 29 – Gravitational Potential Energy</p> <ul style="list-style-type: none"> - Universal gravitational potential energy - Escape speed <p>Read 13.3, 13.4 (from eq. 13.12), 13.8</p>	<p>13. Wed, Feb 28 <i>Homework #13</i></p> <p>14. Fri, Mar 1 <i>Homework #14</i></p>	<p>Even Lab 3: Friction</p>
<p>15. Tues, Mar 5 - Linear Momentum</p> <ul style="list-style-type: none"> - Impulse - Conservation of linear momentum - Explosions and Collisions <p>Read 8.1-8.3, <i>Litany for Momentum Problems</i></p> <p>16. Thurs, Mar 7 - Linear Momentum of Systems of Particles</p> <ul style="list-style-type: none"> - Center of mass motion and rockets <p>Read 8.4-8.6</p>	<p>15. Wed, Mar 6 <i>Homework #15</i></p> <p>16. Fri, Mar 8 <i>Homework #16</i></p>	<p>Odd Lab 4: Impulse</p>

<p>17. Tues, Mar 12 -- Static Fluids - Pressure in a static fluid - Buoyancy and Archimedes' Principle Read 12.1 – 12.3</p> <p>18. Thurs, Mar 14 Spring Recess. No class</p>	<p>17. Wed, Mar 13 <i>Homework #17</i></p> <p>18. Fri, Mar 15 Spring Recess. No class</p>	<p>No Labs</p>
<p>19. Tues, Mar 19 - Problem Solving Review for Test 2 Review Assigned Reading: Chs 6, 7, 8, 12, 13</p> <p>20. Thurs, March 21 Rotational Motion and Energetics - Rotational kinematics - Moment of inertia & parallel axis theorem - Rotational energy and rolling motion Read 9.1-9.5 (skim proof of eq. 9-19), 10.3 (through Example 10.5)</p>	<p>19. Wed, Mar 20 <i>Test 2 Preparation HW</i></p> <p>Test 2 5:00 PM Ch. 6, 7, 8, 12, 13</p> <p>20. Fri, March 22 <i>Homework #20</i></p>	<p>Even Lab 4: Impulse</p>
<p>Spring Break March 24-31 No classes</p>		
<p>21. Tues, Apr 2 - Torque - Rotating rigid objects, rotational dynamics Read 1.10 (vector product), 10.1-10.2, 10.3 (after Example 10.5)</p> <p>22. Thurs, Apr 4 - Static Equilibrium - Conditions for equilibrium - Analysis of equilibrium situations Read 11.1-11.3</p>	<p>21. Wed, Apr 3 <i>Homework #21</i></p> <p>22. Fri, Apr 5 <i>Homework #22</i></p>	<p>Odd Lab 5: Rotational Motion</p>
<p>23. Tues, Apr 9 - Angular Momentum - conservation of angular momentum - Interacting rotating objects - projectile collisions with rotating objects Read 10.5-10.7</p> <p>24. Thurs, Apr 11 – Periodic Motion - Simple harmonic motion - Kinematics, dynamics, energetics - Simple and physical pendulum Read 14.1-14.6</p>	<p>23. Wed, Apr 10 <i>Homework #23</i></p> <p>24. Fri, Apr 12 <i>Homework #24</i></p>	<p>Even Lab 5: Rotational Motion</p>

<p>25. Tue, Apr 16 - Problem Solving Review for Test 3 Review Assigned Reading: Chs 9, 10, 11, 14</p> <p>26. Thurs, Apr 18 - Wave Motion - Transverse and longitudinal waves - Mathematical description of traveling waves - Doppler effect Read 15.1-15.5, 16.7- 8</p>	<p>25. Wed, Apr 17 <i>Test 3 Preparation HW</i></p> <p>Test 3 5:00 PM Ch. 9, 10, 11, 14</p> <p>26. Fri, Apr 19 <i>Homework #26</i></p>	<p>Odd Lab 6: Waves</p>
<p>27. Tue, Apr 23 - Interference Phenomena - Interference in traveling & standing waves - Standing waves Read 15.6-15.8, 16.6 Read <i>End of Semester Information</i></p> <p>28. Thurs, Apr 25 - Heat Energy and Transport - Specific heat, Heat conduction Read 17.1-17.3, 17.5- 17.7</p>	<p>27. Wed, Apr 24 <i>Homework #27</i></p> <p>28. Fri, Apr 26 <i>Homework #28</i></p>	<p>Even Lab 6: Waves</p>
<p>29. Tues, Apr 30 - First Law of Thermodynamics - Work by a gas - Energy transformation in thermal processes for ideal gas Read 18.1, 19.1-19.8</p> <p>30. Thurs, May 2 - Thermodynamic Cycles - Heat engines - Entropy and Second Law of Thermodynamics Read 20.1-2, 20.5-20.7 (but just skim Examples)</p>	<p>29. Wed, May 1 <i>Homework #29</i></p> <p>30. Fri, May 3 <i>Homework #30</i></p>	<p>No labs</p>
<p>Wednesday, May 8, 12:30-2:30 pm</p> <p>End Material Test: - Chapter 15: Waves - Chapter 16 (selected): Sound - Chapter 17-20: Thermodynamics</p> <p>Final Exam - Chapters covered in the three regular tests</p>		