Engineering Physics 1 (Physics 1135)
Syllabus and Schedule Fall 2024 (Last updated 8/22/2024 – subject to change)

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.

Canvas: All 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. There will be separate Canvas pages for lecture and recitation.

Office hours: Instructors will hold their office hours by being available in the Physics Learning Center. See the instructor information on the lecture Canvas page in the Course Info Module.

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 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. 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 or similar ones. 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, and they are keeping your grades.

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 Mr. Peacher.

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 faculty and 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. You may come at any time while the PLC is open.

Sources of Course Points and Grading

Exams. There will be three 60-minute tests given at **5:00pm** on the Wednesdays listed under *Class details* on JoeSS 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. Makeup exams must be completed within ten days from the common exam date.

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:

- give quizzes. These may include having you 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*.
- collect, or have you submit through Canvas, solutions to worksheets.

There will be no excused absences from recitation, except for illness. 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.

Final Grade Composition:

Tests	60%	(The lowest exam score of four is dropped)
End-Material Test	5%	
Recitation	20%	(The three lowest scores are dropped)
Laboratory	15%	(The lowest score of six labs is dropped)

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

A for 89.50% of total possible points
B for 79.50% of total possible points
C for 69.50% of total possible points
D for 59.50% of total possible points
F for less than 59.50% of possible points

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.

Grades for recitations and labs will be posted separately on Canvas. The lab is not a stand-alone course. Periodically, we will incorporate the lab scores into the recitation gradebook. The course grade will be calculated through the gradebook on the recitation Canvas page.

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 email a request to Dr. Vojta and provide an official note 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. If you fail to show up for your scheduled makeup, you will receive a grade of zero for the exam.

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

Communication. Contact information for all instructors is posted in the Course Information Module on the Canvas page for the lectures. We will try to respond to your emails within 24 hours during the work 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, recitation, and labs) can be dropped from the course. Students with 5 or more missed assignments will not be allowed to switch to Hearer status.

Student Honor Code and Academic Integrity: All students are expected to follow the Honor Code https://stuco.mst.edu/about/honor-code/. Student Academic Regulations https://registrar.mst.edu/academicregs/conductofstudents/ describes the student standard of conduct relative to the University of Missouri System's Collected Rules and Regulations section 200.010, and offers descriptions of academic dishonesty including cheating, plagiarism, sabotage, and unauthorized use of artificially generated content, any of which will be reported to the Vice Provost for Undergraduate Education. Other resources for students regarding academic integrity can be found online.

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 syllabus 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 physics department chair, Dr. Thomas Vojta (vojtat@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.

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.**

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 http://titleix.mst.edu.

Additional university policies are posted in the Course Information Module on Canvas.

Phys 1135 Schedule Fall 2024

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

Lectures	Recitation/Exam	Lab
1. Tuesday, August 20 **Course Orientation. Motion in One Dimension** - Position, velocity and acceleration in 1-D Read 1.1-1.6; 2.1-2.3. Read *Syllabus* **2. Thurs, Aug 23 -- Motion in One Dimension** -Constant acceleration - Free Fall Read 2.4-2.6, *Litany for Kinematics*	**1. Wednesday, August 21** *Homework #1* **2. Friday, August 23** *Homework #2*	No labs
3. Tues, Aug 27 – Vectors and Motion in 2 Dimensions - Magnitudes - Unit vectors and vector components - Vector addition - Position, displacement, velocity, acceleration - Components of motion in 2-D - Projectile motion Read 1.7-1.9, 3.1-3.3 (through Ex. 3.6) **4. Thurs, Aug 29 - Motion in Two Dimensions** - Problem solving Read 3.3 (Examples 3.7 – 3.10), 3.5	**3. Wed, Aug 28** *Homework #3* **4. Fri, Aug 30** *Homework #4*	Odd Lab 1: Capstone
5. Tues, Sept 3 - Newton's 1st and 2nd Laws of Motion - Force, mass, and acceleration. Weight. Read 4.1-4.4, 4.6, 5.1 [*only Example 5.3*], 5.2 *Litany for Force Problems* **6. Thurs, Sept 5 - 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)	**5. Wed, Sept 4** *Homework #5* **6. Fri, Sept 6** *Homework #6*	No labs Labor Day week

7. Tues, Sept 10 - Friction - Relationship to normal force and velocity - Applications to physical situations Read 5.3 **8. Thurs, Sept 12 - Circular Dynamics** - Centripetal and tangential acceleration & forces - Force components || & perpendicular to velocity Read 3.4, 5.4	**7. Wed, Sept 11** *Homework #7* **8. Fri, Sept 13** *Homework #8*	Even Lab 1: Capstone

9. Tues, Sept 17 - Problem Solving Review for Test Review Assigned Reading: Chapters 2, 3, 4, 5 **10. Thurs, Sept 19 - Work** - Vector dot product - Work done by a force, Work-KE theorem - Power Read 1.10 (scalar product only), 6.1-6.4, *Litany for Work-KE Problems*	**9. Wed, Sept 18** *Test 1 Preparation HW* **Test 1 5:00 PM** **(Check Room Assignment)** **Ch. 2 – 5** **10. Fri, Sept 20** *Homework #10*	Odd Lab 2: Constant acceleration
11. Tues, Sept 24 - Mechanical Energy - Conservative and non-conservative forces - Potential energy and mechanical energy - Conservation of mechanical energy Read 7.1-7.3, *Litany for Energy Problems* **12. Thurs, Sept 26 - Energy Methods** - Relationship between force and potential energy - Graphical Analysis of 1-D motion - Nonconservative forces, internal energy, dissipation - Conservation of total energy Read 7.4-7.5	**11. Wed, Sept 25** *Homework #11* **12. Fri, Sept 27** *Homework #12*	Even Lab 2: Constant acceleration

13. Tues, Oct 1 – Universal Gravitation - Kepler's Laws of planetary motion - Universal gravitational force - Satellite motion Review Reading: 5.4 Read 13.1, 13.2, 13.4 (to eq. 13.12), 13.5 (skim 2nd law) **14. Thurs, Oct 3 – Universal Gravitational Potential Energy** - Universal gravitational potential energy - Escape speed Read 13.3, 13.4 (from eq. 13.12), 13.8	**13. Wed, Oct 2** *Homework #13* **14. Fri, Oct 4** *Homework #14*	Odd Lab 3: Friction
15. Tues, Oct 8 - Static Fluids - Pressure in a static fluid - Buoyancy and Archimedes' Principle Read 12.1 – 12.3 **16. Thurs, Oct 10 – Fall Break. No class**	**15. Wed, Oct 9** *Homework #15* **16. Fri, Oct 11**	No Labs. Fall Break

17. Tues, Oct 15 - Linear Momentum - Impulse - Conservation of linear momentum - Explosions and Collisions Read 8.1-8.3, *Litany for Momentum Problems* **18. Thurs, Oct 17 - Linear Momentum of Systems of Particles** - Center of mass motion and rockets Read 8.4-8.6	**17. Wed, Oct 16** *Homework #17* **18. Fri, Oct 18** *Homework #18*	Even Lab 3: Friction
19. Tues, Oct 22 - Problem Solving Review for Test 2 Review Assigned Reading: Chs 6, 7, 8, 13 **20. Thurs, Oct 24 - 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)	**19. Wed, Oct 23** *Test 2 Preparation HW* **Test 2 5:00 PM** **(Check Room Assignment)** **Ch. 6, 7, 8, 12, 13** **20. Fri, Oct 25** *Homework #20*	Odd Lab 4: Impulse
21. Tues, Oct 29 - Torque - Rotating rigid objects, rotational dynamics Read 1.10 (vector product), 10.1-10.2, 10.3 (after Example 10.5) **22. Thurs, Oct 31 - Static Equilibrium** - Conditions for equilibrium - Analysis of equilibrium situations Read 11.1-11.3	**21. Wed, Oct 30** *Homework #21* **22. Fri, Nov 1** *Homework #22*	Even Lab 4: Impulse
23. Tues, Nov 5 - Angular Momentum - conservation of angular momentum - Interacting rotating objects - projectile collisions with rotating objects Read 10.5-10.7 **24. Thurs, Nov 7 – Periodic Motion** - Simple harmonic motion - Kinematics, dynamics, energetics - Simple and physical pendulum Read 14.1-14.6	**23. Wed, Nov 6** *Homework #23* **24. Fri, Nov 8** *Homework #24*	Odd Lab 5: Rotational Motion

25. Tue, Nov 12 - Problem Solving Review for Test 3 Review Assigned Reading: Chs 9, 10, 11, 12, 14 **26. Thurs, Nov 14 - Wave Motion** - Transverse and longitudinal waves - Mathematical description of traveling waves - Doppler effect Read 15.1-15.5, 16.7- 8	**25. Wed, Nov 13** *Test 3 Preparation HW* **Test 3 5:00 PM** **(Check Room Assignment)** **Ch. 9, 10, 11, 12, 14** **26. Fri, Nov 15** *Homework #26*	Even Lab 5: Rotational Motion
27. Tue, Nov 19 - Interference Phenomena - Interference in traveling & standing waves - Standing waves Read 15.6-15.8, 16.6 Read *End of Semester Information* **28. Thurs, Nov 21 - Heat Energy and Transport** - Specific heat, Heat conduction Read 17.1-17.3, 17.5- 17.7	**27. Wed, Nov 20** *Homework #27* **28. Fri, Nov 22** *Homework #28*	Odd Lab 6: Waves
Thanksgiving Break – no classes		
29. Tues, Dec 3 - First Law of Thermodynamics - Work by a gas - Energy transformation in thermal processes for ideal gas Read 18.1, 19.1-19.8 **30. Thurs, Dec 5 - Thermodynamic Cycles** - Heat engines - Entropy and Second Law of Thermodynamics Read 20.1-2, 20.5-20.7 (but just skim Examples)	**29. Wed, Dec 4** *Homework #29* **30. Fri, Dec 6** *Homework #30*	Even Lab 6: Waves
Monday, December 9, 10:00am – 12:00pm **End Material Test:** - Chapter 15: Waves - Chapter 16 (selected): Sound - Chapter 17-20: Thermodynamics **Final Exam** - Chapters covered in the three regular tests		