

# Physics 11 – Summer 2021

(any Physics 9 students please see me ASAP)

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**Structure of this course:** All Lehigh University courses are via remote learning this summer. The content will be delivered via pre-recorded video lectures and lecture note scans that you can use at your convenience. Homework assignments will be due at 9:30am on class days. At the scheduled class time (10:00am Eastern Time Monday-Thursday) I plan to hold a Zoom videoconference to discuss the submitted homework, briefly review the new material, answer questions, and do group problem-solving practice. I plan to record and post those Zoom sessions. Short online exams will be held at 10am Eastern Time on the first lecture day of weeks 2-6 and at the Final Exam time scheduled by the Registrar (probably 1pm Eastern Time on Friday July 2, 2021. Shorter online quizzes will be held between the exam days.

**Textbook and MasteringPhysics: REQUIRED** University Physics, Volume 1, with MasteringPhysics, by Hugh D. Young and Roger A. Freedman, Fifteenth Edition, Pearson Addison-Wesley, 2020. There is research that indicates that students learn and retain material better from paper textbooks, but you certainly may use either a hardcopy or an electronic version. If you buy some non-standard version, please make sure your purchase includes at least chapters 1-14 and 17-20. According to the pearson.com website, the bundle pack of loose-leaf paper copy of Volume 1 plus MasteringPhysics is available for \$186.66 as ISBN-13: 9780135984901. The most economical alternative would be the limited 18-week access eText plus MasteringPhysics for \$69.99 as ISBN-13: 9780136781998. If you purchase a new or used paper text elsewhere, please note that a subscription to the MasteringPhysics online homework system is still required and can be purchased with instant on-line access at <http://www.masteringphysics.com> - I can't see the student price for this, but I believe the price is fairly close to the \$69.99 for MasteringPhysics plus the eText, so getting the eText add-on might be worth it. (Optional: If this is your first-ever course in Physics, you may want to consider purchasing the \$53.32 Student Solutions Manual to Volume 1, ISBN-13: 9780135216958, which contains full solutions for most of the odd-numbered problems.)

**Reading Assignments** are essential! You should at least look through the chapter before or during the pre-recorded lecture videos, then read in detail as needed to solve the problems. Please note that active progress through the course activities is required for continued enrollment in the course under University policy (see section 3 of Rules and Procedures).

**Homework** will be submitted via MasteringPhysics. MP also includes "Tutorial" practice problems and "ExtraCredit" exam preparation practice problems. Access to all MP online activities will END at the start time for the Final Exam. To subscribe, please note that Lehigh's zip code is 18015, and the course id is licini09671.

**Quizzes** will be given on the third class day of each week (usually Wednesday). The quiz questions are short and are typically similar to homework problems. Only your highest five quiz scores are used in the computation of your course grade. Missed quizzes count as a zero.

**Exams:** Six short (approximately 45 minutes each) online exams will be given. These are the ONLY content resources you may use during the exam (because they are available to all students in this course): our textbook, our three equation sheets, your lecture notes (including workshop handouts), your prior written homework and quiz papers, and homework solution handouts. I will explicitly point out that using any additional resources or using any other person's work is strictly forbidden by Lehigh's code of academic integrity. You explicitly may NOT use resources from any prior semester or other institution, do any internet searches, access any tutoring websites such as Chegg, or communicate with any other person via any means. You explicitly may NOT ever communicate with any person about these problems, including posting them via the internet. Each exam may draw on prior material but will focus on testing the recent material. **Absolutely no cell phone** use is permitted during the exams. No makeups! (see next item)

**No makeups:** Exams are designed to be taken by all students at the same time. Requesting a makeup or alternate time exam requires supporting documentation, endorsement from the Dean of Students office, and possibly a petition to the Committee on Standing of Students. Students with an unusually high level of medical issues or conflicts should contact me in advance.

**Course grading:** **There is no Lehigh University standard mapping of percentages to letter grades!** The curve will be set so that the average letter grade is approximately a B+. Rather than guess about your performance, please talk to me.

Course Grading:	Homework	100
	Quizzes (best 5)	50
	SIX weekly exams	300
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	TOTAL	450

**CONTENTS:** Physics 11 “Introductory Physics I” is the four-credit “content” portion of the first semester of Lehigh University’s calculus-based two-semester introductory physics sequence, designed primarily for science and engineering students. In Physics 11, we cover two broad subject areas, MECHANICS (including kinematics, Newton’s laws, energy, momentum, rotational mechanics (kinematics / dynamics / energy / angular momentum), statics, gravity, and oscillations) and THERMODYNAMICS (including specific heat, latent heat, calorimetry, heat transfer, kinetic theory, the First and Second Laws of Thermodynamics, entropy, and application to thermodynamic machines).

**Prerequisites/Corequisites:** Physics 11 requires simultaneous enrollment in (or prior credit for) a first-semester calculus course from the set of Math {21, 31, 51, 75, or 76}.

**Other related courses:** Physics 12 “Introductory Physics I Laboratory” is the separately-scheduled one-credit laboratory course, which should typically be taken during the same semester as Physics 11. The second-semester continuation course which covers electromagnetism, waves, and optics is Physics 21 “Introductory Physics II” with its accompanying Physics 22 laboratory. An alternative course sequence, Physics 10 and 13 is offered with a more biological orientation and somewhat lower math expectations. Students with a particular interest in physics may be interested in auditing our “Advanced Topics in Introductory Physics” online courses this summer, or available for one credit each in Fall and Spring.

#### **FINAL COMPETENCIES:**

- 1) Students demonstrate competence with the mathematical tools and techniques required (units, conversions, exponential notation, significant figures, algebra, quadratic equations, simultaneous equations, geometry, trigonometry, vector components, scalar and vector products, basic differentiation and integration of polynomial and trigonometric functions, and interpreting and creating graphs).
- 2) Students demonstrate competence at analyzing word problems into underlying physical principles, visual depictions, equations, and graphs as appropriate.
- 3) Students understand the relationships between kinematic quantities and can use them to analyze and predict constant acceleration motion in one and two dimensions.
- 4) Students understand the different types of forces and Newton’s Laws relating net force to acceleration and can use them to analyze and predict motion using free-body diagrams, including situations with friction and circular motion.
- 5) Students understand combining the basic quantities above into more abstract quantities of work, kinetic energy, potential energy, impulse, and linear momentum, and can use them to solve problems using conservation laws.
- 6) Students understand that the same principles of kinematics, dynamics, and conservation laws apply to rotational motion and can use them to analyze and predict rotational motion.
- 7) Students develop an appreciation for how basic physics principles are applied to more complex systems of statics, gravity, and oscillations as an example for their future professional work.
- 8) Students understand the macroscopic and microscopic nature of heat, its First and Second Laws, and the thermal properties of matter, and can use them to analyze cyclic processes of an ideal gas and thermodynamic machines.

**Accommodations for Students with Disabilities:**

Lehigh University is committed to maintaining an equitable and inclusive community and welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact Disability Support Services (DSS), provide documentation, and participate in an interactive review process. If the documentation supports a request for reasonable accommodations, DSS will provide students with a Letter of Accommodations. Students who are approved for accommodations at Lehigh should share this letter and discuss their accommodations and learning needs with instructors as early in the semester as possible. For more information or to request services, please contact Disability Support Services in person in Williams Hall, Suite 301, via phone at 610-758-4152, via email at [indss@lehigh.edu](mailto:indss@lehigh.edu), or online at <https://studentaffairs.lehigh.edu/disabilities>.

**The Principles of Our Equitable Community:**

Lehigh University endorses The Principles of Our Equitable Community ([http://www.lehigh.edu/~inprv/initiatives/PrinciplesEquity\\_Sheet\\_v2\\_032212.pdf](http://www.lehigh.edu/~inprv/initiatives/PrinciplesEquity_Sheet_v2_032212.pdf)). We expect each member of this class to acknowledge and practice these Principles. Respect for each other and for differing viewpoints is a vital component of the learning environment inside and outside the classroom.

**Religious holidays:** (<https://chaplain.lehigh.edu/node/6>)

1. Inform your instructor that you will be absent from class due to observance of religious holidays.
2. Arrange with the instructor to complete assignments or any required make-up work.  
(Dates for many religious holidays are posted on the Chaplain's web page listed above.)

**WE FULLY ENFORCE ALL UNIVERSITY STANDARDS FOR ACADEMIC INTEGRITY.****STATEMENT ON IRRESPONSIBLE ACADEMIC BEHAVIOR:** (after Prof. Barry Bean, Biology)

There are many forms of irresponsible behavior that can ruin opportunities for you or for others in this course; there is no room and no excuse for bad behavior. Examples of irresponsible behavior cover a wide range, and include cheating, plagiarism, creating hazards or disruptions, slacking on responsibilities, unfairly exploiting the efforts of others, etc. Appropriate penalties should be expected. Offenders may lose points from their course totals, and serious offenders may be dropped from the course. Further explanation and guidelines on academic integrity at Lehigh can be found on the University Student Conduct System web page (<http://studentaffairs.lehigh.edu/conduct>) and on the Provost's Academic Integrity Site (<http://www.lehigh.edu/~inprv/faculty/academicintegrity.html>). It is firm policy in this course that cheating or plagiarism are unacceptable violations of academic integrity, and will earn an F as the semester grade in the course. **ALL EXAMS AND QUIZZES ARE REQUIRED TO BE STRICTLY YOUR OWN INDIVIDUAL WORK!**

**HOMEWORK COLLABORATION POLICY:** (after Prof. Edwin Kay, CSE)

Learning on homework assignments allows for healthy cooperation and collaboration. In grappling with the course work, the SHARING of ideas is educationally useful. The COPYING of ideas is destructive, fraudulent, and unacceptable. It is difficult to know where to draw the line between educationally useful sharing of ideas and the educationally destructive copying of ideas. I will paraphrase Roger D. Eastman of Loyola College (attributing the source material!): "I encourage you to help each other with homework assignments, but I also want you to understand where the help should stop. Don't take someone else's solution to copy or "for reference," or give yours for copying or "for reference." If you want to show someone your solution to illustrate the trouble you are having, that's fine; if you want to brainstorm about what the assignment requires and how to approach it, that's fine; if you want to share your knowledge of physics, that's fine; but letting someone copy your solution line by line, in fact or spirit, is not fine." Working together on troublesome areas, then continuing individually is a good technique. It is okay to tell the other person what is wrong and coach them toward solving the problem, but do not simply provide the correct equations.

## PHYSICS 11 – Tentative Schedule Summer 2021

DATE	TOPIC	READING
Tu May 25	Intro to kinematics, constant acceleration	1.0 to 1.6, 2.0 to 2.s
W May 26	Vectors, motion in 2D and 3D	1.7 to 1.9, 3.0 to 3.3
Th May 27	Relative velocity, two objects	3.5 to 3.s
M May 31	NO CLASS – MEMORIAL DAY	
Tu June 1	EXAM 1, Newton's Laws, force diagrams	4.0 to 4.s
W June 2	More Newton's Laws	5.0 to 5.3
Th June 3	Paths, centripetal acceleration, review	3.4, 5.4 to 5.s
M June 7	EXAM 2, work and dot product	1.10 to 1.s, 6.1
Tu June 8	Kinetic energy	6.0 to 6.s
W June 9	Potential energy	7.0 to 7.s
Th June 10	CM motion, momentum	8.0 to 8.3
M June 14	EXAM 3, systems, collisions	8.4 to 8.s
Tu June 15	Rotation, energy, cross product	9.0 to 9.s, 1.10 to 1.s
W June 16	Torque, angular momentum	10.0 to 10.5
Th June 17	Ang. mom. conservation / review	10.5 to 10.s
M June 21	EXAM 4, angular wrap-up	11.0 to 11.s
Tu June 22	Statics	11.0 to 11.s
W June 23	Gravitation and Astronomy	13.0 to 13.s
Th June 24	Oscillations	14.0 to 14.s
M June 28	EXAM 5, temp., expansion, heat capacity	12.0-12.2, 17.0-17.6
Tu June 29	Heat transfer and molecular properties	17.7 to 18.s
W June 30	Processes, heat engines	19.0 to 20.3
Th July 1	Refrigeration, Carnot, entropy	20.4 – 20.s
Fri July 2	EXAM 6 starts at 1pm	