

Physics 21 – Summer 2021 – Syllabus

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Structure of this course: Physics 21 is a remote learning course 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 (10:00-11:45am Eastern Time Monday-Thursday) we will hold Zoom videoconferences to discuss the submitted homework, briefly review the new material, answer questions, do group problem-solving practice, and take quizzes and exams. Attendance and participation in the Zoom sessions is required and will be part of your grade. Short online exams will be held during the Zoom sessions, usually on Monday of weeks 2-6 and at the Final Exam time scheduled by the Registrar (probably 1pm Eastern Time on Friday August 13, 2021). Shorter quizzes will be held between the exam days. At this time, we anticipate using the time slot at 2pm on Wednesdays only for office hours.

Textbook and MasteringPhysics REQUIRED: 1) "University Physics," Hugh D. Young and Roger A. Freedman, **Fifteenth Edition**, Pearson Addison-Wesley. We will be focusing on the content that would be labelled "Volume 2" in a paper edition, so you should make sure that whatever you purchase contains Chapters 21-36. We will also touch on material from chapters 14-16 and 38-39, but you can get by without owning those. There are multiple avenues to obtain the textbook material. The least expensive is an e-book, but please note that there is research that indicates that students learn and retain better when using a paper textbook. According to the pearson.com website, the loose-leaf paper copy of Volume 2 is available for \$133.32 as ISBN-13: 9780135216125. 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> – As instructors, we can't see the student price for this, but we 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 might also consider purchasing the Student Study Guide / Solutions Manual for Volume 2 (ISBN 013521694X) which contains full solutions for most of the odd-numbered problems, which you can use for problem-solving practice.

Reading Assignments are essential! We recommend skimming the relevant sections **before** watching the videos, then looking through the textbook examples in detail as you work through the homework assignments. Alternate presentations of the material (youtube videos, simulations, etc.) are available in the "Links to external resource webpages" item on our CourseSite homepage.

Attendance and participation at the Zoom sessions is part of your course grade and is required for continued enrollment in the course under University policy (see section 3 of Rules and Procedures).

Online Homework (conceptual questions) 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 **licini00925**.

Written "scratchwork" you write for your online homework you will upload as pdf files (due at 9:30am on class days). Keeping in mind that your goal is to be able to solve physics problems by yourself on the exams, it is far better to actually work on the problems than to copy somebody else's perfect solution, and you should start working on the assignments **early** so that if you get stuck, you have time to discuss the problems with your coursemates or email me.

Quizzes: The quiz questions are typically similar to homework problems rather than exam-level problems. Missed quizzes count as a zero. Only your highest five quiz scores are used in the computation of your course grade, so no makeup quizzes will be offered.

Exams: Six short (approximately 45 minutes each) online exams will be given as part of the Zoom sessions. These are the **ONLY** content resources you may use during the exam (because they are the ones 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 our solution handouts. I will explicitly point out that using any additional resources or using any other person's work is strictly forbidden by **Lehigh University'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. Because we only use the top five quiz scores, one or two zeros from missed quizzes will simply be discarded. Students with an unusually high level of medical issues or conflicts should contact Professors Licini or Quinn.

Course Grading:	Homework	100
	Quizzes (best 5)	50
	Zoom attendance and participation	50
	Six exams (50 points each)	300
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	TOTAL	500

CONTENTS: Physics 21 “Introductory Physics II” is the four-credit “content” portion of the second semester of Lehigh University’s calculus-based two-semester introductory physics sequence, designed primarily for science and engineering students. In Physics 21, we cover two broad subject areas, **ELECTROMAGNETICS** (including electrostatics, magnetostatics, electrodynamics, and circuits) and **WAVES** (including mechanical and electromagnetic waves, optics, diffraction and interference, and quantum phenomena).

Prerequisites/Corequisites: Physics 21 requires prior mechanics course credit (Physics 10 or 11) and **PRIOR** second-semester calculus credit (Math 22, 32, or 52).

Other related courses: Physics 22 “Introductory Physics II Laboratory” is the separately-scheduled one-credit laboratory course, which should typically be taken during the same semester as Physics 21. Students with a particular interest in physics should inquire about Physics 72 for advanced topics.

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, differentiation and integration of polynomial, trigonometric, and vector 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 sources and fields and can determine electric and magnetic fields.
- 4) Students understand the consequences of time-varying fields and can use them to analyze and predict induced electric and magnetic fields.
- 5) Students understand applying the above concepts to discrete circuits elements, and can use them to solve the overall behavior of DC, transient, and AC circuits.
- 6) Students understand wave principles and can use them to describe and predict the behavior of mechanical, sound, and electromagnetic waves.
- 7) Students understand the propagation of electromagnetic waves as manifested in geometric optics as well as polarization, interference and diffraction.
- 8) Students understand that wave phenomena apply to particles as well, and can understand basic quantum principles of photons, particles, and atoms.

**WE FULLY ENFORCE ALL UNIVERSITY STANDARDS FOR ACADEMIC INTEGRITY.
CELL PHONES AND ELECTRONIC DEVICES:**

During exams, absolutely no use of cell phones or other electronic devices. (This will be automatically treated as an academic integrity violation.) During Zoom sessions, please do not use your cell phone or other electronic device. (This is a distraction to yourself and deprives the other class members of your participation.) These course policies are backed up by official policy from the College of Arts and Sciences: “No cell phones, laptops, tablets, e-readers, MP3 players, calculators, or other electronic devices are allowed to be used during any class, quiz, or exam in the College of Arts and Sciences, unless otherwise specified by the instructor or authorized as an accommodation of disability. Electronic devices must be silenced and put away out of sight during class, unless their use is permitted.”

Accommodations for Students with Disabilities:

If you have a disability for which you are or may be requesting accommodations, please contact both your instructor and the Office of Academic Support Services, Williams Hall, Suite 301 (610-758-4152) as early as possible in the semester. You must have documentation from the Academic Support Services office before accommodations can be granted.

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). 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.)

Student Senate Statement on Academic Integrity: We, the Lehigh University Student Senate, as the standing representative body of all undergraduates, reaffirm the duty and obligation of students to meet and uphold the highest principles and values of personal, moral and ethical conduct. As partners in our educational community, both students and faculty share the responsibility for promoting and helping to ensure an environment of academic integrity. As such, each student is expected to complete all academic course work in accordance to the standards set forth by the faculty and in compliance with the University's Code of Conduct.

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.

Students sometimes attempt to maximize their homework points by copying someone else's perfect solution. It is far more important, however, to attempt the problems on your own, using hints that may be provided, since this will increase your capability to solve problems on your own during the quizzes and exams. (Quizzes and exams are worth 400 points compared to the 100 points for homework.)

PHYSICS 21 STUDY SUGGESTIONS: The standard guideline is that students should spend two to three hours studying outside class for every hour inside class. You should therefore expect to commit four to six hours per class day to study and homework, and then at least four hours over the weekend to exam conditions practice.

Here is a typical minimum sequence:

- skim textbook sections before lecture (20-30 minutes per day)
- review lecture notes, reread problem spots in text (15-20 minutes per day)
- do online homework, reading examples in detail as necessary (2 hours per day)
- make a problem-solving checklist for current problem types (10 minutes per day)
- reconcile back homeworks with solution handout (20 minutes per day)
- finalize problem-solving checklist from prior problem types onto page of notes (5 minutes per day)
- exam-conditions practice using only equation sheet and your page of notes (5 hours per week)

Recommended minimum of 20 hours per week.

Please be wary about making too many other commitments during these six weeks.

Written HW assignments are NOT ENOUGH to develop fluency with exam problems!

Basic techniques: "Tutorial" assignments from MasteringPhysics

Exam preparation: "ExtraCredit" assignments from MasteringPhysics

Copies of "3000 Solved Problems in Physics" in Fair-Mart

Student Solution Manual > half of odd-numbered problems (ISBN 978-0-321-69668-7)

From my homepage: <http://www.lehigh.edu/~jcl3/index.html>

From Prof. Dan Stryer at Oberlin College are two excellent pages: "Study Tips for Introductory Physics Students" and "Solving Problems in Physics"

PHYSICS 21 Schedule -- Summer 2021-- Preliminary!

Date	Topic	Reading
Tu July 6	Coulomb's Law and Electric Field	Ch. 21
W July 7	Gauss's Law	Ch. 22
Th July 8	Electric Potential	Ch. 23
M July 12	Equipotentials, Energy, Capacitance	Ch. 24
Tu July 13	Current, Conductivity, Resistance	Ch. 25
W July 14	DC Circuits	Ch. 26
Th July 15	Magnetic Force	Ch. 27
M July 19	Biot-Savart Law	28.0-28.5
T July 20	Ampere's Law	28.6-28.S
W July 21	Faraday's Law	Ch. 29
Th July 22	Snell's Law, Polariz	Ch. 30
M July 26	AC Circuits	Ch. 31
Tu July 27	Waves	Ch. 14-15
W July 28	Wrap up waves	Ch. 15-16
Th July 29	Intro EM waves	Ch. 32
M Aug 2	More EM waves	Ch. 32
Tu Aug 3	Snell's Law, Polariz	Ch. 33
W Aug 4	Geometric Optics	Ch. 34
Th Aug 5	Interference	Ch. 35
M Aug 9	Diffraction	Ch. 36
Tu Aug 10	Quantum	Ch. 38-39
W Aug 11	Review	
Th Aug 12	Review	
Fri Aug 13	LAST EXAM prob. 1:00 to 4:00pm	