

Physics 111 – Elements of Physics – Spring Semester 2017

Distance Education

Instructor

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University email is preferable to a phone call, and will provide you with a written response you can save.

Objectives

This course meets the University's General Education Requirements for a three hour Natural Science course with a one hour laboratory.

As with other General Education Natural Science courses, the objective of this course is to incorporate physics into your critical thinking skills, and to understand how the methods of science work. We will do that by exploring how physics helps us unravel the underlying mysteries of the Universe, and to

1. Help you understand (and cope with) physics encountered in everyday life: LED light bulbs, microwave ovens, and car parts.
2. Provide a basis for understanding the latest developments about science you will hear in the news.
3. Recognize that while physics does not explain everything, it does predict the effects of intangible invisible things, even though nobody knows what they really are ... yet. (That is, not to fret when something seems incomprehensible, since physics itself still does not explain everything, and has to rely on predictable behaviors of invisible things such as gravity, electromagnetism, and the nuclear forces which nobody completely understands.)
4. Present you with mysteries not yet solved, or with contradictory or untested theories, so that you may solve them in the future and win a Nobel Prize. (There is plenty of Physics that we do not yet know, as mentioned above.)
5. Teach physics that you may apply to make life better for yourself and others now, and in the future. (Such as how to heat and cool a house simply by where the windows are placed, or perhaps how to create new lightweight solar voltaic battery technology.)
6. Open your mind to new discovery by knowing that the world should be understandable.

Requirements

The class website will guide you through experiments or observations on about 14 different weekly topics over the semester, and will pose specific questions to answer. While you may work on these on- or off-line, your responses will be entered online interactively. We reserve the right not to accept work that is late, but please let us know when you need extra time.

While you study, you are expected to use the discussion forum on the website for discussions with other students in the same way that you would work with one another for any class. This is a very important part of the class and we monitor the forum to see where you are having difficulty. We encourage collaboration and peer instruction because our goal is to have you learn by whatever means you find most helpful, but of course you must do your own work. We will try to resolve questions you may have for the class as a whole through the discussion forum whenever we can, and to respond to email individually as needed.

Use the discussion forum, take your time to understand, ask questions when you need help, and remember the objective is to learn how to observe, reason, and apply your growing knowledge and skill to solve problems. Individual and group assistance through our video conferencing system, Skype or telephone is available on request.

Each week the class website has new web-based content, suggested readings, an interactive review, and a lab activity. There is a graded quiz on Blackboard over the week's content that may be taken any time from 3 AM Saturday morning through Monday midnight (US Eastern Time) at the end of each week. Lab work will be graded by a separate lab quiz that may be taken any time during the week. There will be two longer exams administered through Blackboard, one at midterm and the other during the final exam period. These exams will also be open from Saturday to Monday midnight. We will send email reminders weekly about the quizzes and exams.

Websites

The University's Blackboard system is its gateway to Distance Education programs:

<http://blackboard.louisville.edu/>

Use your University *User ID* and *Password* to log into Blackboard for the quizzes, exams, and announcements. For this Elements of Physics class, however, all of the content will be managed on our program website at

<http://prancer.physics.louisville.edu/moodle>

This site is available only to registered students, and it requires a personal password that is different from your university computer password. Instructions on how to use this system will be posted on Blackboard and sent to registered students by email on or before the first day of classes. Please contact Professor Kielkopf if you have not received this by the second day of classes, or if you have difficulty logging into the website. The University's Help Desk can only respond to questions about Blackboard.

Textbook

The content will be provided online through the class website. For additional help, the text for the course is

College Physics, Openstax College, 2016

It is made available under the auspices of Rice University **for free** online at

<https://openstax.org/details/college-physics>

Click “Download a PDF” or links on the class website or Blackboard. It is also available in a high quality paper copy through the University’s bookstore, or through Amazon and other online retailers at low cost. The book, is a supplement to the on-line content and has considerably more material than we will cover, but it is well-suited for self-study and we will recommend readings from some sections.

In many cases, simply by using Google and looking for an appropriate entry in the Wikipedia you can find an answer to basic physics questions, and links to far more detail than most textbooks provide. If you follow this suggestion, be selective in accepting answers from Internet resources. Wikipedia has proven to be very reliable, as are the sites supported by NASA and the selected links we provide for you.

Information on useful software and other materials also will be provided online. No matter what kind of computer you use, there will be tools available for you. While we are working to provide all content through advanced web-based technology, access to a desktop or laptop rather than a tablet or cellphone may be necessary for some of the required work. If you have problems with class content or software, please use our website and post your question to the Discussion Forum. Often other students have seen the same issue and will know the answer, or if not, we can work together to a solution.

Please keep in mind that we are developing the technology to offer improved non-traditional learning outside the classroom and we need your feedback through the discussion forum.

Evaluation and Grading

Quizzes and exams will evaluate your progress toward meeting the course objectives.

There will be a quiz at the end of each week. Weekly quizzes will be added and averaged to make 25% of your grade.

There will be a weekly lab activity and a lab “quiz” based on it. Lab quizzes will be added and averaged to make 25% of your grade.

There will be 2 exams: the first is near mid-term; the second one, given in the final exam period, covers the entire course. Each exam counts 25%.

An additional 5% extra credit will be added for students who consistently make thoughtful contributions to the forum discussions on the class website.

We monitor activity, and to receive a grade you must **each week**

- Study the content on line
- Take the self-assessments on line
- Do the lab activity on line
- Participate in the discussion forum by posting a comment, question, or response
- Take the lab quiz on Blackboard before the next week starts
- Take the content quiz on Blackboard during the limited period it is open
- Take the first and second exams on Blackboard

To complete the course and receive a grade, you must meet the requirements noted above, including participation in the online components and taking all the quizzes and exams. Given that, letter grades are based on the graded quizzes and tests, and scoring on quizzes and exams is based on a simple percentage of correct answers.

Letter grades are approximately A (90 to 100); B (80 to 89); C (70 to 79); and D (60 to 69). Plus and minus grades may be used when a numerical score is within 2 points of a letter grade division.

Caveats

We reserve the right to make changes in the syllabus when necessary to meet learning objectives, when new Physics discoveries occur, or when there is a technical or software issue that requires a change in content or methodology. Any changes will be announced by email and posted in the current online syllabus and schedule.

Title IX/Clery Act Notification

Sexual misconduct (including sexual harassment, sexual assault, and any other nonconsensual behavior of a sexual nature) and sex discrimination violate University policies. Students experiencing such behavior may obtain confidential support from the PEACC Program (502.852.2663), Counseling Center (502.852.6585), and Campus Health Services (502.852.6479). To report sexual misconduct or sex discrimination, contact the Dean of Students (502-852-5787) or University of Louisville Police (502.852.6111).

Disclosure to University faculty or instructors of sexual misconduct, domestic violence, dating violence, or sex discrimination occurring on campus, in a University-sponsored program, or involving a campus visitor or University student or employee (whether current or former) is not confidential under Title IX. Faculty and instructors must forward such reports, including names and circumstances, to the University's Title IX officer.

For more information, see the Sexual Misconduct Resource Guide here <http://louisville.edu/hr/employeerelations/sexual-misconduct-brochure>.

Schedule and Content

Please see the class website for each week's content, the assigned work, self-assessments, and discussion forum. The lab activity report and the weekly quizzes for credit are on Blackboard from Saturday morning through Monday midnight.

January 9 - 15 Measuring space and time.

What is a vector?

The wheel and other works of genius.

January 16 - 22 Gravity and how to escape it.

January 23 - 29 Gravity beyond Earth.

Electromagnetism is different from gravity.

January 30 - February 5 Electricity and magnetism go together.

February 6 - 12 Light and spectra know all and almost tell all.

Lenses help us to see the world.

What is the nature of light?

February 13 - 19 Periodic Table: insight to everything.

Fusion: Energy from hydrogen.

Fission: Energy from uranium.

February 20 - 26 Atoms and molecules.

Hot gases and the particulars of plasma physics.

Saturday, 25, through Monday, February 27 First exam.

February 27 - March 5 Condensed matter physics.

Crystals.

Synchrotrons and crystallography.

March 6 - 12 What's special about Special Relativity?

Light clocks and time dilation.

March 13 - 19 Spring break week.

March 20 - 26 Quanta, particle physics, and making matter from nothing.

March 27 - April 2 Astrophysics and energy from the stars.

Taking a planet's temperature.

Sun's source of energy.

April 3 - April 9 General Relativity.

Physics of black holes.

April 10 - April 16 Dark energy, dark matter, and other mysteries.

April 17 - 23 Constants that defy explanation amidst Universal Physical Law.

April 24 - 30 The story of the universe as a review for second exam.

Saturday, April 29, through Monday, May 1 Second exam.

Class schedule version of December 16, 2016