

# Physics 107 – Elementary Astronomy – Spring Semester 2016

## 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 examines the entire universe, as observed today with the instruments of modern technology, and as explained with the ideas of physicists and astronomers. It meets the University's General Education Requirements for a three hour Natural Science course. There is a separate optional Physics 108 laboratory, also offered online.

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

1. Help you understand (and cope with) astronomy encountered in everyday life: seasons, solar energy, and the GPS in your cell phone.
2. Provide a basis for understanding the latest developments about astronomy you will hear in the news.
3. Recognize that while physics does not fully explain the universe, 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 science itself still does not explain everything, and has to rely on predictable behaviors of invisible things such as gravity and the properties of the fundamental particles 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 astronomy that we do not yet know, as mentioned above.)
5. Teach physics and astronomy that you may apply to make life better for yourself and others now, and in the future. (The stability of our planet's atmosphere.)
6. Open your mind to new discovery by knowing that the universe should be understandable.

## Requirements

The class website will guide you through about 14 different weekly topics over the semester, and will pose specific ideas and questions to consider. While you study, you are expected to use the discussion forum on the website 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 use your growing knowledge and skill to understand our universe. Individual and group assistance through email, our own video conferencing system, Skype or telephone is available on request.

Each week the class website has new web-based content, suggested readings, and an interactive review. 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. There will be three longer exams administered through Blackboard, one at midterm, one at the end of the course, and one 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 Elementary Astronomy 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 supplemental help, the text for the course is

It is available through the University's bookstore, or through Amazon and other online retailers. Earlier editions are fine too.

In many cases, simply by using Google and looking for an appropriate entry in the Wikipedia you can find an answer to basic astronomy and 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, ESA, and ESO.

Information on useful software and other materials 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.

## 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 3 exams: the first is near mid-term; the second at the end covering the second half of the course, and a third one during the final exam period covers the entire course. Each exam counts 25%.

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

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 exams, 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 astronomical 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

**January 6 - 10** Constellations.

“Looking up” at the front of the book.

Star charts at end of book.

Unit 5.1-5.3, 6.1-6.2, 6.6

**January 11 - 17** The Sun keeps us warm.

Units 6.3-6.5, 7.1-7.2, 38.2, 51.1-51.4, 52.1, 53.1-53.4 56.1-56.5

**January 18 - 24** Telescopes, spacecraft, and the solar system.

Units 1, 34, 44, 48, 30, 31, 32

**January 25 - 31** The Moon.

Units 6.5, 8.1-8.3, 39

**February 1 - 7** Mars, Saturn, and extra-solar planets.

Units 42, 45, 47

**February 8 - 14** Comets, meteors, and meteorites.

Units 49, 50

**February 15 - 21** Periodic table of elements and the Universe.

Units 2, 4.2, 67.4, 83.1-83.2 and review.

**Saturday, February 20, through Monday, February 22** First exam.

**February 22 - 28** Subatomic particles, birth and death of stars, black holes.

Units 4.4, 52, 60, 62, 63, 65, 66, 67, 69.1-69.3

**February 29 - March 6** Things beyond our understanding.

Units 77, 79, 80, 81

**March 7 - 13** How to measure distances across the universe.

Units 3, 10.3, 54.1-54.4, 55, 64, 66

**March 14 - 20** Spring break.

**March 21 - 27** Special and General Relativity.

Units 26, 27, 69.2, 79.3, 80.2, 82

**March 28 - April 3** The expanding universe and the beginning of time.

Units 66.3, 75, 80

**April 4 - 10** Galaxies near and far.

Units 71, 74, 76, 78

**April 11 - 17** The story of the universe. Review and study for second exam.

**Saturday, April 16, through Monday, April 18** Second exam.

**Saturday, April 23 , through Monday, April 25** Final exam.