

ASTRONOMY 200LG - FALL 2021

***** Please make sure to see me ASAP if you were not present on the first day of class or enrolled late for the course*****

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Office hours: Tuesdays 11:00am – 12:30pm, Thursdays 11:00am – 12:30pm, and
Fridays 12:30pm – 2:00pm, *and by appointment*

Welcome to Astronomy 200: Life in the Universe! One of the oldest and most intriguing questions posed by humankind is “are we alone?” In the Twenty-First century, this question has gained new meaning and impetus as we find scores and scores of planets orbiting other stars, and begin in earnest to search for life not just in our solar system, but in our galaxy and in the vastness of the Universe. As a first step, we will explore how the Universe came to exist, how our solar system formed, and our place in the Universe. We will go beyond this, however, as we define life (as we know it), explore the necessary ingredients for the existence and persistence of life, and the evolution of life on Earth. Finally, we’ll examine the solar system and nearby stars for the possibility of the existence of life.

This course is designed specifically for those non-science majors who have very little, if any, background in the sciences and mathematics. The course is non-mathematical by prerequisite, but you will have to learn to do some calculations. However, these calculations will be very simple and will employ formulae that are easy to remember. You will have the opportunity to note that formulae represent ideas. Mathematics is the language of science.

1. TEXTBOOK AND OTHER RESOURCES

Textbook

Bennett & Shostak, *Life in the Universe*, 4th edition, Pearson, 2016.

Since we will be using Mastering Astronomy for the homework assignments in this course, you have the option of purchasing the textbook (bound or loose leaf) from the USC Bookstore or purchasing an eBook with Mastering Astronomy access online (<https://www.pearsonmylabandmastering.com/northamerica/>) for \$60. Please note that if you have purchased or have access to a used textbook, you will still need to purchase a Mastering Astronomy access code.

Astronomy on the Internet

There is a vast amount of information (and lots of pretty pictures) on the internet. I’ve listed some of these sites on a separate list published on Blackboard. You can also find many more sites by simply Googling the specific topic you’re looking for. Also, Wikipedia is considered a (mostly) reliable source for astronomy, so don’t shy away from using Wikipedia in your web searches.

2. GUIDELINES

2.1 Registration and administration

Your registration for this course consists of two separate parts: the lectures and the laboratory. You must register for each of them. *The Undergraduate Physics Office in ACB 439 deals with all administrative aspects of this class. Additional help regarding administrative issues is available in that office in person, by phone at (213) 740-1140 or (310) 740-0848, and by email at physics@dornsife.usc.edu.*

2.2 Disabilities

Students who need to request accommodation based on disability are required to register each semester with the Office of Student Accessibility Services (OSAS). This office can be found at STU 301 with phone number 213-740-0776. A letter of verification to the instructor from OSAS is needed for the semester you are enrolled in. If you have any further questions please contact the OSAS office or the instructor. **Please note that you need to send the instructor a copy of your accommodation letter as the instructor doesn't automatically receive this information.**

2.3 Grading

Your grade will be determined according to the following key:

80% lectures:

10% Homework

40% Midterms (best two out of three, 20% each)

30% Final exam

20% laboratory

Broadly speaking, grading is done by the distribution curve of the combined scores of exams, homeworks and lab. No rigid percentage marks (such as, e.g., a rule that 90% corresponds to an A–, or similar) are used. Further details about the grading procedure are given in class.

You cannot pass the course if you do not earn a passing grade (14/20 or 70%) on the lab portion of the course.

Students taking the course Pass / No Pass must reach a minimum overall score of 70% to pass the course, regardless of the manner in which letter grades are assigned to students taking the class for a letter grade.

2.4 Attendance

Attendance is not mandatory in this course. However, many of the class announcements will be made during lecture, and it is your responsibility to make sure you don't miss important announcements.

2.5 Exams

There will be three 50-minute midterm exams and one 80-minute final exam consisting of multiple choice and fill-in-the-blank questions. The midterms will be given during the lecture that they are scheduled in. Of the three midterms, only the scores of the two highest will be counted, and the score of the lowest of the three will be dropped. The midterms will cover the course material incrementally throughout the semester, and the final exam will cover the whole course. **All exams are closed book.**

Please note that the third midterm exam can serve as a make-up exam for either of the first two exams. There will not be any other make-up exams. Any student missing two of the three midterms will only have recorded the points scored on the one exam taken.

2.6 Homework

We will be using the Mastering Astronomy online homework system for this course. To access the assignments for this course, please go to <https://www.pearsonmylabandmastering.com/northamerica/masteringastronomy/>, then click on the "Student" button under the "Register Now" heading on the right side of the page. You will need to enter the course ID **PEROOMIAN18598**.

After you successfully log in to Mastering Astronomy, you will see 8 assignments due for this course. The first assignment, which is an introduction to Mastering, walks you around the Mastering system so that you are familiar with all its aspects. This "assignment" is not part of your regular homework but is worth 20 bonus points toward reaching the maximum homework score, as described below. To earn the bonus points, please complete this assignment by 11:59pm on September 2, 2021.

After the bonus assignment, the first homework assignments will be due on September 9 and every other week afterward, at midnight on Thursdays. Homework can be turned in up to 24 hours late for 50% credit. You can set

up reminders for assignments that are due through Mastering Astronomy. Please note that exceptions will not be made to homework deadlines, except for medical emergencies.

I expect that it will take a couple of hours to complete each of your homework sets. The homework sets are the central means by which to master the course material, and, consequently, to perform well in the exams

Homework will count for 10% of your total score. Each of the 7 assignments listed below will be worth 100 points, and a cumulative score of 500 out of the maximum 700 points will equate to a 100% homework grade (this is equivalent to, but better than, dropping two homeworks as you can use all 7 assignments plus the bonus to reach the 500 points).

Homework Schedule

| | |
|-------------|-----------------------------------|
| Homework #1 | Due: Thursday, September 9, 2021 |
| Homework #2 | Due: Thursday, September 23, 2021 |
| Homework #3 | Due: Thursday, October 7, 2021 |
| Homework #4 | Due: Thursday, October 21, 2021 |
| Homework #5 | Due: Thursday, November 4, 2021 |
| Homework #6 | Due: Thursday, November 18, 2021 |
| Homework #7 | Due: Thursday, December 2, 2021 |

2.7 Laboratory

The course Astronomy 200 has a mandatory laboratory component, and you should already be signed up for one of the laboratory sessions. The purpose of the laboratory is to give you some feeling for making and interpreting observations, thereby reinforcing some of the course material by direct experience. Indeed, without such experience, some of the theoretical material could appear a little too abstract. Another purpose is that you can get some hands-on experience in using a telescope: Often one can see spectacular pictures taken from large telescopes around the world or from the Hubble Space Telescope (HST) and you might be curious about what is possible from a small, but good “amateur” telescope.

Note that late registration in the course will NOT excuse you from any labs you’ve missed, and you must contact the Lab Director, Joseph Vandiver (SGM 309; Phone: (213) 740-8889; Email: vandiver@usc.edu) IMMEDIATELY if you’ve signed up late for the course.

I hope that our laboratory will enhance your experience and enjoyment of this course. Please appreciate the great logistical complexity of arranging laboratories for so many people with such a broad variety of backgrounds: I therefore kindly request your good will and patience in this enterprise.

Questions concerning the laboratory should be referred to the Lab Director, Joseph Vandiver (SGM 309; Phone: (213) 740-8889; Email: vandiver@usc.edu).

Labs begin during the second week of class and will follow the below schedule:

| Week of Term | Lab Description |
|----------------------------|--|
| August 23 rd | No Labs |
| August 30 th | Eco Zone Project Discussion & Basic Aspects of Astronomy |
| September 6 th | No Labs |
| September 13 th | Kepler’s Laws |
| September 20 th | No Labs |
| September 27 th | Starry Night |
| October 4 th | No Labs |
| October 11 th | No Labs (Fall Break) |

| | |
|---------------------------|--------------------------------|
| October 18 th | Spectroscopy |
| October 25 th | No Labs |
| November 1 st | Habitable Zone |
| November 8 th | No Labs |
| November 15 th | Drake Equation & Fermi Paradox |
| November 22 nd | No Labs (Thanksgiving) |
| November 29 th | Eco Zone Presentations |

3. SUPPORT

You have a variety of opportunities for support available to you.

3.1 LECTURE

Do not underestimate the value of questions during the lecture period. In large lectures, many students are reluctant to pose questions that they fear might seem silly to their instructor or to their peers. Almost always, if one student asks a question, there are several other students who were wondering about the same issue. Often such questions tell the instructor what material might benefit from a more detailed discussion.

3.2 INSTRUCTOR OFFICE HOURS

I will have 4.5 hours of office hours each week, but these office hours will be open to all of the courses that I teach. Office hours will be held in SHS 360/363. Most of my time is filled by teaching or office hours, but if I'm in my office during other times, you're welcome to stop by for a quick question (less than five minutes). You can also make an appointment to see me if you cannot make it to any of the office hours listed on the first page of the syllabus. In this case, it is best to contact me by email at least one day before you'd like to meet, or see me immediately after class.

3.3 ELECTRONIC ASSISTANCE

Everyone registered in this course should find a link to the course in their *Blackboard* account. All information about the course will be posted on *Blackboard* at <http://blackboard.usc.edu>.

4. OBTAINING YOUR GRADES

You will be able to access your grades in Astronomy 200 via *Blackboard* at <http://blackboard.usc.edu>.

5. FACULTY LIAISON

All courses in the Department of Physics & Astronomy have an assigned Faculty Liaison to serve students as a confidential, neutral, informal, and independent resource when they wish to discuss issues concerning their course without directly confronting their instructor. The Faculty Liaison for this course is Prof. Jack Feinberg (feinberg@usc.edu, 213-740-1134, SSC 327).

6. FEEDBACK

Feedback regarding all aspects of these lectures is very much appreciated and welcome at any time. Please get in touch with your instructor via email, after lectures, or during office hours.

7. STATEMENT ON ACADEMIC CONDUCT AND SUPPORT SYSTEMS

7.1 ACADEMIC CONDUCT:

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Part B, Section 11, “Behavior Violating University Standards” policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct>.

7.2 SUPPORT SYSTEMS:

Student Counseling Services (SCS) – (213) 740-7711 – 24/7 on call

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention. engemannshc.usc.edu/counseling

National Suicide Prevention Lifeline – 1 (800) 273-8255

Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. www.suicidepreventionlifeline.org

Relationship and Sexual Violence Prevention Services (RSVP) – (213) 740-4900 – 24/7 on call

Free and confidential therapy services, workshops, and training for situations related to gender-based harm. engemannshc.usc.edu/rsvp

Sexual Assault Resource Center

For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: sarc.usc.edu

Office of Equity and Diversity (OED)/Title IX Compliance – (213) 740-5086

Works with faculty, staff, visitors, applicants, and students around issues of protected class. equity.usc.edu

Bias Assessment Response and Support

Incidents of bias, hate crimes and microaggressions need to be reported allowing for appropriate investigation and response. studentaffairs.usc.edu/bias-assessment-response-support

The Office of Student Accessibility Services

Provides certification for students with disabilities and helps arrange relevant accommodations. osas.usc.edu

Student Support and Advocacy – (213) 821-4710

Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic. studentaffairs.usc.edu/ssa

Diversity at USC

Information on events, programs and training, the Diversity Task Force (including representatives for each school), chronology, participation, and various resources for students. diversity.usc.edu

USC Emergency Information

Provides safety and other updates, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible. emergency.usc.edu

USC Department of Public Safety – UPC: (213) 740-4321 – HSC: (323) 442-1000 – 24-hour emergency or to report a crime.

Provides overall safety to USC community. dps.usc.edu

8. SOME USEFUL DATES

| | |
|---|---|
| August 23 | Fall semester classes begin |
| September 6 | Labor Day (University Holiday) |
| September 10 | Last day to drop class without a mark of “W,” and last day to change enrolment option |
| September 23 | Midterm 1 |
| October 14 – 15 | Fall Recess |
| October 21 | Midterm 2 |
| November 12 | Last day to drop class with mark of “W” |
| November 18 | Midterm 3 |
| November 24 – 28 | Thanksgiving Break |
| December 3 | Fall semester classes end |
| Thursday December 9, 2:00am – 4:00pm | Final exam |

7. COURSE SCHEDULE

You should read through the relevant chapters prior to coming to the lectures each week, and review them again after each lecture before attempting the homework problems.

| Week | Required reading |
|------|---|
| 1 | Chapter 1: A Universe of life? |
| 2 | Chapter 2: The science of life in the Universe |
| 3 | Chapter 3: The universal context of life |
| 4 | Chapter 3: The universal context of life |
| 5 | Chapter 4: The habitability of Earth |
| 6 | Chapter 5: The nature of life on Earth |
| 7 | Chapter 6: The origin and evolution of life on Earth Chapter 7: Searching for life in our solar system |
| 8 | Chapter 8: Mars |
| 9 | Chapter 9: Life on jovian moons |
| 10 | Chapter 10: The nature and evolution of habitability |
| 11 | Chapter 11: Habitability outside the solar system |
| 12 | Chapter 11: Habitability outside the solar system + special topic: extrasolar planet detection |
| 13 | Chapter 12: The search for extraterrestrial intelligence |
| 14 | Chapter 13: Interstellar travel and the Fermi Paradox |
| 15 | <i>Review</i> |