

# ASTRONOMY 200LG - SUMMER 2022 (ONLINE INSTRUCTION)

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

**Please note that all dates and times listed below are in Pacific Daylight Time (PDT), which is GMT-7 during the summer session**

Prof. Vahé Perroomian

Email address: peroomia@usc.edu

Office hours: Mondays, Tuesdays and Wednesdays after class as necessary, and by appointment

Office Hours Zoom Meeting Room: <https://usc.zoom.us/my/peroomian> (or Meeting ID 972 4034 151)

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

### Optional Textbook

Bennett & Shostak, *Life in the Universe*, 4<sup>th</sup> edition, Pearson, 2016.

Please note that the listed textbook is optional and you are **not** required to purchase it. I will be providing PDFs of my lecture slides and study guides for each topic that we will cover during the course. The exams in the course will be based on my lecture material, on the study guides, and on the assigned homework questions.

### 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 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 Disability Services and Programs (DSP). This office can be found at STU 301 with phone number 231-740-0776. A letter of verification to the instructor from the DSP is needed for the semester you are enrolled in. If you have any further questions please contact the DSP or the instructor.

## 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. All lectures will be recorded and will be available via under “USC Zoom Pro Meeting” section of Blackboard, under the “Cloud Recordings” tab (you need to log in to usc.zoom.us with your USC credentials in order to watch the recordings).

## 2.5 Exams

There will be three 50-minute midterm exams and one 80-minute final exam. On the date of each exam, the exam will become available on Blackboard (under Assignments) from 8:00am to 8:00pm (Pacific). All exams are open book and open notes, and open Internet. You are not allowed to obtain the “live” assistance of others during exams.

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. **Please note that makeup exams will only be given in case of a documented medical emergency.**

## 2.6 Homework

Homework will be assigned via Blackboard and will consist of review questions for each topic. Homework assignments will be due every week, at midnight on Fridays (Pacific time). Homework can be turned in up to 24 hours late for 50% credit. 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 5 assignments listed below will be worth 60 points, and a cumulative score of 240 out of the maximum 300 points will equate to a 100% homework grade (this is equivalent to, but better than, dropping one homework as you can use all 5 assignments to reach the 240 points).

### Homework Schedule

Homework #1

Due: Friday, July 8, 2022

Homework #2

Due: Friday, July 15, 2022

Homework #3	Due: Friday, July 22, 2022
Homework #4	Due: Friday, July 29, 2022
Homework #5	Due: Friday, August 5, 2022

## 2.6 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).

**All of the labs for this course will be conducted online. During your first lab meeting, on June 29 or 30, your lab TA will conduct a Zoom meeting and will go over the details and mechanics of the labs. The TA will also share the schedule for labs and their due dates. The schedule of labs is as follows:**

Date of Term	Lab Sections
June 29 <sup>th</sup> & 30 <sup>th</sup>	Introductory Zoom Meeting & Basic Aspects of Astronomy
July 4 <sup>th</sup> & 5 <sup>th</sup>	July 4 <sup>th</sup> Holiday & No Lab
July 6 <sup>th</sup> & 7 <sup>th</sup>	Physical Properties of the Earth
July 11 <sup>th</sup> & 12 <sup>th</sup>	No Labs Exam #1
July 13 <sup>th</sup> & 14 <sup>th</sup>	Kepler’s Laws
July 18 <sup>th</sup> & 19 <sup>th</sup>	Distance to M4
July 20 <sup>th</sup> & 21 <sup>st</sup>	No Labs Exam #2
July 25 <sup>th</sup> & 26 <sup>th</sup>	Spectroscopy
July 27 <sup>th</sup> & 28 <sup>th</sup>	Habitable Zone
August 1 <sup>st</sup> & 2 <sup>nd</sup>	No Labs Exam #3
August 3 <sup>rd</sup> & 4 <sup>th</sup>	Drake Equation & Fermi Paradox
August 8 <sup>th</sup> & 9 <sup>th</sup>	Final Exam

Labs become available at 8:00am on first day and must be completed and submitted via blackboard by midnight on the second day. For example; for the MW sections Experiment #1 becomes available on June 29<sup>th</sup> at 8:00am Pacific time and must be submitted via the lab Blackboard section by June 30<sup>th</sup> *before* midnight Pacific time. For the TTh sections, Experiment #1 becomes available on June 30<sup>th</sup> at 8:00am Pacific time and must be submitted via the lab Blackboard section by July 1<sup>st</sup> before midnight Pacific time.

### 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 office hours at the end of lecture on Mondays, Tuesdays, and Wednesdays each week, and will meet with students as long as necessary. You can also make an appointment to talk to 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>.

At this address, you will find this Syllabus, important announcements, homework sets, etc. Solutions to your homework sets (after the due date) will be placed on *Blackboard*.

### 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](mailto: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](http://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](http://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](http://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](http://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](http://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](http://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](http://studentaffairs.usc.edu/bias-assessment-response-support)

*The Office of Disability Services and Programs*

Provides certification for students with disabilities and helps arrange relevant accommodations. [dsp.usc.edu](http://dsp.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](http://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](http://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](http://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](http://dps.usc.edu)

**8. SOME USEFUL DATES**

June 29	Summer Session classes begin
July 4	Independence Day (holiday, no classes)
July 7	Last day to add this class
July 12	Midterm 1
July 21	Midterm 2
August 2	Last day to drop class with mark of “W”
August 2	Midterm 3
August 9	Final Exam

**9. COURSE SCHEDULE**

<b>Week</b>	<b>Start date</b>	<b>Required reading</b>
1	6/29	Topic 1: A Universe of life? Topic 2: A brief history of astronomy
2	7/4	Topic 3: Our toolbox of physical laws Topic 4: Formation of the Solar System Topic 5: Birth of the Universe
3	7/11	Topic 6: The geology and habitability of Earth, Climate Change Topic 7: Life on Earth Topic 8: Origin and evolution of life on Earth
4	7/18	Topic 9: Searching for life in the Solar System Topic 10: Mars Topic 11: The Sun, our star, and Space Weather
5	7/25	Topic 12: Surveying the sun and stars Topic 13: The life cycle of stars Topic 14: Extrasolar planetary systems
6	8/1	Topic 15: The nature and evolution of habitability Topic 16: The search for extraterrestrial intelligence Topic 17: Interstellar travel
7	8/8	Topic 18: The Fermi paradox