

ASTR 202: Life in the Universe

Spring 2015, TuTh, 12:30 PM - 1:45 PM, Flandrau Science Center

Instructor: Dr. J. Serena Kim

TA: Mr. Youngmin Seo

Overview

Welcome to one of the most exciting adventures in science, astrobiology! Astronomy 202 is a **Tier 2** General Education course, aimed at **students who have had at least one general education science course, but it assumes no prior knowledge of astronomy**. We meet on **Tuesdays and Thursdays from 12:30 to 1:45 PM in the Flandrau planetarium**. "Life in the Universe" confronts one of the biggest questions humans can ask: Are we alone in the universe? The content is mostly astronomy, but will include aspects of physics, geology, chemistry, biology and even sociology. Astrobiology is driven by large telescopes, space missions, lab experiments and continued exploration of the full range of terrestrial life. We will critically assess the nature of life on Earth and the likelihood for finding life beyond.

Teaching Team

Your instructor is Dr. Jinyoung Serena Kim in the Department of Astronomy. My office is Room N330 (note N in front of 330), Steward Observatory, phone 626-0187, fax 621-1532, serena00@email.arizona.edu. My office hours are 10:30AM-11:30AM on Mondays and 1:30AM-3:30PM on Wednesdays. Email is a good way to reach me. I will try to answer your emails within 24 hours. You are welcome to see me before or after class. It is best to make an appointment first, by phone or email. Mr. Youngmin Seo (Ph.D. student) is the TA of this course (seo3919@email.arizona.edu). His office hours are from 2PM to 4PM on Tuesdays and 11AM to noon on Wednesdays at T110 at Steward Observatory).

Class Materials and D2L course website

The textbook is **Life In the Universe** by Bennet and Shostak (3rd edition). We will follow the textbook, although some extra materials may be used. Lecture notes, additional materials, including copies of the activities and homework, helpful web sites, and this syllabus, will be posted on the class web site. We will be using the UA course management system **Desire2Learn** (D2L, go to the URL <http://d2l.arizona.edu>, and follow the instructions for students; you'll need your NetID to login). You are strongly advised to stay current with course related announcement and materials as well as class notes. Check the class d2l site frequently. **Please make sure the email sent to your d2l email address is correctly forwarded to you.**

The textbook can be either hardcopy or eTextbook:

1. Hardcopy can be found in the University book store.
2. Pearson <http://www.mypearsonstore.com/bookstore/product.asp?isbn=0321687671>
3. Course Smart http://www.coursesmart.com/9780321740885?_professorview=false&_hdv=6.8 (\$65.99)
4. Amazon http://www.amazon.com/Life-Universe-3rd-Jeffrey-Bennett/dp/0321687671/ref=sr_1_1?ie=UTF8&qid=1421100806&sr=8-1&keywords=life+in+the+universe

Structure

Even though this class is large, you will be an active participant. Each week we will cover a particular broad topic. We will generally have lectures, although we may often break for recent news on Mars and extra-solar planets, demonstrations or short discussions. We will touch upon the broad and selected topics from the textbook, therefore keeping up with reading assignment is important. Questions are always welcome. We will often have **group activities** that relate to the lecture materials, and may also have mini 2 person discussions. The class will split into groups of 3-4 for the regular activities (maximum 4), and as a group you will fill in a worksheet and get a “group” grade (the same score for each person) for the activity. An **individual homework** assignment will be handed out at the end of each activity. Homework builds on the class activities and reading, and is due one week after the homework assignment is given. There will be few **pop quizzes** in class mainly based on reading materials, previous lectures, activity and homework. There will be three **exams** during the semester. There will be **one term project** (your exo-planet).

Grades

More than 50% of the total grade in this class will be based on in-class group activities, homework, pop quizzes, and a term project. Exam will be 40% of the final grade. At the end of each activity, your group will submit a completed worksheet. It will be scored out of 25 points, with each member of the group getting the same grade. Homework is an **individual** assignment, scored out of 20 points. Scores for activities and homework use a grading scheme that allocates the points for a (majority) subset of the questions asked. There are 7 group activities and 4 homework assignments, and pop quizzes (or mini discussions) during the semester. You may drop your 2 lowest scores of activity and pop quizzes, 1 lowest for homework and exams. All missed assignments and exams are scored as zero. Everyone is also expected to do an individual term project. I reserve the option to offer a small amount of extra credit for an outside class event. There will be three exams during this semester, one of which can be dropped (highest two exam grades will be counted). **This course uses absolute grading, therefore you’re not competing with other students.** The components of the grade and the final grade boundaries are following:

- 3 Exams **(1 exam dropped)** 40% (200 points)
- 7 Group activities **(2 scores dropped)** 25% (125 points)
- 4 Homework **(1 score dropped)** 15% (75 points)
- 1 Term project 10% (50 points)
- Attendance (pop quizzes or mini discussion) 10% (50 points)
(2 scores dropped)
- extra credit homework/activity <5% (<25 points)

(total grade points: 500 points)

A: 90-100% (450-500+)
 B: 80-90% (400-449)
 C: 70-79% (350-399)
 D: 60-69% (300-349)
 E: < 59% (<300)

Errors in grading: If you spot an error in grading or have a question you must call it to the attention of the TAs or instructor within one week after the graded materials are handed out. An effort will be made to hand back material in a timely manner. Make sure to review all your handed-back material as soon as possible. Note that you can only discover an error in grading if you pick up your graded material and review it!

Activities and Homework

The class will split into groups of 3-4 for hands-on activities. The activities will relate to material covered in previous lectures. At the end of each activity, you may be given a homework to be completed by the beginning of class (12:30PM) a week from the day homework is given. Note that the homework is an **individual assignment** in a worksheet format—you should do **your own work**. No late work is accepted since you can drop (or swap) one lowest score during the semester. Some questions will be quantitative, but involve nothing beyond high school math level. Homework assignment should be submitted to the d2l dropbox by 12:30PM on due date. Most of the homework assignments will depend closely enough on the group activity that you are unlikely to do well on the homework if you do not participate in the group activity. Group activities and homework together count for 40% of your grade. Note that you can always hand in homework early before the due date. Therefore, even if you are out of town or missing classes you can still do your homework and submit it to the d2l dropbox. No extension or make up will be given for a homework assignment. You can drop one lowest homework grade and two lowest activity grades.

Projects - YOUR EXO-PLANET

Each student will adopt one extrasolar (exo) planet that will be randomly selected from a list of known exo-planets. Nobody will share the same planet. Each student is expected to do mini-research on the planet and the system (star+planet) as well as the method used to discover the planet. Example items and more detailed information will be provided early in the semester and during the lectures. The term project counts for 10% of your grade. Please do not copy the materials just as written in a webpage or in a journal. Quotes can not be more than 10% of your paper. All the used references including the links (URLs) should be clearly cited at the end of the term paper. Please find the citation guide in the University of Arizona Library website (<http://www.library.arizona.edu/search/reference/citation.html>). You may follow of of the suggested guide in the website, e.g., APA, Chicago, or MPA guide. The page limit of the written part of the project is minimum 3 page, maximum 5 page **not** including large figures and citations (single spaced, font size should be 12). The rubric and submission details for the project will be discussed IN class. All projects are to be submitted on-line (d2l dropbox) and is due by **12:30 PM, Apr 16, 2015—a firm deadline. No late submission will be accepted.**

Exams and Pop quizzes

There will be total three exams during the semester (see the schedule table). Exam questions will be related to the reading assignments, lectures, activities, quizzes, and homework. Details on exam format will be discussed in class. The lowest grade will be dropped. Midterm exam dates are currently planned on **February 24 (12:30PM-1:45PM)**, **April 2 (12:30-1:45PM)**, and the final exam date will be on **May 13 (1-3PM)**. More details on midterm and final will be

discussed IN CLASS, and information related to each exam will be posted in the course D2L site. Pop quizzes and exams will count for 50% of your final grade.

Conduct & Code of Academic Integrity

Please be courteous to each other, the TA, and me. Please do not eat, carry on conversations unless permitted for activities, or read materials unrelated to the class. Please arrive on time, and do not leave early. Always do your own work, and keep your academic integrity. Please turn off the mobile phones, electronic devices, and do not use your computer unless asked. No twitter, texting, facebook, social network allowed during the class. Note takers using computers must talk to me to use laptops during the lectures, and sit in a designated area of the room. For emergency phone calls, you may quietly step out of the classroom, and may come back to your seat quietly.

Large fraction (35%) of your grade is based on group activities and pop quizzes/impromptu discussion questions, and if you miss a group activity, you're unlikely to do well on the homework and quizzes. Therefore, I advise you to come to lectures. The UA Code of Academic Integrity (see <http://deanofstudents.arizona.edu/academicintegrity>) prohibits all forms of academic dishonesty, including cheating, plagiarism, and fabrication; all students should be familiar with it and follow it in this class. The report that you turn in at the end of each activity is awarded a group grade, but each homework is an individual assignment and must be your own work. When you sign an activity, you are stating that you were actually there! Homework that is identical or nearly identical will be graded zero; a second infraction will be considered a Code of Conduct violation. The projects should be your own work for this class, and can not be copied directly from any website or book without proper references, can not be a copy of other person's work, and can not ask help from friends, family, or others without a permission from me. Please read the Code of Academic Integrity (<http://deanofstudents.arizona.edu/codeofacademicintegrity>) very carefully, and follow the code. Any project in violation with the code of conduct will be graded zero.

Students with Disabilities:

If you anticipate barriers related to the format or requirements of this course, please meet with me as soon as possible, so that we can discuss ways to ensure your full participation in the course. If you determine that disability-related accommodations are necessary, please register with Disability Resources (621-3268; <http://drc.arizona.edu>) and notify me of your eligibility for reasonable accommodations. We can then plan how best to coordinate your accommodations. For example, if you need a note taker, please contact with me as soon as possible.

Class Schedule

These lectures/activities/date for activity may be revised or rescheduled during the semester.

A: Activity E: exam EC: extra credit

Week	DAY	DATE	TOPIC	CHAPTER
1	Th	1/15	Welcome, Introduction, Course Overview P: Night Sky, Celestial Sphere	1
2	Tu	1/20	A Universe of Life? Astronomical numbers, definition of astronomical objects	1, Appendix es (A,B,C)
	Th	1/22	Activity 1: Astrology and Statistics Activity P: Solar System: the Sun, Planets, Moons	1, A
3	Tu	1/27	Ancient Debate, Copernican Revolution P: Planetary motion	2
	Th	1/29	Kepler's Laws, Scientific methods	2
4	Tu	2/3	Scales, Space, power of 10 Activity 2: Scale of the Universe	3, A
	Th	2/5	History of the Universe Universe of Matter and Energy, Properties of Light	3
5	Tu	2/10	Radiation, Matter, Energy Activity 3: Light and Spectroscopy	3, A
	Th	2/12	Geology and Life, History of Earth, Habitability of Earth.	4
6	Tu	2/17	The Hadean Earth and the Dawn of Life Climate Regulation and Change	4
	Th	2/19	Exam1	1-4
7	Tu	2/24	Defining Life, Cells, DNA	5
	Th	2/26	Biological revolution, Natural Selection	5
8	Tu	3/3	Metabolism, Life at the Extreme	5
	Th	3/5	Activity 4: Extracting DNA or Observing Tardigrade?	A

Week	DAY	DATE	TOPIC	CHAPTER
9	Tu	3/10	The Origin of Life, Extinction, Human Evolution	6
	Th	3/12	Human Evolution Biological Tour of the Solar System	6,7
10	Tu	3/24	Mars	8
	Th	3/26	Activity 5: Terraforming Mars	A, 8
11	Tu	3/31	Exam 2	5-8
	Th	4/2	Moons of Jupiter and Saturn	9, 10
12	Tu	4/7	Habitability, Habitable Zone, Global Warming	10
	Th	4/9	H-R diagram Detecting extra-solar planets	11
13	Tu	4/14	Detecting extra-solar planets	11
	Th	4/16	Search for Extraterrestrial Intelligence (SETI) Activity 6: Distant Suns and Exo-planets	11, A
14	Tu	4/21	Drake Equation, SETI Project paper due by 12:30 PM	12
	Th	4/23	Activity 7: Drake equation	12, A
15	Tu	4/28	Interstellar travel	13
	Th	4/30	Fermi Paradox Discussions on selected exoplanets	13
16	Tu	5/5	Last lecture, Ending remarks	EC
	Th	5/13	Exam 3	9-13

Notes:

- (1) The lecture
- (2) Read the textbook, activities, and lecture notes for quizzes.
- (3) Pop quizzes are given in class.
- (4) Term project paper is due by 12:30 PM, Apr. 21, 2015, a firm deadline.
- (5) Exams are on Feb. 24, March 31, and May 13.

Tips for the Class

This syllabus serves as the “contract” for this class, so there should be no mystery as to what we can expect from each other. Please read this syllabus carefully and continuously check for updated schedule that will be posted in the d2l class site. Come to class regularly, and come to one of our office hours if you have a question or have trouble understanding certain topics. Keep up with the readings (the textbook and the lectures). You will get a chance to give your opinion on a variety of topics. Get help if you need it. If you miss two weeks of assignments it will be difficult to get the best grade in the class. Group activities work best when everyone contributes. Since you can drop one or two scores for each category of work, no late work will be accepted, and no make up will be offered. With absolute grading, you know what you need to do to get a particular grade on day one and you are not competing with other students. Research project on your own planet should start as soon as you receive the name of your planet. Do not procrastinate until the last moment. Ask for comment for draft of your project writing. Remember to participate actively in class. Always ask questions. Try to think outside the box. The best part of a university education is the chance to think deeply about big questions. Enjoy the class! Let’s have a fun semester to search for life in the universe!

Summary

The summary of most important information you’ll need for the course is summarized below:

- Class:** Tu/Th at Flandrau Planetarium 12:30PM-1:45PM
- Materials:** Textbook: *Life in the Universe* by Bennet & Shotstak (3rd edition)
- Instructor:** Dr. J. Serena Kim (serena00@email.arizona.edu)
 Office Hours: Mondays: 10:30AM - 11:30AM (Steward N330)
 Wednesdays: 1:30PM - 3:30PM (Steward N330)
- TA:** Mr. Youngmin Seo (seo3919@email.arizona.edu)
 Office Hours: Tuesdays: 2:00PM - 4:00PM (Steward Observatory T110)
 Wednesdays: 11:00AM - 12:00PM (Steward Observatory T110)
- Group Activities:** Group activities will be given in class.
 Hand in the group report as a group at the end of the activity.
 You may want to keep your own copy for homework assignments.
- Pop Quizzes and Homework assignment:** Pop quizzes may be given in class.
 The previous week’s homework is due before the lecture starts (to d2l dropbox)
- Grade:** 40% exam , 25% group activities, 15% homework, 10% pop quizzes, 10% project, <5% extra credit
- Grading queries and appeals:** All grade queries or appeals should be done **within a week of work being handed back.**
- Late Work/make-up:** **No late work or makeup** without excused absence, because 1 or 2 lowest scores can be dropped.
- Project:** Final project due by Apr. 16, 2015 (by 12:30PM **before** the class).
you can hand in early, but not late! No late work will be accepted.

Classroom Etiquette

Please read carefully, date, sign, and return it to me or TA today.

In order to foster a good learning environment for the ASTR 202 course, I agree to obey the following rules of etiquette while attending class:

1. I will carefully read the The UA Code of Academic Integrity, and will follow the code.
2. I will respect the instructor, TA, and other students in the classroom.
3. I will not eat food or drink anything other than water in the classroom
4. I will not read the Arizona Daily Wildcat, newspapers, books, or any other materials unrelated to the class while class is in session.
5. I will turn my cell phone (or other mobile devices) OFF while class is in session.
If I am a parent or I am in an emergency situation, I will set my cell phone to VIBRATE.
6. I will not disrupt class by talking to my classmates about non-course-related subjects while the professor is speaking to the class.
7. I will not use my laptop to play movies or games or surf the Internet for non-course-related subjects and sites (e.g.,facebook, twitter) while class is in session.
8. I will make every effort to arrive in class on time and not leave until class is over.
If I must arrive late or leave early, I will not disrupt class or distract my classmates.
9. I will not bring any pets or animals into the classroom (seeing-eye/therapy dogs exempted.)
10. Should I break any of these rules of etiquette which are listed above, I give Dr. Kim full authority to eject me from the classroom.

Date: ____ / ____ / ____

YOUR COPY (KEEP)

Signed,

Print your name

Your signature

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Date: ____ / ____ / ____

Signed,

Print your name

Your signature