ASTR380: Fall 2025
Life in the Universe

Prof: Doug Hamilton
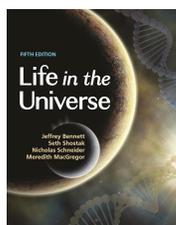Email: Please use the ELMS messaging system
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Class Textbook: *Life in the Universe* by Jeffrey Bennett, Seth Sostak, Nicholas Schneider, and Meredith MacGregor, 5th edition.

Class Web Page: http://www.astro.umd.edu/~hamilton/ASTR380/

Course Description:

The Universe is vast, containing some 100 billion galaxies each containing roughly 100 billion stars, each circled by perhaps 10 planets. That is an unimaginable large 10^{23} planets in the Universe, each one potentially capable of supporting life. We have so many questions!

- Has life originated elsewhere?
- Has it evolved intelligence?
- Have intelligent aliens visited Earth?

This course will tackle these fascinating questions head on, applying relevant scientific understanding from multiple fields. This is a young field but one that is advancing rapidly. The course will investigate many different sources of information to answer fundamental questions about life, such as:

- How did life arise on Earth?
- How do we search for life outside Earth?
- How do we search for intelligent life outside Earth?

This course is intended primarily for juniors and seniors who are not majoring in the physical sciences. We will use a little mathematics in this course and a lot of physical reasoning, and we will use information from

geology, climate science, and biology as well as from astronomy, all sciences that are relevant to the understanding of the origin of life. Your challenge will be to master this diverse and extensive body of knowledge and my goal is to help you accomplish this.

Course Expectations:

Attendance: In order to succeed in this course, I expect you to attend all lectures which will be held in person. Attending class is extremely important - it is by far the best way to learn! The material on the homeworks and exams are based upon the material covered in the lectures and in the text. If you have to miss a lecture be sure to look at the class slides and, ideally, another student's notes to make sure that you understand what was covered. To encourage attendance, there will be questions, in class quizzes, and group work all worth points that can only be earned during class. Your responses will count towards your participation grade in the class.

Preparation: I expect you to be prepared to work. You will understand the lecture more easily if you look again at the previous lecture slides and your class notes before the next class. A careful reading of relevant topics in the textbook is also recommended. Try to make sure that everything is clear and that you do not fall behind. I encourage you to ask questions in class, during office hours, and over ELMS email.

Study Habits: Study wisely and ask for help if you need it. If you just cram the night before the exam, you probably will not do very well. It is better (and easier) if you keep up with the material on a daily basis. Make it a point to read book material in pace with the lectures; this is one of the best study habits you can have. If you have questions, please see me. Prof's Tip: Before each exam, make several pages of condensed notes summarizing the class! By doing this, you find areas that you need to know more about. This is an excellent way to begin your studying!

Grading:

I grade on a point scale with different assignments weighted as shown in the table.

ASSIGNMENT	Homework	Exam I	Exam II	Participation	Final	Total
POINTS	100	100	100	100	200	600

Letter grades will be assigned based upon your curved cumulative score. Here is how your grade will be determined from your point total in the class.

Letter Grade	Course Total	Percentage
A	540-600	90%-100%
B	480-539	80%-89%
C	408-479	68%-79%
D	330-407	55%-67%
F	0-384	0%-54%

The point scale makes it possible for everyone in the class to do well. For example, if everyone scores above

80% in the course, you would all receive either a B- or better letter grade. I do use +/- modifiers - you will get a "+" if you are in roughly the upper 1/3 of students with the same letter grade and a "-" if you are in the lower 1/3. I may adjust the number of points required to get a given grade depending on the class averages; however, any adjustment will make it easier to get a given grade, never more difficult. You can monitor my current estimate of your grade from the class webpage as the semester progresses.

Exams

There will be two in-class midterm exams. These exams are closed book with no printed material allowed. Tests will be online, so be sure to bring a laptop on test days. The exams emphasize understanding of concepts rather than memorization and, accordingly, you may bring a single page of your handwritten notes (front and back) to refer to during the exam. Each exam will consist of short answer questions, numerical questions, and essay questions. These exams allow you to show how well you are keeping up with the class material. If for whatever reason, the University is *officially* closed on the exam date, the exam date shifts to the next lecture date.

According to University rules, **the final exam for this course will be held on Friday, Dec. 19 from 4:00pm to 6:00pm in our classroom.** This final exam is cumulative, that is, it will cover *all* material discussed in this course. However, since some material will not be covered by the midterm exams (see Lecture Schedule), *the weight on that material will be higher.* The final will include short answer, essay, and problem solving questions with the exact combination to be determined. This exam, like the midterms, are online. The only external resources allowed are three pages (front and back) of handwritten notes.

Missed Exams

If you are not able to take an exam due to illness or other legitimate reasons (as outlined in the Academic Info section of the schedule of classes) and you wish to take a make-up exam, you must

> 1) contact me by ELMS email **before** you miss the regularly-scheduled exam and
> 2) submit a valid written excuse for your absence **within one week** after the regularly-scheduled exam. All missed exams must be made up promptly, normally within a week.

Homeworks

There are a number of homework assignments in this course. All homeworks will be made available from ELMS, will be turned in there, and will be graded and returned to you there as well. Assignments are always due at 11:59pm, with a several hour grace period. Late homeworks will be assessed a late penalty; to avoid this, feel free to turn your homework in early. Multiple submissions will be supported - we will grade the last one submitted by the deadline. If necessary, please convert things to PDF format before turning them in on ELMS.

Although you may discuss the homework problems with your friends, the final writeup must be in your own words. Copying from a friend's homework, a book, a website, allowing a friend to copy your homework, and/ or mindlessly using ChatGPT or the equivalent is academic dishonesty and will not be tolerated in this class. If you consult a reference other than the course text, please acknowledge it in your homework - this includes websites!

Participation

A significant part of your grade will be based on your in class participation. Many things will count toward this score including interactive and individual work done in class, attendance as measured by bonus point questions and in class activities, and attentiveness and interactivity during class. The best way to succeed in any class is to attend and pay attention to lecture, to read the book, and to think critically about the course material. Participation points are designed to encourage these activities. Phones and the internet are distractors in class and have been demonstrated to lead to poorer academic performance. I will do my best to make the class periods lively, informative, and entertaining - please do your part by turning your devices off and focusing your attention on the class.

Extra Credit

There will be no extra credit papers or projects. The best way to earn extra credit in this class is:

- Attend Class: So important! And I almost always ask questions worth bonus points during lectures.

Academic Integrity

The University of Maryland, College Park has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student you are responsible for upholding these standards for this course. It is very important for you to be aware of the definitions and consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the Code of Academic Integrity or the Student Honor Council, please visit http://www.shc.umd.edu/SHC/Default.aspx; pay particular attention to the links for students. **We are very serious about this.**

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ASTR380 LECTURE SCHEDULE

Lecture Date	Lecture Topic	Reading
Tue. Sep. 2	Introduction to Astrobiology	1.1 - 1.4
Thu. Sep. 4	Space	3.1 & 3.2
Tue. Sep. 9	Light	3.3
Thu. Sep. 11	Matter	3.3
Tue. Sep. 16	Earth	4.1 & 4.2
Thu. Sep. 18	Climate	4.5
Tue. Sep. 23	Life Introduction	5.1 & 5.2
Thu. Sep. 25	Life Mechanics	5.3 & 5.4
Tue. Sep. 30	Life Origins	6.1 & 6.2
Thu. Oct. 2	Life Natural History	6.3 - 6.5
Tue. Oct. 7	Life Extreme	5.5
Thu. Oct. 9	**EXAM I**	
Tue. Oct. 14	**FALL BREAK!!**	
Thu. Oct. 16	Solar System	3.4
Tue. Oct. 21	Solar System Habitability	7.1 - 7.3
Thu. Oct. 23	Life and Mars	8.1 & 8.2
Tue. Oct. 28	Life and the Jovian Moons	9.1 & 9.2
Thu. Oct. 30	Solar System Exploration	7.4
Tue. Nov. 4	Habitability	10.1 - 10.4
Thu. Nov. 6	Stars	11.1
Tue. Nov. 11	Finding Planets	11.2
Thu. Nov. 13	**EXAM II**	
Tue. Nov. 18	Exoplanets	11.3
Thu. Nov. 20	Intelligent Life	12.1
Tue. Nov. 25	Drake Equation	12.2
Thu. Nov. 27	**THANKSGIVING!**	
Tue. Dec. 2	SETI	12.3
Thu. Dec. 4	Interstellar Travel	13.1 & 13.2
Tue. Dec. 9	Colonization Fermi	13.3
Thu. Dec. 11	Speculations	13.4
Fri. Dec. 19	**FINAL EXAM** (4:00pm-6:00pm)	