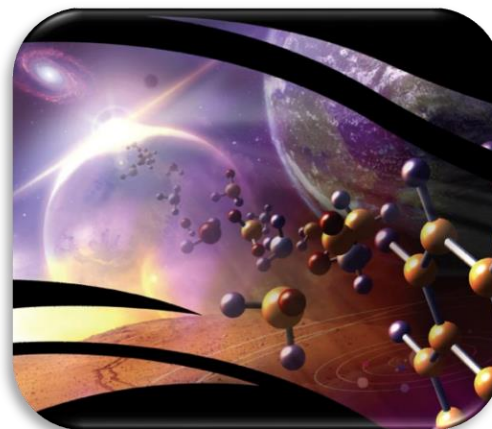


**Astrobiology Seminar- Special Topics
(GLY 4930/6932) Syllabus
Spring 2021
W 9:35 – 12:05 Williamson 210**



Contact Information

Instructor: Dr. Amy Williams
Email: amywilliams1@ufl.edu
Office: Williamson Hall 270
Phone: 352-273-1284
Department Mailbox: WM 241
Office Hours: To be determined at the first class meeting –
Or by appointment Monday through Friday

Required Text

❖ Readings and materials on Canvas

Catalog Course Description

Is there life beyond Earth? Astrobiology is a new, multidisciplinary field of science encompassing astronomy, biology, microbiology, biochemistry, genomics, chemistry, atmospheric chemistry, geochemistry, paleontology, geology, and many other fields of science and technology. Astrobiology includes the study of the origin of habitable planets, origin of life, the connections between the evolution of life and of environments, the potential for life and life's actual distribution in our solar system and beyond, and future of life on Earth and in space. Students will expand their knowledge base beyond their discipline while considering such issues as the origins of stars and planets, environmental conditions of the prebiotic Earth, the origin of life on Earth, the nature of the universal "tree of life", the establishment of evolutionary patterns and rates, the causes of global glaciations and their use as analogues for life on planets or moons such as Europa, how life survives in extreme environments on Earth, what determines planetary habitability, how planets in other solar systems are detected, and how we might detect life on other planets.

Course Objectives

- 1) Students will explore the primary literature in the field of Astrobiology by learning to effectively analyze peer-reviewed journal articles, synthesizing primary data to understand the state of the art in Astrobiology and the existing 'known unknowns' in the field, and applying that knowledge to interpreting the conditions in modern and ancient environments on and beyond Earth.
- 2) Students will learn about a variety of techniques for the collection and study of astrobiological data.
- 3) Students will synthesize data from the literature to develop a conceptual model for how life is preserved and detected in the geologic and fossil record, what makes a planet habitable, and how likely it is that life exists there.

Grading

The final course grade will be calculated using the following system:

IN CLASS PARTICIPATION	10%
PAPER PRESENTATIONS	20%
LITERATURE CRITIQUES	30%
ANNOTATED BIBLIOGRAPHY	10%
FINAL TERM PAPER	30%
	100% TOTAL

Grading Scheme:

	A = 94.0-100%	A- = 90.0-93.9%
B+ = 87.0-89.9%	B = 84.0-86.9%	B- = 80.0-83.9%
C+ = 77.0-79.9%	C = 70.0-76.9%	
D+ = 67.0-69.9%	D = 64.0-66.9%	D- = 60.0-63.9%
F = below 60.0%		

More information on grades and grading policies is here:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>.

In Class Participation: As this is a seminar/ discussion class, participation in the discussion is essential. Therefore, everyone is required to substantively contribute to the discussion during class.

Paper Presentations: This seminar focuses on the evaluation of primary literature from the field of astrobiology. To support the deep assessment of the literature, every student will take responsibility for presenting at least one journal article to the class in powerpoint format, describing the nature of the article, the findings, and any relevant supplemental material, including any external sources or materials needed to fully explain the article. Presentations and their relevant discuss are expected to take >1 hour. You are not required to submit a literature critique on the paper that you present to the class.

Literature Critiques: We will discuss peer-reviewed journal articles during the term. These articles will be posted on Canvas in advance of the scheduled discussion. The goal of these assignments is to increase your familiarity with the scientific literature and to begin to assess and recognize the components of a good scientific paper. The entire class will read a scientific paper and each student will write a two-page summary of the article before class. During part of designated course periods, we will discuss the paper as a class.

Each person will help lead the discussion on at least one paper during the semester AND write up a full critique that will identify the main points of the paper and discuss the strengths and weaknesses of the work. Details of the full write up are forthcoming. Each critique should be no longer than two pages, 1.5 line spacing, 1" margins, typed, and 12 point Times New Roman font.

Written Term Papers: At the end of the term, students will submit an individual term paper. An annotated bibliography is due early in the semester to Canvas in which you will compile a minimum of 10 peer-reviewed, relatively recent (post-2000) most-important publications on the topic of your paper and provide at least four sentences describing the subject and findings of each paper. A draft outline of this term paper is due mid-semester to Canvas. Details of the draft requirements are forthcoming. The final individual paper is due at the end of the semester to Canvas. **Graduate Student Term Papers** will have a longer paper length requirement and more required citations.

Lecture Schedule: The schedule for lecture topics and reading assignments is below, and posted separately on Canvas.

Class Policies

Zoom sessions are to be recorded. Our class sessions may be audio visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

Course communication: Necessary course materials, in addition to the required text, will be available on Canvas. You are responsible for anything sent by the instructor via email or posted on Canvas. All email communication will be sent to university email accounts; you are responsible for checking your university email account at least daily. In most cases allow 24 hours for an email response from me (and longer over weekends).

I am happy to meet during office hours if you have questions, and if those times do not work, please e-mail me to set up another time for us to meet. You are also welcome to email me with questions. *To help me distinguish your emails from those coming in from other classes, add "GLY 4930/6932" to the start of your subject line. Please use best practices in your email to me (and all faculty)—this includes signing off with your name, using full sentences, and not using text shorthand. This conveys an important sense of professionalism that is worth practicing for future jobs.*

Attendance: Students are expected to attend all lectures as scheduled. Students are also advised to read each assignment prior to its discussion in class. If you miss a lecture, you should get notes from a classmate. I will not provide notes or a summary of the class. There are no make-up assignments except for documented medical or personal emergencies. If this situation is applicable to you, contact me as soon as possible (amywilliams1@ufl.edu) or notify the Department Administrative Assistant (352-392-2231).

Late or Missed Assignments: *There will be no make-up assignments without either prior approval or an official documented excuse.* Late assignments will be penalized 10% if they are turned in after the due date, and 10% more for each subsequent day—no exceptions. If you turn assignments in to my mailbox, please send me an e-mail telling me as much, else I will mark it late based on when I find it. I do not go to my mailbox daily. Requirements for class attendance and make-up assignments, and other work in this course are consistent with university policies that can be found at: <https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>.

Electronic Devices: Cell phones and other communication devices must be set to silent or turned off. Calls cannot be made or accepted during class, and texting is not permitted.

University Honesty Policy: UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code." On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Withdrawal Policy: Students may withdraw from the course with the grade of W at any time prior to and including Friday, April 12, 2024.

Students with Disabilities: Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, www.dso.ufl.edu/drc/) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Counseling and Wellness Center: Contact information for the Counseling and Wellness Center: <http://www.counseling.ufl.edu/cwc/Default.aspx>, 352-392-1575; and the University Police Department: 352-392-1111 or 9-1-1 for emergencies.

Course Evaluation: Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance

on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

Course Materials Bibliography

1. Nutman, A. P., Bennett, V. C., Friend, C. R. L., Van Kranendonk, M. J. & Chivas, A. R. Rapid emergence of life shown by discovery of 3,700-million-year-old microbial structures. *Nature* **537**, 535–538 (2016).
2. Allwood, A. C., Rosing, M. T., Flannery, D. T., Hurowitz, J. A. & Heirwegh, C. M. Reassessing evidence of life in 3,700-million-year-old rocks of Greenland. *Nature* (2018) doi:10.1038/s41586-018-0610-4.
3. Guzman, M. *et al.* Identification of Chlorobenzene in the Viking Gas Chromatograph-Mass Spectrometer Data Sets: Reanalysis of Viking Mission Data Consistent With Aromatic Organic Compounds on Mars. *J. Geophys. Res. Planets* **123**, 1674–1683 (2018).
4. Klein, H. P. The viking biological investigations: review and status. *Orig. Life* **9**, 157–160 (1978).
5. McKay, D. S. *et al.* Search for past life on Mars: Possible relic biogenic activity in martian meteorite ALH84001. *Science (80-.)*. **273**, 924–930 (1996).
6. Bradley, J. P., Harvey, R. P. & McSween Jr., H. Y. No ‘nanofossils’ in martian meteorite. *Science (80-.)*. **390**, 454–465 (1997).
7. Wolfe-Simon, F. *et al.* A Bacterium That Can Grow by Using Arsenic Instead of Phosphorus. *Science (80-.)*. **332**, 1163 LP – 1166 (2011).
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9. Webster, C. R. *et al.* Background levels of methane in Mars’ atmosphere show strong seasonal variations. *Science (80-.)*. **360**, 1093–1096 (2018).
10. Korabev, O. *et al.* No detection of methane on Mars from early ExoMars Trace Gas Orbiter observations. *Nature* **568**, 517–520 (2019).
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12. Fairén, A. G. A cold and wet Mars. *Icarus* **208**, 165–175 (2010).
13. Hynek, B. The great climate paradox of ancient Mars. *Geology* **44**, 879–880 (2016).
14. Joseph, R. G. *et al.* Oceans, Lakes, and Stromatolites on Mars. *Adv. Astron.* **2020**, (2020).
15. Noffke, N. Ancient sedimentary structures in the <3.7 ga gillespie lake member, mars, that resemble macroscopic morphology, spatial associations, and temporal succession in terrestrial microbialites. *Astrobiology* **15**, 169–192 (2015).
16. Greaves, J. S. *et al.* Phosphine gas in the cloud decks of Venus. *Nat. Astron.* (2020) doi:10.1038/s41550-020-1174-4.
17. Snellen, I. A. G., Guzman-Ramirez, L., Hogerheijde, M. R., Hygate, A. P. S. & Van Der Tak, F. F. S. Re-analysis of the 267 GHz ALMA observations of Venus: No statistically significant detection of phosphine. *Astron. Astrophys.* **644**, 2018–2021 (2020).
18. Martin, A. & McMin, A. Sea ice, extremophiles and life on extra-terrestrial ocean worlds. *Int. J. Astrobiol.* **17**, 1–16 (2017).
19. Hand, K. P. & German, C. R. Exploring ocean worlds on Earth and beyond. *Nat. Geosci.* **11**, 2–4 (2018).
20. Harp, G. R., Gray, R. H., Richards, J., Shostak, G. S. & Tarter, J. C. An ATA Search for a Repetition of the Wow Signal. *Astron. J.* **160**, 162 (2020).
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- Assessing Biogenicity. *Astrobiology* **21**, 1–14 (2020).
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27. Lo Sapiro, L. The ethics of astrobiology: Humanity's place in the cosmos and the extinction problem . *Frontiers in Astronomy and Space Sciences* vol. 9 at <https://www.frontiersin.org/articles/10.3389/fspas.2022.1008265> (2022).

Tentative Schedule

Week	Date	Topic	Guest Speaker - TBA
1	10-Jan	Astrobiology intro & how to read a scientific journal article	
2	17-Jan	Early life on Earth ^{1,2}	
3	24-Jan	The Search for Life on Mars: Viking results ^{3,4}	
4	31-Jan	Fossil life in Martian meteorites? The birth of the NASA Astrobiology program ^{5,6}	
5	7-Feb	Extreme Life on Earth: Arsenic Life? ^{7,8}	
6	14-Feb	Methane on Mars ⁹⁻¹¹	
7	21-Feb	Martian Habitability ^{12,13}	
8	28-Feb	Fringe science ^{14,15}	
9	6-Mar	Venusian Life ^{16,17}	
		Spring Break	
10	20-Mar	Ocean Worlds ^{18,19} → ONLINE	
11	27-Mar	ET Phone Earth? ²⁰	
12	3-Apr	Habitability of Extrasolar Planets ^{21,22}	
13	10-Apr	Drake Equation & the Rare Earth Hypothesis ^{23,24}	
14	17-Apr	Life as we don't know it ^{25,26}	
15	24-Apr	The Ethics of Astrobiology ²⁷	

**** This schedule is subject to change with appropriate prior notification. ****