

STUDENT WARNING: This course syllabus is from a previous semester archive and serves only as a preparatory reference. Please use this syllabus as a reference only until the professor opens the classroom and you have access to the updated course syllabus. Please do NOT purchase any books or start any work based on this syllabus; this syllabus may NOT be the one that your individual instructor uses for a course that has not yet started. If you need to verify course textbooks, please refer to the online course description through your student portal. This syllabus is proprietary material of APUS.

American Public University System

The Ultimate Advantage is an Educated Mind

School of Science, Technology, Engineering & Math

Course Number: SPST 342

Course Name: Habitable Worlds

Credit Hours: 3

Length of Course: 8 weeks

Prerequisite: MATH111, SCIN 261

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Instructor Information

Instructor: **instructor name**

Email: **instructor email**

(use only if you do not have access to the classroom...otherwise all written discussion regarding this class should use the Messages link in the classroom)

Office Hours: See Syllabus link in classroom

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Course Description

This course focuses on the concept of habitability and the search for habitable conditions in our galaxy. Students will learn about the requirements for life and the conditions for circumstellar and galactic habitable zones. They will explore the possibility of life both within our solar system and on planets that orbit other stars, known as exoplanets. Students will study the Drake equation and use this important tool to understand the conditions for the development of intelligent life elsewhere in the universe. They will consider the differences between primitive and intelligent life, and current efforts to search for both. Completion of at least college algebra prior to taking this course is highly recommended. SCIN 261 is a pre-requisite for this course.

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Course Scope

This course is intended for students in the Astronomy concentration of the Space Studies program. The course will begin by considering the conditions necessary for life to develop as well as the requirements for both circumstellar and galactic habitable zones. It will analyze the differences in habitable lifetimes as well as conditions in circumstellar habitable zones for different types of stars. This course will explore the differences between searching for primitive vs intelligent life and will focus on the role of the Drake equation in estimating the possibility of finding intelligent life elsewhere in the universe. The course will consider the existence of life in extreme environments on earth and apply this knowledge to the possibility of finding life on other planets or moons within our Solar System. It will take an in depth look at current exoplanet observations, including the TRAPPIST system and other detections of Earth-like planets. Finally, the course will cover the ways in which we search for life, including both NASA missions such as the Mars rovers and space telescopes, as well as private endeavors like SETI. It will also give students the opportunity to analyze exoplanet data by working with images from the APUS telescope Exoplanet Detection research program.

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Course Objectives

Upon successful completion of this course students will be able to:

1. Identify the conditions necessary for life to develop and thrive. (CO1)
2. Describe the requirements of circumstellar habitable zones. (CO2)
3. Compare habitable lifetimes and conditions in circumstellar habitable zones for stars of different masses and types. (CO3)
4. State the Drake equation and define each of the components of the equation. (CO4)
5. Extrapolate conditions of extreme environments on Earth to the planets and moons of the Solar System. (CO5)
6. Analyze currently known exoplanet systems for the possibility of habitable conditions. (CO6)
7. Describe the telescope and rover missions to search for life. (CO7)
8. Analyze telescope data to detect exoplanets and determine their properties. (CO8)

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Course Delivery Method

This course delivered via distance learning will enable students to complete academic work in a flexible manner, completely online. Course materials and access to an online learning management system will be made available to each student. Online assignments are due by Sunday evening of the week as noted and include Forum questions (accomplished in groups through a threaded forum), examination, and individual assignments submitted for review by the Faculty Member). Assigned faculty will support the students throughout this eight-week course.

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Course Resources

Life Beyond Earth: The Search for Habitable Worlds in the Universe

Athena Coustenis and Therese Encrenaz

Cambridge University Press October 28, 2013.

- ISBN-10: 1107026172
- ISBN-13: 978-1107026179

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Evaluation Procedures and Grading

Reading Assignments: Weekly reading assignments are notes in the lessons. Make sure you complete the readings before accomplishing any other assignment.

Introduction Forum Assignment: In week 1, you are required to post in the introductions forum, and the post must be at least 250 words to meet the APUS-wide requirement. Details about this posting are in the description at the top of that forum. This assignment is worth 1% of your course grade.

Forum Assignments: You have seven forum assignments in the course (other than the Introduction Forum). You are required to post your own response to the prompt and to respond to at least two of your classmates. Your main post must be at least 200 words, and your responses must be substantive (not merely saying "Good post"). Each forum assignment is worth 2% of your course grade. Main posts are due on Thursday at midnight Eastern time. Responses are due by Sunday at midnight Eastern time.

Laboratory assignment: There are two laboratory projects in the class, which combined account for 30% of your grade. These are designed to help you deepen your understanding of the concepts in the class, and also give you experience working with real astronomical data relating to exoplanet detections and analysis. Each laboratory submission should include a formal writeup that presents your data in a professional, scientific manner. The website below provides an excellent overview of what a complete laboratory report should contain:
<https://libguides.lmu.edu/c.php?g=324079&p=2174135>

1. Lab 1: Using the data in the website “exoplanets.org,” develop a meaningful research question regarding the exoplanets in the database. Your research question should investigate an aspect of exoplanets that either pertains to finding exoplanets in the galaxy or evaluating exoplanets in order to identify promising candidates for the development of life. Use the data in the website to answer your proposed hypothesis and present your results in a scientific laboratory report.
2. Lab 2: Data will be provided (courtesy of the APUS telescope) which shows the dip in the light curve of the parent star caused by its transiting planet. Use this data to determine the size of the planet. Present your results in a scientific laboratory report and present a concise, well-evidenced argument for whether or not the exoplanet is a likely candidate for the development of life.

Research Papers: There will be one research paper in the class, which accounts for 30% of your grade. The paper provides an opportunity for you to develop a deeper understanding of the topics covered in the class as well as the chance to develop writing and research skills. The paper should be written in APA format and should reflect a formal, scientific report style. The use of first/second person in the paper is inappropriate, as is “flowery” writing. The paper should be well researched but should reflect your own understanding of the material; the overuse of quotes will be penalized. Sources from the paper should be reliable; the use of Wikipedia or similar sites is not allowed. Some science news sites may be used, but the bulk of the references should come from scientific research papers. The APUS library is a great resource for finding appropriate works as well as receiving help with punctuation/grammar/etc (see [Writing@APUS](#)).

1. **Paper 1:** Which of the objects described in this class represents the most promising candidate for the development of life? Describe your choice and present an evidence-based argument in support of your choice in a 6-8 page research paper.

Exams: There will be a midterm and a final exam in this class. The midterm exam, in week 5, will be worth 10% of your course grade. The final exam, in week 8, will be cumulative, and will be worth 15% of your course grade. Both exams are **open book**, but you may not receive help from another person during the exam or any other resources (including web resources) except your own notes. This is on the honor system, and you are expected to act accordingly. Short answer questions should be answered in your own words, not copied from the text or any other source. Academic dishonesty of any kind on either exam will be grounds for failure for the course.

Late Work: Late work will not be accepted without prior approval by the professor. Late work, if approved, must be submitted no more than one week beyond the original due date. The table below shows the points for each assignment.

Assignments	% of Course Grade
Introduction Forum	1%
Forum Assignments (7)	14%
Labs (2)	30%
Research Paper (1)	30%

Midterm Exam	10%
Final Exam	15%
Total Course Points	100%

Please see the [Student Handbook](#) to reference the University's [grading scale](#).

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8 – Week Course Outline

Please see the table below for the weekly readings and assignments.

<u>Week</u>	<u>Topic</u>	<u>Readings</u>	<u>Assignment</u>
1	What is Life?	Text Reading: <i>Life Beyond Earth, Chapter 1 and Chapter 2, sections 2.1</i>	Introductions Forum Post Lab 1: hypothesis due
2	Habitable Worlds	Text Reading: <i>Life Beyond Earth, Chapter 2, sections 2.2-2.4</i>	Week 2 Forum Paper 1 topic sentence/outline due
3	Terrestrial Worlds	Text Reading: <i>Life Beyond Earth, Chapter 3</i>	Week 3 Forum Lab 1 due
4	Water & Ice Moons	Text Reading: <i>Life Beyond Earth, Chapter 4, sections 4.1 & 4.2</i>	Week 4 Forum Midterm Exam
5			Week 5 forum

	Titan & Beyond	Text Reading: <i>Life Beyond Earth, Chapter 4, sections 4.3-4.5</i>	Paper 1: Annotated bibliography due
6	Detecting Exoplanets	Text Reading: <i>Life Beyond Earth, Chapter 5, section 5.1</i>	Week 6 forum Lab 2 due
7	Exoplanetary Systems	Text Reading: <i>Life Beyond Earth, Chapter 5, sections 5.2-5.3</i>	Week 7 Forum Paper 1 due
8	Detecting Life/SETI	Text Reading: <i>Life Beyond Earth, Chapter 6</i>	Week 8 Forum Final Exam

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Policies

Please see the [Student Handbook](#) to reference all University policies. Quick links to frequently asked question about policies are listed below.

[Drop/Withdrawal Policy](#)

[Plagiarism Policy](#)

[Extension Process and Policy](#)

[Disability Accommodations](#)

Writing Expectations

All written submissions should be submitted in a font and page set-up that is readable and neat. It is recommended that students try to adhere to a consistent format, such as that described below.

- Typewritten in double-spaced format with a readable style and font and submitted inside the electronic classroom (unless classroom access is not possible and other arrangements have been approved by the professor).
- 11 or 12-point font in a style such as Arial, Helvetica or Times New Roman.

Citation and Reference Style

Assignments completed in a narrative essay or composition format must follow a widely accepted citation style, such as APA, Turabian or MLA. Please refer to the APUS Online Library for further examples, or contact the instructor with questions.

Late Assignments

Students are expected to submit classroom assignments by the posted due date and to complete the course according to the published class schedule. As adults, students, and working professionals, I understand you must manage competing demands on your time. Should you need additional time to complete an assignment, please contact me **before the due date** so we can discuss the situation and determine an acceptable resolution. Routine submission of late assignments is unacceptable and may result in points deducted from your final course grade.

Netiquette

Online universities promote the advancement of knowledge through positive and constructive debate – both inside and outside the classroom. Forums on the Internet, however, can occasionally degenerate into needless insults and “flaming.” Such activity and the loss of good manners are not acceptable in a university setting – basic academic rules of good behavior and proper “Netiquette” must persist. Remember that you are in a place for the rewards and excitement of learning which does not include descent to personal attacks or student attempts to stifle the Forum of others.

- **Technology Limitations:** While you should feel free to explore the full range of creative composition in your formal papers, keep e-mail layouts simple. The Sakai classroom may not fully support MIME or HTML encoded messages, which means that bold face, italics, underlining, and a variety of color-coding or other visual effects will not translate in your e-mail messages.
- **Humor Note:** Despite the best of intentions, jokes and especially satire can easily get lost or taken seriously. If you feel the need for humor, you may wish to add “emoticons” to help alert your readers: ;-), :), ☐

Disclaimer Statement

Course content may vary from the outline to meet the needs of this particular group.

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Online Library

The Online Library is available to enrolled students and faculty from inside the electronic campus. This is your starting point for access to online books, subscription periodicals, and Web resources that are designed to support your classes and generally not available through search engines on the open Web. In addition, the Online Library provides access to special learning resources, which the University has contracted to assist with your studies. Questions can be directed to librarian@apus.edu.

- **Charles Town Library and Inter Library Loan:** The University maintains a special library with a limited number of supporting volumes, collection of our professors’ publication, and services to search and borrow research books and articles from other libraries.

- **Electronic Books:** You can use the online library to uncover and download over 50,000 titles, which have been scanned and made available in electronic format.
- **Electronic Journals:** The University provides access to over 12,000 journals, which are available in electronic form and only through limited subscription services.
- **Tutor.com:** AMU and APU Civilian & Coast Guard students are eligible for 10 free hours of tutoring provided by APUS. [Tutor.com](http://tutor.com) connects you with a professional tutor online 24/7 to provide help with assignments, studying, test prep, resume writing, and more. Tutor.com is tutoring the way it was meant to be. You get expert tutoring whenever you need help, and you work one-to-one with your tutor in your online classroom on your specific problem until it is done.

Library Guide (<http://apus.campusguides.com/SCIN134>)

The AMU/APU Library Guides provide access to collections of trusted sites on the Open Web and licensed resources on the Deep Web. This course guide provides links to a number of sources relevant to this course, including journals, books, and web sites. Also, you can directly contact the librarian assigned to this course for assistance in locating information.

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