Course Syllabus: AST 248 The Search for Life in the Universe 2020-2021

A study of the role of science in modern society through investigation of the question: Does life exist elsewhere in the universe? Topics include a review of the astronomical and biological settings; the origin of life on the earth and possibly elsewhere; the evolution of life and the development of intelligence and technology. Also discussed are the ramifications of the development of life and intelligence for the atmosphere and the biosphere. *Prerequisite:* One D.E.C. E or SNW course. Satisfies DEC: H and SBC: STAS. *3 credits.*

Instructor:	Prof. Alan Calder alan.calder@stonybrook.edu Online	T.A.:	TBA tba@stonybrook.edu Online

Undergrad TA : TBA, tba@stonybrook.edu, Online

Meeting: Tuesday and Thursday 1:15 PM – 2:35 PM, via Zoom.

Office Hours: Calder: Mon. 10:30–12:00 AM, Wed. 2:30–4:00 PM, and by appointment.
TA: Three hours weekly TBA and questions by email.
Undergrad TA: Three hours weekly TBA and questions by email.
Note that all office hours will be held online via videoconferencing.

Text: *Life in the Universe* (4th edition) by Bennett and Shostak.

Evaluation: 30% Two hour exams, 30% Homework, and 40% Final exam. Grades will be posted on Blackboard. The instructor will discuss grades during office hours but for privacy reasons will not report or discuss grades via email.

Homework: Homework will be assigned most weeks and will be due the following week. Late homework will not be accepted without prior permission.

Lectures: Lectures will be held at the scheduled time and broadcast live on the internets. The lectures will be recorded and made available to the students along with the lecture slides.

Exams: Two hour exams and one final exam. The final exam will be held as scheduled by the Registrar. Details concerning exams are provided below.

Learning Goals for AST 248: The Stony Brook Curriculum Certification for AST248 is STAS, "Understand Relationships between Science or Technology and the Arts, Humanities, or Social Sciences." STAS learning outcomes are

1. Apply concepts and tools drawn from any field of study in order to understand the links between science or technology and the arts, humanities or social sciences.

2. Synthesize quantitative and/or technical information and qualitative information to make informed judgments about the reciprocal relationship between science or technology and the arts, humanities or social sciences.

AST 248 meets these by combining study of astronomy and biology to understand life as we know it, its origin and evolution, and where we might expect to find it. Then the course applies this understanding to take a scientific look at the possibility of life elsewhere in the Universe, including technologically advanced civilizations, and the implication of a discovery. Specifically, the learning goals for AST 248 are

- To understand basic astronomy, stars, and the solar system, including the geology, climate and evolution of planets and exo-planets.

- To understand the basic biology of life as we know it and the origin and evolution of life on the Earth.

- To understand the concept of disaggregation and apply it to considering the possibility of extraterrestrial life, including extraterrestrial intelligence and advanced extraterrestrial civilizations, through the Drake Equation for estimating the number of communicating civilizations in the galaxy.

- To study the impact of science and technology, including the discovery of extraterrestrial life and intelligence, on society.

Examination Policies: Missed exams may not be made up! With advance notice and/or careful documentation of extenuating circumstances, an exam may be excused or accommodations made.

The times and dates of exams will scheduled and announced at the beginning of the semester. Administration of the exams will be according to policies and recommendations implemented by Stony Brook University. As of this writing, policies have not been announced other than the expectation that exams will be online and at least the final exams will be proctored through an independent testing service under contract to the University.

As of this writing, plans for examinations are as follows but, again, plans are subject to change in the event of additional University guidance. Midterms will be held online at class time on the appointed dates and given via either Blackboard or the University contracted testing service. The final exam will be given online at the appointed data and time set by the University Registrar. The final exam will be given according to the policy established between the University and the contracted testing service.

Academic Integrity: Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Any suspected instance of academic dishonesty will be reported to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at

http://www.stonybrook.edu/uaa/academicjudiciary/

Exams will contain the following best-practices policy statement students are expected to abide by:

> Academic integrity is expected of all students at all times, whether in the presence or absence of members of the faculty. Understanding this, I declare that I shall not give, use, or receive unauthorized aid in this examination. I have been warned that any suspected instance of academic dishonesty will be reported to the appropriate office and that I will be subjected to the maximum possible penalty permitted under University guidelines.

Critical Incident Management: Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the University Police and the Office of University Community Standards any serious disruptive behavior that interrupts teaching, compromises the safety of the learning environment, and/or inhibits students' ability to learn. See more here: http://www.stonybrook.edu/sb/behavior.shtml

Electronic Communication: Email to University email accounts is an important way of communicating for this course. General messages will be sent via email from Blackboard. For most students the email address is 'firstname.lastname@stonybrook.edu', and the account can be accessed here: http://www.stonybrook.edu/mycloud. **It is the student's responsibility to read email received at this account.** For instructions about how to verify a University email address see this: http://it.stonybrook.edu/help/kb/checking-or-changing-your-mail-forwarding-address-in-the-epo. One can set up email forwarding using instructions here: http://it.stonybrook.edu/help/kb/setting-up-mail-forwarding-in-google-mail. If one chooses to forward University email to another account, the University is not responsible for any undeliverable messages.

Religious Observances: See the policy statement regarding religious holidays at http://www.stonybrook.edu/registrar/forms/RelHolPol%20081612%20cr.pdf. Students are expected to notify the course professors by email of their intention to take time out for religious observance. This should be done as soon as possible but definitely before the end of the 'add/drop' period. At that time they can discuss with the instructor(s) how they will be able to make up the work covered.

Disabilities: If you have a physical, psychiatric/emotional, medical or learning disability that may impact on your ability to carry out assigned course work, you should contact the staff in the Disability Support Services office [DSS], 632-6748/9. DSS will review your concerns and determine, with you, what accommodations are necessary and appropriate. All information and documentation of disability is confidential.

Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Disability Support Services. For procedures and information go to the website http://www.sunysb.edu/ehs/fire/disabilities.shtml.

Technical requirements: This course will use Blackboard for communication between faculty and students, submission of assignments, and posting of grades and feedback. The Blackboard course site can be accessed at https://blackboard.stonybrook.edu If you are unsure of your NetID, visit https://it.stonybrook.edu/help/kb/finding-your-netid-and-password for more information.

Lectures will be delivered by Zoom and recorded. Students may participate in the lectures with a computer or device of sufficient capability connected to the Internets that has a camera and/or microphone or by telephone. Recordings may be accessed by a network-enabled device with video playback capabilities.

Homework will be submitted electronically to blackboard, and students will upload documents in PDF format. Exams will be given in accordance with University policy, which will dictate the technical requirements.

Students are responsible for having a reliable computer and internet connection throughout the term. Caution! Students will be at a disadvantage if they attempt to complete all course-work on a smart phone or tablet. It may not be possible to submit the files required for homework assignments or take exams.

The instructor is hesitant to recommend particulars about a suitable computer for this course. A fairly new laptop or desktop with a modern system actively supported with system updates and patches, particularly for security, should suffice.

Note that the lecture topics are subject to some change depending on progress of the class. Exam dates will not change.

Lecture #	**chapter**[a]	**topic**
1	1, 3 pp. 50-60, 80-86	Introduction I (Solar System, Astronomy)
2	1, 3	Introduction II (Life in the Universe)
3	2	Ancients
4	2	Greats of Astronomy
5	3	Nature of the Universe
6	3	Matter and Energy
7	4	Geologic History of Earth
8	4	Geology and Habitability
9	5	Life on Earth
10	5	Extremophiles
11	6	Origin of Life on Earth
12	6	Evolution of Life on Earth
13	7	Environmental Requirements of Life
14	7	Biological Tour of Solar System
15	8	Mars I
16	8	Mars II
17	9	Jovian Moons I
18	9	Jovian Moons II
19	10	Habitability
20	10	Evolution of Habitability
21	11	Stars
22	11	Extrasolar Planets
23	12	Drake Equation
24	12	SETI
25	13	Interstellar Travel
26	13	Fermi's Paradox
Final	TBA[b]	

[a] Be sure to read the assigned reading before each class!

[b] Nota Bene: The ultimate authority on the date and time of the final is the Registrar. Students should monitor the exam schedule on the Registrar's web page (http://www.stonybrook.edu/registrar/finals.shtml) during the semester as changes have happened in past semesters. Please also note the student responsibility statement on the Registrar's exam schedule page.