NAU NORTHERN ARIZONA UNIVERSITY

Course Title: AST 183 Life In The Universe
Term: Fall 2022
Instructor: TBA
Course Credit: 3
Mode of Instruction: Online

Course Description:

The course will survey the scientific topics that comprise the key elements of "Astrobiology." These include the philosophical foundations of astrobiology as a science, astronomical sources of life's chemical building blocks and habitable environments, extremophilic organisms, the history of life on earth, the role of asteroid/comet impacts and micro-meteoritic dust, feasibility of space travel, and the search for life in the solar system and beyond.

Course Prerequisites:

N/A

Learning Outcomes:

By the end of the course, the student should be able to:

A. Understand the basic facts, principles, theories, and methods of modern science;

B. Describe the interdependence of scientific and technological developments;

C. Recognize the social and philosophical implications of scientific discoveries and understand the potential of science and technology to address problems of the contemporary world;

D. Promote thinking about the dynamic relation between life and its environment and how changing planetary atmospheres and climates alter the necessary conditions for habitability.

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Course Material:

Carol E. Cleland, ***The Quest for a Universal Theory of Life: Searching for Life As We Don't Know It,*** 11th, Cambridge University Press, 2019.

Evaluation:

- 3 Quizzes [30%]
- Term Paper [15%]
- Mid-term Exam [20%]
- Final Exam [35%]

Description of the Evaluation tasks:

Assignment/ Essay/ ... : During the term, students will be required to finish several evaluation tasks within due date. All the tasks are linked with specific course topics/outcomes and will adequately assess students' competence and learning outcomes. Students are encouraged to meet with instructor about these tasks at any point.

Mid-term/ Final Exams/ Quiz/... : There may be periodic quizzes given at the beginning of lecture sessions; the feedback from these quizzes will monitor the progress of the learners and help to set learning priorities. There will be mid-term exam/ final exam for the course. They are the basic criteria for the evaluation of students' learning outcomes and final grade.

Grading Policy:

Students are supposed to finish each online lecture. Prior to each class, students should finish the required readings. During the class time, students are encouraged to make use of all relevant online course resources and communicate with the instructor. Students' grades are accumulated based on the cumulative evaluations.

Students' letter grade will be assigned according to the following scale:

A+ 90-100	A 85-89	A- 80-84
B+ 77-79	B 73-76	B- 70-72
C+ 67-69	C 63-66	C- 60-62
D+ 57-59	D 53-56	D- 50-52
F < 50		

Academic Integrity:

Students must strictly adhere to the university's academic integrity rule; and all essays, exams and any other form of academic assignments must adhere to these rules. Any form of plagiarism, cheating, or misappropriation of materials will be considered a violation of academic integrity and will be punishable by the university.

Withdrawal from the Course(s):

Students will be able to apply for a transfer or withdrawal within 3 days of the starting date of the course. If a withdrawal is applied for within 3 working days, the tuition fee will be fully refunded. After 3 days, the tuition fee will not be refunded. If a withdrawal is applied for in the first two weeks, it will be recorded as W (Withdraw) on the course transcript. After this initial two-week period, the class will be recorded as F (Fail).

Tentative Schedule:

Week 1

1	The Enduring Legacy of Aristotle
2	Why Life Cannot Be Defined
3	Popular Definitions of Life
4	The Problem with Definitions
5	The Battle over Life as Self-Organization or Reproduction

	Quiz#1

Week 2

6	What is a Scientific Theory?
7	How Scientific Theories Develop?
8	Challenges for a Universal Theory of Life
9	Rethinking the Traditional Paradigm for Life
10	Lesson from the World of Microbes

Week 3

11	Evolution Viewed Through the Lens of the Microbial World
12	The Living Individual Viewed Through the Lens of Microbial World
13	**Mid-term Exam**
14	Biofilms: Aggregated of Cells or Living Individuals?
15	Biofilms: Aggregated of Cells or Living Individuals? (Cont.) **Quiz#3**

Week 4

16	Artificial Life: Could A Life Solve the N=1 Problem?
17	Soft A Life: Digital Organism?
18	Hard A Life: Living Robots?
19	Synthetic Biology
20	Creating Novel Life in the Laboratory? **Term Paper**

Week 5

21	Searching for Extraterrestrial Life Without a Definition or Universal Theory of Life
22	The Role of Anomalies in Scientific Discovery
23	A Shadow Biosphere: Alien Microbes on Earth?
24	How Scientifically Plausible Is a Shadow Biosphere?
25	**Final Exam**