

Astrobiology(EC) Course Syllabus

 2nd Semester, 2019

Department	Physics and Earth Science	Credits	3	Instructor	In-Ok Song	Venue	Tamgu #2403
Lecture	Astrobiology(EC)	Class hr/1week	3	Contacts		Students ID	
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* You could visit the office anytime in working hours; however you are encouraged to give me a phone call or e-mail to set the meeting time before your visit.

* Office Hour: 14:40 ~ 15:30pm (Monday, Tuesday, Wednesday)

A. DESCRIPTION

The science of life in universe known as astrobiology or bioastronomy is interdisciplinary topic with astronomy, astrophysics, chemistry, biology, earth science and somehow philosophy. Astronomy contributes to understand the origin of star and solar system where the Earth was born in. The earth is the best example so far for habitable zones. Chemistry and biology play an important role in astrobiology about the process from atoms to organic molecules and even further to prebiotic molecules and life. Earth science helps to deduce the potentials of early habitats for life on exoplanet as an example.

This course might not deal with all of them, but it is focused on which kinds of interdisciplinary subject are introduced to those scientific areas. You are expected to understand upcoming news and research results as well as to have interests more in basic sciences relevant to astrobiology after this course. Let us to study how to resolve the questions: Is there life out there? Are there others like us elsewhere? The important aim of this subject is to make scientific question properly to be solved about our inquiry.

B. ORGANIZATION

Lectures, presentations, talks, watching video, RTM activities and worksheet will be placed.

C. COURSE OBJECTIVES

1. To introduce astrobiology
2. To follow up current issues about exoplanet and astrobiology
3. How to refine inquiry to be real scientific questions?

D. TEXT and REFERENCES

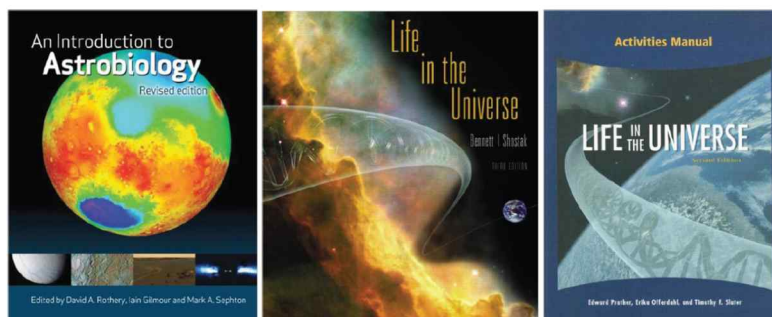
An introduction to Astrobiology, edited by I. Gilmour and M.A. Sephton (Cambridge Univ. Press, 2018)

References:

Life in the Universe, Bennet and Shostak (Addison-Wesley, 2010: 3e/d)

Activities Manual for life in the universe, Prather, Offerdahl and Slater (Addison-Wesley, 2007: 2e/d)

Lectures in Astrobiology, edited by M. Gargaud et al (Springer, 2005)



E. Resources

1. LMS for announcement and submission of essays
2. Lectures: <https://sites.google.com/view/songio/>

F. GRADING PLAN

1. Paper Exams 50% Written exams (Mid-term 25%; Final 25%)
Just in a case, it will be 50% of the score if it happens to be a single written exam.
 2. Scientific essay and presentation 40% Originality and fluency in the topic: data, evidence, logical support, analysis in the context: wide vocabulary, accurate scientific terms, neat figures and table: your own strength
If the report is submitted **in time**, it will get the score from A to C. However, the highest score will be B if it is submitted one week after. After than that, you don't have to submit it because it is already F. Make sure the report submitted because the score of D- is 40 and it will make the huge difference of F (0) in the evaluation. **Plagiarism is criminal and a faculty meeting will be opened for FAIL of the course if it is the case.**
 3. Attendance 10%
Absence degrading you 2% in each time and if the number of unexcused absence is 4 times, then a faculty meeting will be opened for FAIL of the course.
- **Level of Evaluation**

More than expected	A
Expected	B
Reluctantly Followed	C/D
Fail	F

TENTATIVE SCHEDULE

	Topic	Note
Week 01	Introduction to the course Complete course syllabus with students Is it science?	Worksheet: IS IT SCIENCE?
Week 02 Week 03	Origin of life <ul style="list-style-type: none"> • What is life • The building blocks of life • How to study the origins and remains of life • Organic matter in the Universe • Synthesis of organic molecules on the early Earth • Delivery of extraterrestrial organic matter to the early Earth • From chemical to biological system The evolving Earth: Geologic and biologic time	RTM activity Worksheet: WATER IMPORTANCE
Week 04 Week 05	Universal context of life <ul style="list-style-type: none"> • The universe and life • The structure, scale, and history of the universe • The nature of worlds • A universe of matter and energy 	Worksheet: EVOLVING EARTH
Week 06 Week 07	Habitable world <ul style="list-style-type: none"> • Defining a habitable planet • Habitable zones • Environment on the early Earth • Life on the edge • Extreme environment • The nature and evolution of habitability 	Scientific essay I.: Topics you are interested in Worksheet Extremophile for FUN Essay submitted (10.11. 23:00) and few minutes talk (10.14.-)
Week 08	Mid-term	
Week 09 Week 10	Habitable Environments Elsewhere in our Solar System? <ul style="list-style-type: none"> • Life on Mars • Life on Jovian Moons • Searching for life in our solar system Interstellar real estate: Defining the habitable zone	RTM activity Worksheet: TO TERRAFORM OR NOT TO TERRAFORM MARS, THAT IS THE QUESTION
Week 11 Week 12	Detection of exoplanet <ul style="list-style-type: none"> • Reflected radiation • Emitted radiation • Absorbed or occulted radiation • Refracted radiation • Movement of the star • Observables and important properties 	RTM activity Worksheet: Wobbling stars
Week 13 Week 14	The nature of exoplanetary system <ul style="list-style-type: none"> • The discovery of exoplanetary systems • Properties of exoplanetary systems • Migration of exoplanets within exoplanetary system • Undiscovered exoplanets Designer Genes for a designer world	RTM activity Scientific essay II.: Exoplanets you are interested in
Week 15	Search for Habitable Exoplanets <ul style="list-style-type: none"> • Biosignature • Potential planetary habitats 	Essay submitted (12.6. 23:00) few minutes talk (12.9.-)
Week 16	Final Exam	

It might be changed on the needs from the attendants.

Rubric for Participation in Class

1. Frequency

- A. Frequency of comments is optimal (just right; neither too frequent so as to dominate, nor so little that there is no contribution). Steps in when there are silences to move discussion along but keeps quiet when this allows others to contribute. Sensitive to when to comment.
- B. Comments occasionally or a bit too much or at times that break the flow of the discussion. Sometimes talks over others.
- C. Too frequent responses: dominates discussion, not allowing students (or sometimes even teacher) to contribute or is silent or creates distractions by playing with items.

2. Relevance

- A. Contributions enhance lesson or discussion: they may ask a key question, elaborate, bring in relevant personal knowledge, move the discussion along, identify issues or take the discussion to another level. Students use the vocabulary of the topic to be precise and clear. Able to synthesize or indicate gaps or extensions to topic.
- B. Comments may only repeat what has been already said, or may be tangential or may sidetrack discussion from time to time. Language is fairly general; only personal experience has some specific details.
- C. Comments are not related to topic at hand, or go back to previous part of discussion or question. Language is so general or confused that it's difficult to understand where comment fits.

3. Growth of School community

- A. Listens actively and attentively to others prior to making own comments. Comments focus on and enhance consideration of topic rather than focusing on specific people. Comments and body language validate and encourage others' contributions. (Eye contact and nodding as culturally appropriate.)
- B. Listens intermittently as others speak, so comments are sometimes off topic or don't follow thread of discussion. Comments and body language sometimes respectful. Sometimes follows the lead of others to disrupt participation. (Eye contact made intermittently if culturally appropriate.)
- C. Comments may focus attention on self rather than on discussion. Comments may frequently interrupt others or be disrespectful. Side conversations, body language or actions, inappropriate comments or sounds may make class participation fragmented.

- Rubric for Participation in Class is adapted from <Teacher Planet> community

Collaboration Rubric

A - Thorough Understanding

- Consistently and actively works toward group goals.
- Is sensitive to the feelings and learning needs of all group members.
- Willingly accepts and fulfills individual role within the group.
- Consistently and actively contributes knowledge, opinions, and skills.
- Values the knowledge, opinion and skills of all group members and encourages their contribution.
- Helps group identify necessary changes and encourages group action for change.

A - Good Understanding

- Works toward group goals without prompting.
- Accepts and fulfills individual role within the group.
- Contributes knowledge, opinions, and skills without prompting.
- Shows sensitivity to the feelings of others.
- Willingly participates in needed changes.

B - Satisfactory Understanding

- Works toward group goals with occasional prompting.
- Contributes to the group with occasional prompting.
- Shows sensitivity to the feelings of others.
- Participates in needed changes, with occasional prompting.

C - Needs Improvement

- Works toward group goals only when prompted.
- Contributes to the group only when prompted.
- Needs occasional reminders to be sensitive to the feelings of others.
- Participates in needed changes when prompted and encouraged.

Collaboration rubric is adapted from <Teacher Planet> community