

NEW COURSE PROPOSAL

Courses must be submitted by October 15, 2013, and finalized by the end of that fall semester for the next catalog production.

Use YELLOWED areas to enter data.

DATE (*Change if modified and redate file with current date*)

REV 10.21.13GE

PROGRAM AREA(S)

ASTR, PHYS, BIOL

1. Course Information. *[Follow accepted catalog format.]*

Prefix(es) (Add additional prefixes if cross-listed) and **Course No.** ASTR 110, PHYS 110, BIOL 110

Title: LIFE IN THE UNIVERSE **Units:** 3.0

Prerequisites none

Corequisites none

Consent of Instructor Required for Enrollment

Catalog Description (Do not use any symbols): ASTR 110 Life in the Universe

Explains the origins of life on Earth and the conditions for life to be discovered on other worlds. Current and potential means of exploring space will be discussed such as: Mars rovers, radio telescopes and the promise and limitations of interstellar travel.

Grading Scheme:

A-F Grades

Credit/No Credit

x Optional (Student Choice)

Repeatability:

Repeatable for a maximum of units

Total Completions Allowed 1

Multiple Enrollment in Same Semester

Course Level Information:

x Undergraduate

Post-Baccalaureate/Credential

Graduate

Mode of Instruction/Components (*Hours per Unit are defaulted.*)

	Units	Hours per Unit	Benchmark Enrollment	Graded Component	CS & HEGIS # (Filled in by the Dean)
Lecture	3.0	1	25	x	
Seminar		1			
Laboratory		3			
Activity		2			
Field Studies					
Indep Study					
Other Blank					

Leave the following hours per week areas blank. The hours per week will be filled out for you.

hours lecture per week

hours blank per week

Is this course always delivered online? Yes_____ No__x__ (Answer YES if the course is ALWAYS delivered online).

2. Course Attributes:

General Education Categories: All courses with GE category notations (including deletions) must be submitted to the GE website: <http://summit.csuci.edu/geapproval>. Upon completion, the GE Committee will forward your documents to the Curriculum Committee for further processing.

A (English Language, Communication, Critical Thinking)

A-1 Oral Communication

A-2 English Writing

A-3 Critical Thinking

B (Mathematics, Sciences & Technology)

x B-1 Physical Sciences

- x B-2 Life Sciences – Biology
- B-3 Mathematics – Mathematics and Applications
- B-4 Computers and Information Technology

C (Fine Arts, Literature, Languages & Cultures)

- C-1 Art
- C-2 Literature Courses
- C-3a Language
- C-3b Multicultural

D (Social Perspectives)

E (Human Psychological and Physiological Perspectives)

UDIGE/INTD Interdisciplinary

Meets University Writing Requirement (Graduation Writing Assessment Requirement)

Meets University Language Requirement

American Institutions, Title V Section 40404: Government US Constitution US History
Regarding Exec Order 405, for more information: <http://senate.csuci.edu/comm/curriculum/resources.htm>

Service Learning Course (Approval from the Center for Community Engagement must be received before you can request this course attribute).

Online Course (Answer YES if the course is ALWAYS delivered online).

3. Justification and Requirements for the Course. (Make a brief statement to justify the need for the course)

A. Justification: This interdisciplinary, team-taught, general education course will afford lower division students the opportunity to experience an area of “cutting-edge” scientific research, the results of which could have profound implications for the future of humanity. Students will have the opportunity to participate in an actual research program, SETI@home, through the University of California, Berkeley.

B. Degree Requirement:

- Requirement for the Major/Minor
- Elective for the Major/Minor
- X Free Elective

Note: Submit Program Modification if this course changes your program.

4. Student Learning Outcomes. List in numerical order. Please refer to the Curriculum Committee’s “Learning Outcomes” guideline for measurable outcomes that reflect elements of Bloom’s Taxonomy:

<http://senate.csuci.edu/comm/curriculum/resources.htm>. The committee recommends 4 to 8 student learning outcomes, unless governed by an external agency (e.g., Nursing).

Upon completion of the course, the student will be able to:

1. Describe the major steps in the evolution of main sequence stars of various masses and the planets and other bodies surrounding those stars,
2. Define clearly what is meant by “life” and “living organisms,”
3. Understand the relationship between stellar mass, the width of the Circumstellar Habitable Zone (CHZ), stellar lifetime, and the suitability of planets to sustain organic evolution,
4. Describe the stages of geological and biological evolution on Earth and contrast those stages to those on other terrestrial planets and satellites in our solar system,
5. Explain why biology on Earth is based on the chemistry of carbon and analyze the potential for biology based on other elements,
6. Evaluate the progress made to date on identifying exosolar planets, particularly those with the potential to have Earth-like surface conditions,
7. Evaluate the progress made to date in passive Search for Extra-Terrestrial Intelligence (SETI) research programs,

8. Analyze the challenges associated with interstellar travel and assess the probability that Earth has been visited by alien civilizations.
9. Write effectively in various forms.(GE 4.2)
10. Make connections between important/core/key concepts (or big ideas) in the natural sciences to describe/explain natural phenomena. (GE 5.4)

5. Course Content in Outline Form. *[Be as brief as possible, but use as much space as necessary]*

I. INTRODUCING LIFE IN THE UNIVERSE

1. A Universe of Life?
2. The Science of Life in the Universe
3. The Universal Context of Life

II. LIFE ON EARTH

1. The Habitability of Earth
2. The Nature of Life on Earth
3. The Origin and Evolution of Life on Earth

III. LIFE IN THE SOLAR SYSTEM

1. Searching for Life in Our Solar System
2. Mars
3. Life on Jovian Moons
4. The Nature and Evolution of Habitability

IV. LIFE AMONG THE STARS

1. Habitability Outside the Solar System
2. The Search for Extraterrestrial Intelligence
3. Interstellar Travel and the Fermi Paradox
4. Contact – Implications of the Search and Discovery

Does this course content overlap with a course offered in your academic program? **Yes** x **No**
If YES, what course(s) and provide a justification of the overlap. ASTR 105, PHYS 105, BIOL 100

Some topics, such as stellar evolution and the properties of the planets in our solar system are covered in the existing Astronomy 105, Physics 105 course. But the emphasis of this proposed course is entirely different. This course blends elements of physics, astronomy, biology, and earth science into a compelling multidisciplinary course which addresses one of the most profound questions of modern science: "Are we alone in the universe?"

Does this course content overlap a course offered in another academic area? **Yes** x **No**
If YES, what course(s) and provide a justification of the overlap. Biology 100

Topics such as the definition of "life," conditions for living organisms, and biological evolution are also covered in the Biology 100 course. But the emphasis of this proposed course is entirely different. This course blends elements of physics, astronomy, biology, and earth science into a compelling multidisciplinary course which addresses one of the most profound questions of modern science: "Are we alone in the universe?"

Overlapping courses require Chairs' signatures.

6. Cross-listed Courses (*Please note each prefix in item No. 1*)

A. List Cross-listed Courses (Signature of Academic Chair(s) of the other academic area(s) is required).

List each cross-listed prefix for the course: ASTR, PHYS, BIOL

B. Program(s) responsible for staffing: Applied Physics and Biology

7. References. [*Provide 3 - 5 references*]

Life in the Universe, Jeffrey O. Bennett, G. Seth Shostak, Seth Shostak, Addison-Wesley (2011) - ISBN 0321687671

Exobiology: Matter, Energy, and Information in the Origin and Evolution of Life in the Universe, Springer (1998) - ISBN 079235172X

Searching for Extraterrestrial Intelligence: SETI Past, Present, and Future, H. Paul Shuch, Springer Berlin Heidelberg, (2011) - ISBN 3642131956

8. Tenure Track Faculty Qualified to Teach This Course.

Geoff Dougherty, Ph.D.

Gregory G. Wood, Ph.D.

9. Requested Effective Date:

First semester offered: Fall semester 2014

10. New Resources Requested. **Yes** **No** x

If YES, list the resources needed.

A. Computer Needs (data processing, audio visual, broadcasting, other equipment, etc.)
none

B. Library Needs (streaming media, video hosting, databases, exhibit space, etc.)
none

C. Facility/Space/Transportation Needs

none

D. Lab Fee Requested (please refer to Dean's Office for additional processing) Yes No

E. Other

11. Will this new course alter any degree, credential, certificate, or minor in your program? Yes No

If, YES attach a program update or program modification form for all programs affected.

Priority deadline for New Minors and Programs: **October 1, 2013** of preceding year.

Priority deadline for Course Proposals and Modifications: **October 15, 2013**, of preceding year.

Last day to submit forms to be considered during the current academic year: **April 15th**.

Gregory G. Wood and Clint D. Harper, Ph.D.

10/1/13

Proposer of Course (Type in name. Signatures will be collected after Curriculum approval)

Date

Approved by 2013-2014 Committee:

Janet Rizzoli
Emily Saunders
Geoffrey Buhl
Catherine Burriss
Jose Alamillo
Kathy Musashi
Debra Hoffmann
Rachel Danielson
Dax Jacobson
Sarah Johnson

Request Submitted

Course: ASTR110 LIFE IN THE UNIVERSE
Area: B2 Life Sciences -- Biology
Date Submitted: 10/8/2013 3:25:24 PM
Date Approved: 10/21/2013 1:57:51 PM

1. Promote the understanding and appreciation of the methodologies of math or science as investigative tools and the limitations of mathematical or scientific endeavors

Discussing searching for traces of life on, say, Mars requires discussing many techniques and their limitations.

Astronomy uses mathematics to find various properties of stars, such as radius of orbit and temperature. Inherently, knowledge of planets around distant stars is quite limited and students will learn about the challenges this presents.

2. Present mathematical or scientific knowledge in a historical perspective and the influences of math and science on the development of world civilizations, both past and present

Talking about the potential discovery of life outside Earth would have impacts on civilizations at the present. The question of what is alive has a long history.

Astronomy is an excellent subject for historical perspective due to so many different civilizations having left records of positions of planets. An historic perspective allows students to explore common misperceptions - the Earth does not seem to move, and so on. This is needed to understand why the Earth has the temperature it does, and how the seasons vary the temperature.

3. Apply inductive and deductive reasoning processes and explore fallacies and misconceptions in the mathematical or scientific areas

To understand why Earth has the atmosphere we enjoy at present, it is necessary to discuss the organisms which came before and this opens the door to evolution and other topics (such as the age of the Earth) in which there is some controversy, socially.

4. Present the principles and concepts that form the foundations of living systems

In order to talk about life outside Earth, it is necessary to understand what kinds of life exist on Earth and what conditions are needed for their survival. From this, the course moves on to consider possible life outside Earth and what conditions might be suitable for life. By asking what are the essential conditions for life, we examine what we know about living organisms in a new way.

GE Committee response to your request have ASTR110: LIFE IN THE UNIVERSE added to B1: Physical Sciences -- Chemistry, Physics, Geology, and Earth Sciences

Approved by 2013-2014 Committee:

Janet Rizzoli
Emily Saunders
Geoffrey Buhl
Catherine Burriss
Jose Alamillo
Kathy Musashi
Debra Hoffmann
Rachel Danielson
Dax Jacobson
Sarah Johnson

Request Submitted

Course: ASTR110 LIFE IN THE UNIVERSE
Area: B1 Physical Sciences -- Chemistry, Physics, Geology, and Earth Sciences
Date Submitted: 10/8/2013 3:14:48 PM
Date Approved: 10/21/2013 1:59:09 PM

1. Promote the understanding and appreciation of the methodologies of math or science as investigative tools and the limitations of mathematical or scientific endeavors

Astronomy uses mathematics to find various properties of stars, such as radius of orbit and temperature. Inherently, knowledge of planets around distant stars is quite limited and students will learn about the challenges this presents.

2. Present mathematical or scientific knowledge in a historical perspective and the influences of math or science on the development of world civilizations, both past and present

Astronomy is an excellent subject for historical perspective due to so many different civilizations having left records of positions of planets. An historic perspective allows students to explore common misperceptions - the Earth does not seem to move, and so on. This is needed to understand why the Earth has the temperature it does, and how the seasons vary the temperature.

3. Apply inductive and deductive reasoning processes and explore fallacies and misconceptions in the mathematical or scientific areas

Both deductive and inductive reasoning will be employed in this course. Most of physics is highly deductive and the results of the experiments conducted on the Mars rovers to search for traces of life will be discussed, discoveries of extra-solar planets and many other areas are mostly deductive. However, the unique aspect of this class in talking about potential life elsewhere in the Universe opens the door to induction - what aspects of life on Earth should be common elsewhere?

Two common misconceptions will be dealt with directly: evolution and global warming. In understanding how life exists on Earth, it is necessary to consider how life evolved and how the atmosphere came to be. Greenhouse effects are employed to understand how certain planets such as Venus are warmer than they should be simply based on how far they are from the Sun. This naturally leads to asking what effect adding such gasses to Earth's atmosphere will cause.

4. Present the principles and concepts of the physical sciences and the physical universe

Many central principles will be discussed such as force and energy needed to understand orbits and temperatures of planets. Most of the core "big ideas" in physics will be discussed in this course.

Approval Sheet

Program/Course: ASTR 110 BIOL PHYS

If your course has a General Education Component or involves Center affiliation, the Center will also sign off during the approval process.

Multiple Chair fields are available for cross-listed courses.

The CI program review process includes a report from the respective department/program on its progress toward accessibility requirement compliance. By signing below, I acknowledge the importance of incorporating accessibility in course design.

Program Chair		
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Signature

Date

Program Chair		
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Signature

Date

Program Chair		
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Signature

Date

General Education Chair		
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Signature

Date

Center for International Affairs Director		
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Signature

Date

Center for Integrative Studies Director		
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Signature

Date

Center for Multicultural Engagement Director		
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Signature

Date

Center for Civic Engagement Director		
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Signature

Date

Curriculum Chair		
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Signature

Date

AVP		
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Signature

Date