General Education Review Committee
Agenda

September 4, 2009
ADM 201
12:30 p.m. – 1:30 p.m.

I. Call to Order
Roll

( ) Suzanne Forster	UAB/CAS	Written Communication
( ) Oliver Hedgepeth	UAB/CBPP	
( ) Utpal Dutta	UAB/SOE	
( ) Kevin Keating	UAB/Library	
( ) Deborah Fox	UAB/Mat-Su	
( ) Kenrick Mock	UAB/CAS	
( ) Len Smiley	CAS	Quantitative Skills
( ) Marcia Stratton	CAS	Oral Communication
( ) Walter Olivares	CAS	Fine Arts
( ) Patricia Fagan	CAS	Humanities
( ) Beverly Barker		Natural and Physical Sciences
( ) Catherine Sullivan	CHSW	
( ) Robert Capuozzo	COE	
( ) Sandra Pence	CTC	
( ) Vacant		Social Sciences
( ) Hilary Davies	UAB	Ex officio/UAB Chair
( ) Bart Quimby	UAB	Ex officio/OAA
( ) Vacant	Student	

II. Approval of Agenda (pg. 1)

III. Approval of Summary (pg. 2)

IV. Report from Associate Vice Provost Bart Quimby

V. Chair's Report
A. Election of Chair

VI. Course Action Requests

Add BIOL A365 Astrobiology (3 cr) (3+0) (cross listed w/ASTR A365) (pg. 3-8)

Add ASTR A365 Astrobiology (3 cr) (3+0) (cross listed w/BIOL A365) (pg. 9-15)

VII. Old Business
A. Revisit the nine GER Outcomes as posted in catalog.
How do these fit with outcomes in category descriptors, capstone outcomes, and the ILOs? Do we need to revise or streamline outcomes in light of recent work that has been done?

VIII. New Business
A. Review composition and election of GERC members

B. Clarify role and charge of GERC in terms of GER program assessment

C. Goals for AY 2010

IX. Informational Items and Adjournment

General Education Review Committee
Summary

April 24, 2009
ADM 204
12:30 p.m. – 1:30 p.m.

I. Call to Order

Roll

(x) Erik Hirschman	Mat-Su/**UAB**	Social Sciences
( ) Mari Ippolito	CAS/**UAB**	
(e) Patricia Fagan	CAS	Humanities
(x) Robert Capuozzo	COE	
(x) Jack Pauli	CBPP	
(x) Jeane Breinig	CAS	Written Communication
(x) Len Smiley	CAS	Quantitative Skills
(e) Suzanne Forster	CAS/**UAB**	
(e) Robin Wahto	CTC/**UAB**	
( ) Walter Olivares	CAS	Fine Arts
(e) Bart Quimby	OAA/**UAB**	
( ) Catherine Sullivan	CHSW/**UAB**	
(x) Doug Parry/ Shawnalee Whitney	CAS	Oral Communication
( ) Jeff Miller	SOE	
( ) Karl Wing	USUAA	
(e) Hilary Davies	UAB Chair	

II. Approval of Agenda (pg. 1)
Approved

III. Approval of Summary (pg. 2)
Approved

IV. Report from Associate Vice Provost Bart Quimby
Unable to attend

V. Chair's Report
Suzanne Forster unable to attend; Erik Hirschman chaired.

VI. Course Action Requests

Chg PS A331 Political Philosophy (3 cr) (3+0) (pg. 3-8)
Approved

Chg PS A332 History of Political Philosophy I: Classical (3 cr) (3+0) (pg. 9-13)
Approved

Chg PS A333 History of Political Philosophy II: Modern (3 cr) (3+0) (pg. 14-19)
Approved

Chg ECON A210 Environmental Economics and Policy (3 cr) (3+0) (pg. 20-26)
Approved

VII. Old Business

VIII. New Business
A. GER Catalog Copy

IX. Informational Items and Adjournment

Curriculum Action Request
University of Alaska Anchorage
Proposal to Initiate, Add, Change, or Delete a Course or Program of Study

1a. School or College	1b. Division	1c. Department
AS CAS	AMSC Division of Math Science	Biological Sciences

2. Course Prefix	3. Course Number	4. Previous Course Prefix & Number	5a. Credits/CEU	5b. Contact Hours (Lecture + Lab)
BIOL	A365		3	(3+0)

6. Complete Course/Program Title
Astrobiology

Astrobiology
Abbreviated Title for Transcript (30 character)

7. Type of Course ☒ Academic ☐ Non-credit ☐ CEU ☐ Professional Development

8. Type of Action ☒ Course ☐ Program

☒ Add ☐ Prefix ☐ Course Number
☐ Change ☐ Credits ☐ Contact Hours
(mark appropriate boxes) ☐ Title ☐ Repeat Status
☐ Delete ☐ Grading Basis ☒ Cross-Listed/Stacked
☐ Course Description ☐ Course Prerequisites
☐ Test Score Prerequisites ☐ Co-requisites
☐ Other Restrictions ☐ Registration Restrictions
☐ Class ☐ Level
☐ College ☐ Major
☒ Other Capstone status.

9. Repeat Status No # of Repeats 0 Max Credits

10. Grading Basis ☒ A-F ☐ P/NP ☐ NG

11. Implementation Date semester/year
From: Spring/2010 To: /9999

12. ☒ Cross Listed with ASTR A365

☐ Stacked with _____ Cross-Listed Coordination Signature

13. List any programs or college requirements that require this course
Elective capstone course for BA-Biological Sciences, BS-Biological Sciences majors, Biology minors, BS-Geology or BS-Natural Science majors.

14. Coordinate with Affected Units: UAA Faculty ListServ, UAA Deans & Directors.
Department, School, or College

_____
Initiator Signature Date

15. ☒ General Education Requirement ☐ Oral Communication ☐ Written Communication ☐ Quantitative Skills ☐ Humanities
☐ Fine Arts ☐ Social Sciences ☐ Natural Sciences ☒ Integrative Capstone

16. Course Description
A comprehensive examination of the possibility of the existence of life (microbial and advanced) outside of the Earth, the probability of discovery of extraterrestrial life (methods of planet detection, chemical signatures of microbial life, and contact with advanced life), and the scientific and cultural implications of such a discovery. This includes the study of star and planet formation rates, habitability zones, origin of life, evolution, and formation of intelligence.

17a. Course Prerequisite(s) (list prefix and number)	17b. Test Score(s)	17c. Co-requisite(s) (concurrent enrollment required)
BIOL A115 and (PHYS A123 or PHYS A211)	n/a.	n/a.

17d. Other Restriction(s)	17e. Registration Restriction(s) (non-codable)
☐ College ☐ Major ☐ Class ☐ Level	Junior standing; completion of all GER Tier 1 courses.

18. ☒ Mark if course has fees

19. Justification for Action
New UAA GER Integrative Capstone course. The advanced approach to understanding of extraterrestrial life requires an integration of critical concepts of astrophysics, physics, geology, atmospheric science, origin of life, molecular biology, and evolutionary biology. Students will emerge with an understanding of how life originates and evolves, what conditions are necessary for life to exist elsewhere, how we may discover it, and what it would mean to humankind.

UNIVERSITY OF ALASKA ANCHORAGE
COURSE CONTENT GUIDE

I. Implementation Date: Spring 2010

II. Course Information

A.	**College:**	College of Arts and Sciences
B.	**Course Subject/Number:**	BIOL A365
C.	**Course Title:**	Astrobiology
D.	**Course Description:**	A comprehensive examination of the possibility of the existence of life (microbial and advanced) outside of the Earth, the probability of discovery of extraterrestrial life (methods of planet detection, chemical signatures of microbial life, and contact with advanced life), and the scientific and cultural implications of such a discovery. This includes the study of star and planet formation rates, habitability zones, origin of life, evolution, and formation of intelligence.
E.	**Credit Hours:**	3.0
F.	**Contact Hours:**	3 + 0
G.	**Grading Basis:**	A-F
H.	**Status of Course Relative to Degree Program:**	Elective capstone course for BA-Biological Sciences, BS-Biological Sciences majors, Biology minors, BS-Geology or BS-Natural Science majors.
I.	**Course Fees (Yes/No):**	Yes
J.	**Lab Fees (Yes/No):**	No
K.	**Coordination:**	UAA Faculty Listserv, UAA Deans and Directors
L.	**Crosslisting:**	ASTR A365
M.	**Prerequisites/Corequisite:**	Prerequisites: BIOL A115 and PHYS A123.
N.	**Registration Restrictions:**	Junior standing; completion of all GER Tier 1 courses (basic college-level skills) is required for GER Tier 3 credit.
O.	**Course Attributes:**	UAA GER Integrative Capstone

III. Course Activities:

This is primarily a lecture course; however it will use the visualization tools and immersive video environment of the planetarium. Students are required to read, research and synthesize information from the primary literature and other resources to cover a topic of their choice related to the likelihood of life on another planet, the chances of discovery of extraterrestrial life, or the impact that such a discovery would have on society. This research will be presented by the students to the class.

IV. Evaluation:

Course grading is A-F. The evaluation methods, while at the discretion of the faculty member teaching the course, may include written lecture exams, worksheets and other homework assignments, reading and interpreting selected primary literature and a research project with an associated paper in scientific format.

V. Course Level Justification:

Students are required to learn and integrate information from a variety of scientific disciplines as it relates to astrobiology, to read, understand, and apply ideas conveyed by primary scientific literature, to synthesize astrophysical, chemical, geological and biological knowledge and social considerations; and to apply course materials to this topic.

GER Integrative Capstone Justification:
Justifications for designating BIOL A365 Astrobiology as a GER Integrative Capstone course include its emphases on:

1. Knowledge Integration / Interrelationships and synergy among GER disciplines: Astrobiology's relationship to the other natural and social sciences is an overall theme of the course. This course focuses on the interfaces between physical sciences (astronomy, chemistry, physics, geology), biological sciences (molecular biology, origins of life, evolutionary biology), and the social sciences, particularly as they relate to the implications of the discovery of extraterrestrial life.

2. Effective communication skills: Student success demands effective communication through essay examinations, individual classroom presentations, brief reports (oral and written) on hot topics from the local media, and a final research paper.

3. Critical Thinking: Students will succeed in this class if they are able to integrate information across disciplines, and critically evaluate the reliability of data and positions presented in lecture, texts, scientific, and popular viewpoints. Students' ability to critically evaluate diverse materials will be determined based on writing assignments, class presentations, and exams.

4. Information literacy: Students are expected to achieve and demonstrate computer and Internet skills for acquiring information relevant to current topics in astrobiology. This will involve both research in the primary scientific literature (via library and internet resources) and the collection of information from more 'public' sources such as TV, Web, popular press magazines and newspapers, and advocacy organizations. Students must show that they can critically and appropriately evaluate scientific content in 'public' sources based on knowledge gleaned from 'scientific' sources.

5. Quantitative Perspectives: A critical understanding of astrobiology requires that students grasp quantitative concepts such as how a star's mass affects the size and longevity of a habitability zone, and how cell size affects metabolic and reproductive rates. In addition, students must be able to read and interpret scientific graphs (quantitative data, graphically displayed), and to generate graphs showing the relationship between different properties (such as the temperature and luminosity of a star). Exams will specifically test on these skills.

6. Evolving realities of the 21st Century: The growing knowledge that understanding the possibility and probability of life on another planet is to understand how life originated on ours. It creates a special perspective on the uniqueness of life on Earth, and its fragility. This is particularly relevant in the context that humans are having large and potentially irreversible impacts on the habitability of the Earth for many forms of life, which has been a recent focus of scientific and politial discussions.

VI. Course Outline

1.0 An Introduction to Life in the Universe
- 1.1 The Possibilities of Life Beyond Earth
- 1.2 The Scientific Context of the Search
- 1.3 The New Science of Astrobiology

2.0 The Habitability of the Earth
- 2.1 Geology and Life
- 2.2 Habitability
- 2.3 Climate Regulation and Change

3.0 The Nature of Life on Earth
- 3.1 Defining Life
- 3.2 Cells: The Basic Units of Life
- 3.3 Metabolism
- 3.4 DNA and Heritability

4.0 Origin and Evolution of Life on Earth
- 4.1 Searching for the Origin of Life
- 4.2 The Evolution of Life
- 4.3 Impacts and Extinctions

5.0 Life in the Solar System
- 5.1 The Inner Solar System
- 5.2 The Outer Solar System
- 5.3 Spacecraft and Exploration

6.0 Mars
- 6.1 Fantasies of Martian Civilization
- 6.2 A Modern Portrait of Mars
- 6.3 The Climate History of Mars
- 6.4 Searching for Life on Mars

7.0 The Jovian Moons
- 7.1 Life on the Galilean Moons
- 7.2 Life on Saturn and Beyond

8.0 The Nature and Evolution of Habitability
- 8.1 The Concept of a Habitable Zone
- 8.2 Venus and Mars: Examples in Potential Habitability
- 8.3 The Future of Life on Earth
- 8.4 Global Warming

9.0 Habitability Outside the Solar System
- 9.1 Extrasolar Planets
- 9.2 Stellar Classification
- 9.3 Rare Earth?

10.0 The Search for Extraterrestrial Intelligence
- 10.1 The Drake Equation
- 10.2 The Question of Intelligence
- 10.3 Searching for Intelligence

11.0 Interstellar Travel
- 11.1 The Challenge of Interstellar Travel
- 11.2 Building a Spaceship for Interstellar Travel
- 11.3 Fermi's Paradox

VII. Instructional Goals and Student Outcomes:

A. The instructor will:

The instructor will:

- Provide a basic description of the physical, chemical, and geological properties necessary for the origin and sustainability of life on Earth.
- Build on this conceptual framework to describe how other moon, planet and star systems have zones of habitability in which life can exist.
- Discuss the physical features of other worlds within our Solar System and beyond which may allow life to develop.
- Describe how life evolves in tandem with its changing environment. Provide detailed examples of how the physiological traits of organisms are uniquely linked to their habitat, and of how changes in that habitat may influence species diversity and abundance through impacts on physiological properties.
- Discuss the techniques used to search for extraterrestrial planets on which life could exist. Explore future missions and technologies that will search for the chemical signatures of simple life forms on these worlds.
- Discuss the role of intelligence in the evolution of life, and its implications for the likelihood of advanced extraterrestrial life forms capable of communicating with us.
- Examine the techniques used to search for advanced life in the Universe, and explore the scientific and cultural implications of such a discovery.
- Teach students how to evaluate and integrate information from a variety of different sources and perspectives.

B. Student Outcomes:

Students will be able to:	Assessment Method
Articulate in depth the processes of the origins and evolution of life in different ecosystems. Conceptually link the chemistry and physiology of living organisms with the physical and biological aspects of their environment.	Exams and written assignments
Critically integrate information read from scientific articles provided in lecture and textbook assignments, and apply this information to evaluate the scientific accuracy of popular press (TV, newspaper, magazine, web) reports related to astrobiology.	Exams, written assignments and in-class reports
Describe the likelihood of "contact" with an advanced civilization, and discuss the scientific and cultural impacts of such a discovery.	In-class presentations, exams, and writing assignments
Assess the long-term prospects for the habitability for life of the Earth. In particular, explore the nature of human impacts on ecosystems through in depth study of current 'hot topics' such as global warming.	In-class presentations, exams, and written assignments.

VIII. Suggested Text(s):

Bennett, J. & Shostak, S. 2008. *Life in the Universe.* 2nd Ed. Pearson-Addison Wesley.

Prather, E., Offerdahl, E. and Slater, T.F. 2008. *Life in the Universe Activities Manual.* 2nd Ed. Pearson-Addison Wesley.

IX. Bibliography:

In addition to textbook assignments, an extensive reference list of current literature from scientific journals is utilized for this course and assigned and / or suggested to the students (all provided on blackboard); please contact Travis Rector, aftar, or 6-1242.

Barrow, J.D. et al. 2007. *Fitness of the Cosmos for Life: Biochemistry and Fine Tuning*. Cambridge University Press.

Clancy, P., Brack, A. & Horneck, G. 2005. *Looking for Life, Searching the Solar System.* Cambridge University Press.

Cohen, J. & Stewart, I. 2002. *What Does a Martian Look Like? The Science of Extraterrestrial Life*. Wiley Publishing.

Darling, D. 2002. *Life Everywhere: The Maverick Science of Astrobiology*. Basic Books.

Gilmour, I. & Sephton, M.A. 2004. *An Introduction to Astrobiology*. Cambridge University Press.

Grinspoon, D. 2003. *Lonely Planets: The Natural Philosophy of Alien Life.* Ecco Publishing.

Jastrow, R. & Rampino, J. 2008. *Origins of Life in the Universe*. Cambridge University Press.

Lunine, J. 2004. *Astrobiology: A Multi-Disciplinary Approach*. Pearson-Addison Wesley.

Pudritz, R., Higgs, P. & Stone, J. 2007. *Planetary Systems and the Origins of Life*. Cambridge University Press.

Schklovskii, I.S. & Sagan, C. 1966. *Intelligent Life in the Universe*. Holden-Day Publishing.

Ward, P. & Brownlee, D. 2003. *Rare Earth: Why Complex Life is Uncommon in the Universe*. Springer Publishing.

Curriculum Action Request
University of Alaska Anchorage
Proposal to Initiate, Add, Change, or Delete a Course or Program of Study

1a. School or College	1b. Division	1c. Department
AS CAS	AMSC Division of Math Science	Physics and Astronomy

2. Course Prefix	3. Course Number	4. Previous Course Prefix & Number	5a. Credits/CEU	5b. Contact Hours (Lecture + Lab)
ASTR	A365		3	(3+0)

6. Complete Course/Program Title
Astrobiology

Astrobiology
Abbreviated Title for Transcript (30 character)

7. Type of Course ☒ Academic ☐ Non-credit ☐ CEU ☐ Professional Development

8. Type of Action ☒ Course ☐ Program

☒ Add ☐ Prefix ☐ Course Number
☐ Change ☐ Credits ☐ Contact Hours
(mark appropriate boxes) ☐ Title ☐ Repeat Status
☐ Delete ☐ Grading Basis ☒ Cross-Listed/Stacked
☐ Course Description ☐ Course Prerequisites
☐ Test Score Prerequisites ☐ Co-requisites
☐ Other Restrictions ☐ Registration Restrictions
☐ Class ☐ Level
☐ College ☐ Major
☒ Other Capstone status.

9. Repeat Status No # of Repeats 0 Max Credits

10. Grading Basis ☒ A-F ☐ P/NP ☐ NG

11. Implementation Date semester/year
From: Spring/2010 To: /9999

12. ☒ Cross Listed with BIOL A365

☐ Stacked with _____ Cross-Listed Coordination Signature

13. List any programs or college requirements that require this course
Elective capstone course for BA-Biological Sciences, BS-Biological Sciences majors, Biology minors, BS-Geology or BS-Natural Science majors.

14. Coordinate with Affected Units: UAA Faculty ListServ, UAA Deans & Directors.
Department, School, or College

_____
Initiator Signature Date

15. ☒ General Education Requirement ☐ Oral Communication ☐ Written Communication ☐ Quantitative Skills ☐ Humanities
☐ Fine Arts ☐ Social Sciences ☐ Natural Sciences ☒ Integrative Capstone

16. Course Description
A comprehensive examination of the possibility of the existence of life (microbial and advanced) outside of the Earth, the probability of discovery of extraterrestrial life (methods of planet detection, chemical signatures of microbial life, and contact with advanced life), and the scientific and cultural implications of such a discovery. This includes the study of star and planet formation rates, habitability zones, origin of life, evolution, and formation of intelligence.

17a. Course Prerequisite(s) (list prefix and number)	17b. Test Score(s)	17c. Co-requisite(s) (concurrent enrollment required)
BIOL A115 and (PHYS A123 or PHYS A211)	n/a.	n/a.

17d. Other Restriction(s)	17e. Registration Restriction(s) (non-codable)
☐ College ☐ Major ☐ Class ☐ Level	Junior standing; completion of all GER Tier 1 courses.

18. ☒ Mark if course has fees

19. Justification for Action
New UAA GER Integrative Capstone course. The advanced approach to understanding of extraterrestrial life requires an integration of critical concepts of astrophysics, physics, geology, atmospheric science, origin of life, molecular biology, and evolutionary biology. Students will emerge with an understanding of how life originates and evolves, what conditions are necessary for life to exist elsewhere, how we may discover it, and what it would mean to humankind.

UNIVERSITY OF ALASKA ANCHORAGE
COURSE CONTENT GUIDE

I. Implementation Date: Spring 2010

II. Course Information

A.	**College:**	College of Arts and Sciences
B.	**Course Subject/Number:**	ASTR A365
C.	**Course Title:**	Astrobiology
D.	**Course Description:**	A comprehensive examination of the possibility of the existence of life (microbial and advanced) outside of the Earth, the probability of discovery of extraterrestrial life (methods of planet detection, chemical signatures of microbial life, and contact with advanced life), and the scientific and cultural implications of such a discovery. This includes the study of star and planet formation rates, habitability zones, origin of life, evolution, and formation of intelligence.
E.	**Credit Hours:**	3.0
F.	**Contact Hours:**	3 + 0
G.	**Grading Basis:**	A-F
H.	**Status of Course Relative to Degree Program:**	Elective capstone course for BA-Biological Sciences, BS-Biological Sciences majors, Biology minors, BS-Geology or BS-Natural Science majors.
I.	**Course Fees (Yes/No):**	Yes
J.	**Lab Fees (Yes/No):**	No
K.	**Coordination:**	UAA Faculty Listserv, UAA Deans and Directors
L.	**Crosslisting:**	BIOL A365
M.	**Prerequisites/Corequisite:**	Prerequisites: BIOL A115 and (PHYS A123 or A211).
N.	**Registration Restrictions:**	Junior standing; completion of all GER Tier 1 courses (basic college-level skills) is required for GER Tier 3 credit.
O.	**Course Attributes:**	UAA GER Integrative Capstone

III. Course Activities:

This is primarily a lecture course; however it will use the visualization tools and immersive video environment of the planetarium. Students are required to read, research and synthesize information from the primary literature and other resources to cover a topic of their choice related to the likelihood of life on another planet, the chances of discovery of extraterrestrial life, or the impact that such a discovery would have on society. This research will be presented by the students to the class.

IV. Evaluation:

Course grading is A-F. The evaluation methods, while at the discretion of the faculty member teaching the course, may include written lecture exams, worksheets and other homework assignments, reading and interpreting selected primary literature and a research project with an associated paper in scientific format.

V. Course Level Justification:

Students are required to learn and integrate information from a variety of scientific disciplines as it relates to astrobiology, to read, understand, and apply ideas conveyed by primary scientific literature, to synthesize astrophysical, chemical, geological and biological knowledge and social considerations; and to apply course materials to this topic.

GER Integrative Capstone Justification:
Justifications for designating ASTR A365 Astrobiology as a GER Integrative Capstone course include its emphases on:

1. Knowledge Integration / Interrelationships and synergy among GER disciplines: Astrobiology's relationship to the other natural and social sciences is an overall theme of the course. This course focuses on the interfaces between physical sciences (astronomy, chemistry, physics, geology), biological sciences (molecular biology, origins of life, evolutionary biology), and the social sciences, particularly as they relate to the implications of the discovery of extraterrestrial life.

2. Effective communication skills: Student success demands effective communication through essay examinations, individual classroom presentations, brief reports (oral and written) on hot topics from the local media, and a final research paper.

3. Critical Thinking: Students will succeed in this class if they are able to integrate information across disciplines, and critically evaluate the reliability of data and positions presented in lecture, texts, scientific, and popular viewpoints. Students' ability to critically evaluate diverse materials will be determined based on writing assignments, class presentations, and exams.

4. Information literacy: Students are expected to achieve and demonstrate computer and Internet skills for acquiring information relevant to current topics in astrobiology. This will involve both research in the primary scientific literature (via library and internet resources) and the collection of information from more 'public' sources such as TV, Web, popular press magazines and newspapers, and advocacy organizations. Students must show that they can critically and appropriately evaluate scientific content in 'public' sources based on knowledge gleaned from 'scientific' sources.

5. Quantitative Perspectives: A critical understanding of astrobiology requires that students grasp quantitative concepts such as how a star's mass affects the size and longevity of a habitability zone, and how cell size affects metabolic and reproductive rates. In addition, students must be able to read and interpret scientific graphs (quantitative data, graphically displayed), and to generate graphs showing the relationship between different properties (such as the temperature and luminosity of a star). Exams will specifically test on these skills.

6. Evolving realities of the 21st Century: The growing knowledge that understanding the possibility and probability of life on another planet is to understand how life originated on ours. It creates a special perspective on the uniqueness of life on Earth, and its fragility. This is particularly relevant in the context that humans are having large and potentially irreversible impacts on the habitability of the Earth for many forms of life, which has been a recent focus of scientific and politial discussions.

VI. Course Outline

1.0 An Introduction to Life in the Universe
- 1.1 The Possibilities of Life Beyond Earth
- 1.2 The Scientific Context of the Search
- 1.3 The New Science of Astrobiology

2.0 The Habitability of the Earth
- 2.1 Geology and Life
- 2.2 Habitability
- 2.3 Climate Regulation and Change

3.0 The Nature of Life on Earth
- 3.1 Defining Life
- 3.2 Cells: The Basic Units of Life
- 3.3 Metabolism
- 3.4 DNA and Heritability

4.0 Origin and Evolution of Life on Earth
- 4.1 Searching for the Origin of Life
- 4.2 The Evolution of Life
- 4.3 Impacts and Extinctions

5.0 Life in the Solar System
- 5.1 The Inner Solar System
- 5.2 The Outer Solar System
- 5.3 Spacecraft and Exploration

6.0 Mars
- 6.1 Fantasies of Martian Civilization
- 6.2 A Modern Portrait of Mars
- 6.3 The Climate History of Mars
- 6.4 Searching for Life on Mars

7.0 The Jovian Moons
- 7.1 Life on the Galilean Moons
- 7.2 Life on Saturn and Beyond

8.0 The Nature and Evolution of Habitability
- 8.1 The Concept of a Habitable Zone
- 8.2 Venus and Mars: Examples in Potential Habitability
- 8.3 The Future of Life on Earth
- 8.4 Global Warming

9.0 Habitability Outside the Solar System
- 9.1 Extrasolar Planets
- 9.2 Stellar Classification
- 9.3 Rare Earth?

10.0 The Search for Extraterrestrial Intelligence
- 10.1 The Drake Equation
- 10.2 The Question of Intelligence
- 10.3 Searching for Intelligence

11.0 Interstellar Travel
- 11.1 The Challenge of Interstellar Travel
- 11.2 Building a Spaceship for Interstellar Travel
- 11.3 Fermi's Paradox

VII. Instructional Goals and Student Outcomes:

A. The instructor will:

The instructor will:

- Provide a basic description of the physical, chemical, and geological properties necessary for the origin and sustainability of life on Earth.
- Build on this conceptual framework to describe how other moon, planet and star systems have zones of habitability in which life can exist.
- Discuss the physical features of other worlds within our Solar System and beyond which may allow life to develop.
- Describe how life evolves in tandem with its changing environment. Provide detailed examples of how the physiological traits of organisms are uniquely linked to their habitat, and of how changes in that habitat may influence species diversity and abundance through impacts on physiological properties.
- Discuss the techniques used to search for extraterrestrial planets on which life could exist. Explore future missions and technologies that will search for the chemical signatures of simple life forms on these worlds.
- Discuss the role of intelligence in the evolution of life, and its implications for the likelihood of advanced extraterrestrial life forms capable of communicating with us.
- Examine the techniques used to search for advanced life in the Universe, and explore the scientific and cultural implications of such a discovery.
- Teach students how to evaluate and integrate information from a variety of different sources and perspectives.

B. Student Outcomes:

Students will be able to:	Assessment Method
Articulate in depth the processes of the origins and evolution of life in different ecosystems. Conceptually link the chemistry and physiology of living organisms with the physical and biological aspects of their environment.	Exams and written assignments
Critically integrate information read from scientific articles provided in lecture and textbook assignments, and apply this information to evaluate the scientific accuracy of popular press (TV, newspaper, magazine, web) reports related to astrobiology.	Exams, written assignments and in-class reports
Describe the likelihood of "contact" with an advanced civilization, and discuss the scientific and cultural impacts of such a discovery.	In-class presentations, exams, and writing assignments
Assess the long-term prospects for the habitability for life of the Earth. In particular, explore the nature of human impacts on ecosystems through in depth study of current 'hot topics' such as global warming.	In-class presentations, exams, and written assignments.

VIII. Suggested Text(s):

Bennett, J. & Shostak, S. 2008. *Life in the Universe.* 2nd Ed. Pearson-Addison Wesley.

Prather, E., Offerdahl, E. and Slater, T.F. 2008. *Life in the Universe Activities Manual.* 2nd Ed. Pearson-Addison Wesley.

IX. Bibliography:

In addition to textbook assignments, an extensive reference list of current literature from scientific journals is utilized for this course and assigned and / or suggested to the students (all provided on blackboard); please contact Travis Rector, aftar, or 6-1242.

Barrow, J.D. et al. 2007. *Fitness of the Cosmos for Life: Biochemistry and Fine Tuning*. Cambridge University Press.

Clancy, P., Brack, A. & Horneck, G. 2005. *Looking for Life, Searching the Solar System.* Cambridge University Press.

Cohen, J. & Stewart, I. 2002. *What Does a Martian Look Like? The Science of Extraterrestrial Life*. Wiley Publishing.

Darling, D. 2002. *Life Everywhere: The Maverick Science of Astrobiology*. Basic Books.

Gilmour, I. & Sephton, M.A. 2004. *An Introduction to Astrobiology*. Cambridge University Press.

Grinspoon, D. 2003. *Lonely Planets: The Natural Philosophy of Alien Life.* Ecco Publishing.

Jastrow, R. & Rampino, J. 2008. *Origins of Life in the Universe*. Cambridge University Press.

Lunine, J. 2004. *Astrobiology: A Multi-Disciplinary Approach*. Pearson-Addison Wesley.

Pudritz, R., Higgs, P. & Stone, J. 2007. *Planetary Systems and the Origins of Life*. Cambridge University Press.

Schklovskii, I.S. & Sagan, C. 1966. *Intelligent Life in the Universe*. Holden-Day Publishing.

Ward, P. & Brownlee, D. 2003. *Rare Earth: Why Complex Life is Uncommon in the Universe*. Springer Publishing.

Barrow, J.D. et al. 2007. *Fitness of the Cosmos for Life: Biochemistry and Fine Tuning*. Cambridge University Press.
Clancy, P., Brack, A. & Horneck, G. 2005. *Looking for Life, Searching the Solar System.* Cambridge University Press.
Cohen, J. & Stewart, I. 2002. *What Does a Martian Look Like? The Science of Extraterrestrial Life*. Wiley Publishing.
Darling, D. 2002. *Life Everywhere: The Maverick Science of Astrobiology*. Basic Books.
Gilmour, I. & Sephton, M.A. 2004. *An Introduction to Astrobiology*. Cambridge University Press.
Grinspoon, D. 2003. *Lonely Planets: The Natural Philosophy of Alien Life.* Ecco Publishing.
Jastrow, R. & Rampino, J. 2008. *Origins of Life in the Universe.* Cambridge University Press.
Lunine, J. 2004. *Astrobiology: A Multi-Disciplinary Approach*. Pearson-Addison Wesley.
Pudritz, R., Higgs, P. & Stone, J. 2007. *Planetary Systems and the Origins of Life*. Cambridge University Press.
Schklovskii, I.S. & Sagan, C. 1966. *Intelligent Life in the Universe*. Holden-Day Publishing.
Ward, P. & Brownlee, D. 2003. *Rare Earth: Why Complex Life is Uncommon in the Universe*. Springer Publishing.