LSC Use Only Proposal No:	UWUCC Use Only Proposal No: 12-76a.
LSC Action-Date: App-1/31/13	UWUCC Action-Date: App-2/5/13 Senate Action Date: App-2/26/13

Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee

Contact Person(s) Kenneth S. Coles	Email Address kcoles@iup.edu
Proposing Department/Unit Geoscience	Phone 724-357-5626

Check all appropriate lines and complete all information. Use a separate cover sheet for each course proposal and/or program proposal.

1. Course Proposals (check all that apply)

- [ ] New Course
- [x] Course Revision
- [ ] Course Prefix Change
- [ ] Course Number and/or Title Change
- [ ] Course Deletion
- [ ] Catalog Description Change

Current course prefix, number and full title: GEOS 154 Human Exploration of Space

Proposed course prefix, number and full title, if changing:

2. Liberal Studies Course Designations, as appropriate

This course is also proposed as a Liberal Studies Course (please mark the appropriate categories below)

- [ ] Learning Skills
- [x] Knowledge Area
- [ ] Global and Multicultural Awareness
- [ ] Writing Across the Curriculum (W Course)
- [ ] Liberal Studies Elective (please mark the designation(s) that applies – must meet at least one)
  - [ ] Global Citizenship
  - [ ] Information Literacy
  - [ ] Oral Communication
  - [ ] Quantitative Reasoning
  - [ ] Scientific Literacy
  - [ ] Technological Literacy

3. Other Designations, as appropriate

- [ ] Honors College Course
- [ ] Other: (e.g. Women's Studies, Pan African)

4. Program Proposals

- [ ] Catalog Description Change
- [ ] Program Revision
- [ ] Program Title Change
- [ ] New Track
- [ ] New Degree Program
- [ ] New Minor Program
- [ ] Liberal Studies Requirement Changes
- [ ] Other

Current program name:

Proposed program name, if changing:

5. Approvals	Signature	Date
Department Curriculum Committee Chair(s)	Kenneth S. Coles	11/5/2012
Department Chairperson(s)		11/5/12
College Curriculum Committee Chair		12/5/12
College Dean		12/5/12
Director of Liberal Studies (as needed)		1/31/13
Director of Honors College (as needed)		
Provost (as needed)		
Additional signature (with title) as appropriate		
UWUCC Co-Chairs	Gail S Sechrist	2/5/13

Received

DEC 10 2012

Liberal Studies

Part II

1. Syllabus of Record

I. Catalog Description

GEOS 154: Human Exploration of Space 3c-0l-3cr

Prerequisite: No Geoscience majors/minors

Covers the history, technical considerations, and scientific and social issues of the exploration of the planets and smaller objects of the solar system. Early rocketry, the race to the Moon, and past robotic missions provide a perspective to consider current and future science missions and human settlement beyond Earth. Includes field observations and activities that may occur on evenings and weekends.

II. Course Outcomes and Assessment

Objective 1:

Students will describe and analyze the most important scientific principles, technical issues, and logistical challenges in robotic space exploration and human space travel.

Expected Student Learning Outcomes 1 and 2

Informed and Empowered Learners

Rationale:

Space travel could not happen until the underlying science and engineering was discovered. Course content and assignments are designed to show how the laws of physics and limitations of the space environment are fundamental constraints on robotic and human missions.

Objective 2:

Students will identify key questions and priorities for future space exploration and outline appropriate mission designs to meet them.

Expected Student Learning Outcomes 1 and 2

Informed and Empowered Learners

Rationale:

Space travel cannot take place unless the resources devoted to it are used for the most important needs. Course assignments and content will engage students in the critical interpretation of key challenges of space travel and ways of meeting them.

Objective 3:

Students will give examples of scientific principles and methods of inquiry used in the study of the solar system and the gains in science made through space exploration.

Expected Student Learning Outcomes 1, 2, and 3

Informed, Empowered, and Responsible Learners

Rationale:

The validity of scientific conclusions depends critically on the kinds of evidence used and how it is evaluated and validated. Assignments and course content will require students to master interpretation of evidence in order to answer questions about the solar system and interplanetary space.

Objective 4:

Students will synthesize the history of space exploration and the contributions of diverse groups and interests.

Expected Student Learning Outcomes 1, 2, and 3

Informed, Empowered, and Responsible Learners

Rationale:

Space travel has involved the efforts of people from many groups and nationalities. Students will learn what conditions led to the opening of space exploration persons other than the male majority group in the participating nations.

Objective 5:

Students will synthesize and apply knowledge they have learned in the planning of future scientific and human activities in space.

Expected Student Learning Outcomes 1 and 2

Informed and Empowered Learners

Rationale:

Space travel is so difficult and expensive that decisions must be made in an informed way. Assignments will require mission design to realistic and based on correct science and current technologies, enabling students to participate as citizens in future debates over space exploration..

III. Detailed Course Outline

Lecture

Part A (6 hours): Principles of Flight and Space Science

Beginnings: Models of the Universe; Telescopes

Part B (14 hours): History of Space Exploration and the Space Race

First Rockets: Tsiolkovsky, Goddard, the German VfR, WWII
The Cold War: Von Braun and Korolyov
Sputnik and the Space Race begins
Orbital Flight
Their Finest Hour - The Race to the Moon

Midterm Exam (1 hour)

Part C (6 hours): Robotic Missions

Robotic Missions and Space Science: 1960s
Planetary missions in 1970s and 1980s
Faster, Better, Cheaper: Missions since 1990

Part D (15 hours): Humans in Space and Prospects for the Future

Living in Space: Skylab/Soyuz/Intl. Space Station
Who goes into space?: The elite vs. inclusion, past and future
What is next?
- U.S. plans
- Other countries in space
- How much cost is too much? What is worth doing?
- Return to the Moon/Visiting Mars/Living Beyond Earth

Final Exam during Final Exam Period

IV. Evaluation Methods

In-Class Writing	Short answers to questions on assigned reading and prior class activities	15%
Time Line	Small group project to construct a time line of the first (1945-1972) or second (1972-2003) space age for the U.S. or for the U.S.S.R./Russia	15%
Written Report on a Space Mission	Research paper on a robotic or manned space mission	15%
Written Proposal for a Future Mission	Detailed outline of a future robotic mission, manned mission, or other study of space	15%
Class Participation	Attendance, participation in discussion and class activities	5%
Midterm Exam	Short answers and essays over reading, class topics, and assignments	15%
Final Exam (Culminating Activity)	Short answers and essays over reading, class topics, and assignments for the entire term	20%

V. Example Grading Scale

The final grade for this course will be determined using the following scale:

A=90-100%; B=80-89%; C=70-79%; D=60-69%; F=below 60%

VI. Undergraduate Course Attendance Policy

The attendance policy will conform to IUP's undergraduate course attendance policy.

VII. Required textbooks, supplemental books and readings

Text: Launius, R. D., and A. K. Johnson, 2009, *Smithsonian Atlas of Space Exploration*: New York, Harper Collins, 230 p.

Supplementary readings from the Bibliography and from the following book will be required and form the basis for In-Class Writing assignments.

Weitekamp, M. A. 2005, *Right Stuff, Wrong Sex: America's First Women in Space Program (Gender Relations in the American Experience)*: Johns Hopkins Univ. Press, 256 p.

VIII. Special Resource Requirements

There are no special resource requirements for this course

IX. Bibliography

Burrows, William E., 1998, *This new ocean: The story of the first space age*: New York, Random House, 723 + xviii pp.

Cadbury, Deborah, 2005, *Space Race: The epic battle between America and the Soviet Union for Dominion of space*: New York, Harper Collins, 373 + xii pp.

Chaikin, A., 1994, *A Man on the Moon*: Penguin Books, 688 p.

Clarke, Arthur C., 1951, *The Exploration of Space*: Harper Brothers, 216 p.

Furniss, Tim, 2006, *A history of space exploration*: London, Mercury Books, 192 pp.

Heppenheimer, T. A., 1999, *Countdown: A history of space flight*: Wiley, 416 pp.

Launius, R. D., 1997, *Spaceflight and the Myth of Presidential Leadership*: Univ. of Illinois Press, 272 p.

Sagan, Carl, 1994, *Pale blue dot: A vision of the human future in space*: New York, Random House, 429 pp.

Schmitt, H. H., 2006, *Return to the Moon: Exploration, Enterprise, and Energy in the Human Settlement of Space*: Spring, 336 p.

Wolfe, Tom, 2001 *The Right Stuff*: Bantam, 368 p.

Zimmerman, R., 1999, *Genesis: The Story of Apollo 8*: Dell, 368 p.

Zubrin, R., 1997, *The Case for Mars*: Free Press, 368 p.

Old Syllabus of Record

Note: the course number was changed to GEOS 154 and the title revised to Human Exploration of Space by Senate approval on April 20, 2010 (UWUCC 09-59e).

SYLLABUS OF RECORD

I. Catalog Description:

GEOS 254: Exploration of Space 3c-0-3cr
Prerequisite: No Geoscience majors/minors
The history, technical considerations, and scientific and social issues of the exploration of the planets and smaller objects of the solar system. Early rocketry, the race to the Moon, and past robotic missions provide a perspective to consider current and future science missions and human settlement beyond Earth. Includes field observations and activities that may occur on evenings and weekends.

II. Course Outcomes/Objectives
At the end of this course students will be able to:
1) Describe and analyze the most important scientific principles, technical issues, and logistical challenges in robotic space exploration and human space travel.
2) Identify key questions and priorities for future space exploration and outline appropriate mission designs to meet them.
3) Demonstrate an understanding of scientific principles and methods of inquiry used in the study of the solar system and the gains in science made through space exploration.
4) Demonstrate knowledge of the history of space exploration and the contributions of diverse groups and interests.
5) Synthesize and apply knowledge they have learned in the planning of future scientific and human activities in space.

III. Detailed Course Outline
Lecture
Part A (6 hours): Principles of Flight and Space Science
Beginnings: Models of the Universe; Telescopes
Part B (14 hours): History of Space Exploration and the Space Race
First Rockets: Tsiolkovsky, Goddard, the German VfR, WWII
The Cold War: Von Braun and Korolyov
Sputnik and the Space Race begins
Orbital Flight
Their Finest Hour - The Race to the Moon
Midterm Exam (1 hour)
Part C (6 hours): Robotic Missions
Robotic Missions and Space Science: 1960s
Planetary missions in 1970s and 1980s
Faster, Better, Cheaper: Missions since 1990
Part D (15 hours): Humans in Space and Prospects for the Future
Living in Space: Soyuz/ Skylab/Intl. Space Station

Who goes into space?: The elite vs. inclusion, past and future
What is next?
U.S. plans
Other countries in space
How much cost is too much? What is worth doing?
Return to the Moon/Visiting Mars/Living Beyond Earth

Final Exam during Final Exam Period

IV. Evaluation Methods

In-Class writing	Short answers to questions on assigned reading and prior class activities	15%
Time Line	Small group project to construct a time line of the first (1945-1972) or second (1972-2003) space age for the U.S. or for the U.S.S.R./Russia	15%
Written Report on a Space Mission	Research paper on a robotic or manned space mission	15%
Written Proposal for a Future Mission	Detailed outline of a future robotic mission, manned mission, or other study of space	15%
Class Participation	Attendance, participation in discussion and class activities	5%
Midterm Exam	Short answers and essays over reading, class topics, and assignments	15%
Final Exam (Culminating Activity)	Short answers and essays over reading, class topics, and assignments for the entire term	20%

V. Example Grading Scale

The final grade for this course will be determined using the following scale:
A=90-100%; B=80-89%; C=70-79%; D=60-69%; F=below 60%

VI. Undergraduate Course Attendance Policy

The attendance policy will conform to IUP's undergraduate course attendance policy.

VII. Texts:

Sagan, Carl, 1994, *Pale blue dot: A vision of the human future in space*: New York, Random House, 429 pp.
Furniss, Tim, 2006, *A history of space exploration*: London, Mercury Books, 192 pp.

Supplementary readings from the Bibliography will be required.

VIII. Special Resource Requirements

There are no special resource requirements for this course

IX. Bibliography

Burrows, William E., 1998, *This new ocean: The story of the first space age*: New York, Random House, 723 + xviii pp.

Cadbury, Deborah, 2005, *Space Race: The epic battle between America and the Soviet Union for Dominion of space*: New York, Harper Collins, 373 + xii pp.

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Heppenheimer, T. A., 1999, *Countdown: A history of space flight*: Wiley, 416 pp.

Launius, R. D., 1997, *Spaceflight and the Myth of Presidential Leadership*: Univ. of Illinois Press, 272 p.

Schmitt, H. H., 2006, *Return to the Moon: Exploration, Enterprise, and Energy in the Human Settlement of Space*: Spring, 336 p.

Weitekamp, M. A. 2005, *Right Stuff, Wrong Sex: America's First Women in Space Program (Gender Relations in the American Experience)*: Johns Hopkins Univ. Press, 256 p.

Wolfe, Tom, 2001 *The Right Stuff*: Bantam, 368 p.

Zimmerman, R., 1999, *Genesis: The Story of Apollo 8*: Dell, 368 p.

Zubrin, R., 1997, *The Case for Mars*: Free Press, 368 p.

2. Summary of the proposed revisions.

1. Objectives – course objectives from the 2008 syllabus of record were aligned with the Expected Undergraduate Student Learning Outcomes (EUSLO).

2. Common Learning Objectives for non-laboratory Natural Science course were incorporated into the content of the course. These objectives include: examine a body of knowledge of natural science that will contribute to an understanding of the natural world and an appreciation of the impacts that natural sciences have on the lives of individuals and the world in which they live; understand the differences between science as a knowledge base and science as a process that generates knowledge; develop an inquiring attitude consistent with the tenets of natural science; understand the empirical nature of science; understand the concept of bias and the efforts to which scientists go to avoid it.

3. Updated text and non-textbook to more current books and also updated the bibliography.

3. Justification/Rationale for the revision.

The course is a currently approved Liberal Studies Non-Laboratory Natural Science course and is being revised to meet the new curriculum criteria for this category.

Liberal Studies Course Approval General Information

1. As only one faculty member in the Geoscience Department has the expertise to teach this course, it is not anticipated that there will be more than one section per semester.

2. During Week 11, the focus will be on the issue of who goes into space. The first astronauts and support personnel were men from the majority groups in the U.S. and the U.S.S.R. The women chosen but never flown for Project Mercury, the first (Soviet) woman in space, and the participation by minority and Third-World astronauts in recent years illustrate how space exploration and society have changed in the last half-century. Weeks 12-14 include consideration of the question whether only rich, developed nations will explore and settle space, and, if not, how the cost will be paid while meeting other responsibilities on Earth.

3. One aspect of Space Exploration that is well covered in published works is biographies and other histories of early manned space missions. Examples of such readings that will be included are excerpts from Chaikin's A Man on The Moon and Zimmerman's Genesis: The Story of Apollo 8. The true stories in these works contain drama as well as lessons for the future of space exploration.

4. Exploration of Space emphasizes not only technical challenges and scientific discoveries, but also the human context of scientific discovery. The efforts of humanity to visit space and explore the solar system provide many examples of how scientific questions are formulated and answered. The interplay between technology and the ends it serves are illustrated by launch vehicles and robotic spacecraft. The last part of the course emphasizes application of these experiences to planning future scientific and human activities in space, so that students must synthesize and apply what they have learned.

   This course differs from an introductory course for majors in both scope and emphasis. The university does not have any introductory astronomy courses specifically for geoscience majors. The only astronomy courses for majors (GEOS 341 and 342) concern the objects and processes in the solar system and universe respectively and require significant knowledge of physics and mathematics. The events that produced our understanding of the solar system and universe are not covered in GEOS 341 and 342.

Example Assignment and Rubric

Time Line Project

This is a small group project to construct a time line of the first (1945-1972) or second (1973-2003) space age for the U.S. or for the U.S.S.R./Russia. It includes several parts:

I. Construct, as a group, a time line to display in class.
II. Participate in the display and explanation of your timeline to other members of the class.
III. A short, individual written summary of the most important events on your timeline, and why you chose them, submitted via Moodle.

[date 1] Group sign up for timelines, drawing for topics after class
[date 2] Display of completed timelines in class and individual write ups *due by the start of class*

Details and grading:
I. Your time line should have the following elements:
Linear display of time, long (or tall) enough to show time at a scale of 1 inch or 25 mm per year and at least one sheet of paper wide. The choice of materials or colors is up to you.
Key events clearly indicated by name of mission or other event and some may be illustrated with small pictures or drawings. Each should include a key fact or two.

Grading will cover the following areas:
Neat and readable appearance
Appropriate choice of events
Time(s) of events are identifiable
Events are in correct sequence
Events correctly described and key facts included
All sources of information listed
40 points possible

I will also have each of you fill in an online questionnaire detailing your contribution and giving your assessment of the contributions of the other members of your group.

II. Your participation in the presentation will be part of your class participation grade. As the date approaches I will give specific guidelines. You will want to get your time line here that day and be present to explain it and view the time lines of other groups. You will be responsible for knowing the basic ideas of all four timelines, so you will need to learn and take notes from the other three.

III. Rubric for paper:

Summarize the most important events on your timeline. How do they tie together? Why did you choose these events as most important? 300-500 words would be appropriate. To be submitted via Moodle. *Penalties for late work will apply.*

Organization: Logical flow from introductory paragraph through event summaries to closing paragraph; point of paper is clear; length and scope appropriate. (0-5 points)

Arguments: Events you select as most important are clearly identified and summarized/It is clear what is original and what is from other authors. (0-10 points)

Written English: Use of grammar, spelling, word choice. (0-10 points)

Originality: Any direct quotes are properly cited and attributed; content of paper as presented is your own creation. (0-10 points)

35 points possible

Human Exploration of Space
Time Line Score Sheet

Group:
Assigned topic:

Points

Neat and readable appearance (up to 10 points)
Linear display of time, long (or tall) enough to show time at a scale of 1 inch or 25 mm per year and at least one sheet of paper wide.

Time(s) of events are identifiable (up to 5 points)

Events are in correct sequence (up to 5 points)

Appropriate choice of events (up to 10 points)

Events correctly described and key facts included (up to 5 points)

Key events clearly indicated by name of mission or other event and some may be illustrated with small pictures or drawings. Each should include a key fact or two.

All sources of information listed (up to 5 points)

Total
(40 points possible)

Comments:

Human Exploration of Space
Time Line Paper Score Sheet

Student:
Assigned topic:

Points

Organization: (up to 5 points)
Logical flow from introductory paragraph through event summaries to closing paragraph; ties within paper is clear; length and scope appropriate.

Arguments: (up to 10 points)
Events you select as most important are clearly identified and summarized/Event selection justified; It is clear what is original and what is from other authors.

Written English: (up to 10 points)
Use of grammar, spelling, word choice.

Originality: (up to 10 points)
Any direct quotes are properly cited and attributed; content of paper as presented is your own creation.

All sources of information listed if not on poster

Total
(35 points possible)

Comments: