

LSC Use Only No: <u>07-28</u>	LSC Action-Date:	UWUCC USE Only No.	UWUCC Action-Date: <u>App-11/27/07</u>	Senate Action Date: <u>App-1/29/08</u>
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Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee

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

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

1. Course Proposals (check all that apply)	
<input checked="" type="checkbox"/> New Course	<input type="checkbox"/> Course Prefix Change
<input type="checkbox"/> Course Revision	<input type="checkbox"/> Course Deletion
<input type="checkbox"/> Course Number and/or Title Change	<input type="checkbox"/> Catalog Description Change

<i>Current Course prefix, number and full title</i>	<i>Proposed course prefix, number and full title, if changing</i>

2. Additional Course Designations: check if appropriate	
<input checked="" type="checkbox"/> This course is also proposed as a Liberal Studies Course.	<input type="checkbox"/> Other: (e.g., Women's Studies, Pan-African)
<input type="checkbox"/> This course is also proposed as an Honors College Course.	
3. Program Proposals	
<input type="checkbox"/> New Degree Program	<input type="checkbox"/> Catalog Description Change
<input type="checkbox"/> New Minor Program	<input type="checkbox"/> Program Title Change
<input type="checkbox"/> New Track	<input type="checkbox"/> Program Revision
<input type="checkbox"/> Other	

<i>Current program name</i>	<i>Proposed program name, if changing</i>

4. Approvals	
	Date
Department Curriculum Committee Chair(s)	<u>[Signature]</u> 10/29/07
Department Chair(s)	<u>[Signature]</u> 10/29/07
College Curriculum Committee Chair	<u>[Signature]</u> 10/29/07
College Dean	<u>[Signature]</u> 10/29/07
Director of Liberal Studies *	<u>[Signature]</u> 8-5-08
Director of Honors College *	
Provost *	
Additional signatures as appropriate:	
(include title)	
UWUCC Co-Chairs	<u>[Signature]</u> 11/27/07

* where applicable

Received

NOV 06 2007

Liberal Studies

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 on 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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- 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.

Course Analysis Questionnaire

Section A: Details of the Course

A1. How does this course fit into the programs of the department? For which students is the course designed? Explain why this content cannot be incorporated into an existing course.

This course is an addition to the non-lab science courses offered by the Geoscience Department. The course is intended for students from majors outside the Geoscience Department to satisfy the Liberal Studies science requirement. No course presently offered addresses the topics of this course, which merit a full-semester treatment.

A2. Does this course require changes in the content of existing courses or requirements for a program?

This course does not require changing the existing content of any other courses or requirements for any program.

A3. Has this course ever been offered at IUP on a trial basis?

This course is being offered during the Spring 2008 semester as a special topic course (GEOS 281) with an enrollment of 40.

A4. Is this course to be a dual-level course?

This course is not a dual-level course.

A5. If this course may be taken for variable credit, what criteria will be used to relate the credits to the learning experience of each student?

This course cannot be taken for variable credit.

A6. Do other higher education institutions currently offer this course?

A survey of PASSHE and other universities in the region yielded only one course similar to the proposed course. The University of Pittsburgh offers the lecture course ASTRON 0087, Basics of Space Flight, for 3 credits. The description reads, in part: "This is a self-contained course for students not majoring in the physical sciences. Topics covered include overview of the solar system, gravitation and mechanics, the history of space flight, rocket propulsion, the Moon landings, interplanetary trajectories and planetary orbits, light, remote sensing, interstellar space travel and life in the universe. Specific examples of planetary space missions and their scientific instruments, goals and results will be discussed. Particular emphasis will be placed on current missions."

A7. Is the content, or are the skills, of the proposed course recommended or required by a professional society, accrediting authority, law or other external agency?

No professional society, accrediting authority, law or other external agency recommends or requires any specific content or skills for this course.

Section B: Interdisciplinary Implications

B1. Will this course be taught by instructors from more than one department or team taught within the department?

This course will be taught by one instructor from the Geoscience Department.

B2. What is the relationship between the content of this course and the content of courses offered by other departments?

There is no overlap between the content of this course and that of other courses offered by other departments.

B3. Will this course be cross-listed with other departments?

This course will not be cross-listed with any other department.

B4. Will seats in this course be made available to students in the School of Continuing Education?

No.

Section C: Implementation

C1. Are faculty resources adequate?

Faculty resources are currently adequate to teach this course. The course will be offered once per year by the faculty member with responsibility for teaching astronomy courses in the Geoscience Department. It will be scheduled so that GEOS 105 and 106 (Exploring the Universe lecture and lab, respectively) will continue to be offered twice per year. Where GEOS 105 has been offered in two sections in past semesters, the offerings would now be one section of GEOS 105 and one section of this new course. This course will be counted as one preparation and three hours of equated workload.

C2. What other resources will be needed to teach this course and how adequate are the current resources?

- a. Classroom space is currently adequate to teach this course.
- b. There is no special equipment required to teach this course.
- c. No expense for consumable supplies is expected for this course.
- d. Library materials will be acquired for this course within the regular library allotment for the Department.
- e. There will be no additional travel expenses.

C3. Are any of the resources for this course funded by a grant?

No resources for this course are funded by a grant.

C4. How frequently do you expect this course to be offered?

The Department expects this course to be offered once per year. There are no seasonal restrictions.

C5. How many sections of this course do you anticipate offering in any single semester?

We anticipate offering a single section of this course in a given semester.

C6. How many students do you plan to accommodate in a section of this course?

A section of this course will be similar in size to other liberal studies science courses in astronomy offered by the Geoscience Department, limited in size by the classroom in which the course is taught.

C7. Does any professional society recommend enrollment limits or parameters for a course of this nature?

No professional society recommends enrollment limits or parameters for this course.

C8. Not applicable.

Section D: Miscellaneous

None.

LIBERAL STUDIES COURSE APPROVAL, PARTS 1-3: GENERAL INFORMATION CHECK-LIST

I. Please indicate the LS category(ies) for which you are applying:

LEARNING SKILLS:

First Composition Course Second Composition Course
 Mathematics

KNOWLEDGE AREAS:

Humanities: History Fine Arts
 Humanities: Philos/Rel Studies Social Sciences
 Humanities: Literature Non-Western Cultures
 Natural Sci: Laboratory Health & Wellness
 Natural Sci: Non-laboratory Liberal Studies Elective

II. Please use check marks to indicate which LS goals are **primary, secondary, incidental, or not applicable**. When you meet with the LSC to discuss the course, you may be asked to explain how these will be achieved.

Prim	Sec	Incid	N/A
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

- A. Intellectual Skills and Modes of Thinking:**
1. Inquiry, abstract logical thinking, critical analysis, synthesis, decision making, and other aspects of the critical process.
 2. Literacy--writing, reading, speaking, listening.
 3. Understanding numerical data.
 4. Historical consciousness.
 5. Scientific Inquiry.
 6. Values (Ethical mode of thinking or application of ethical perception).
 7. Aesthetic mode of thinking.

B. Acquiring a Body of Knowledge or Understanding Essential to an Educated Person

_____ _____

C. Understanding the Physical Nature of Human Beings

_____ _____
 _____ _____

- D. Collateral Skills:**
1. Use of the library.
 2. Use of computing technology.

III. The LS criteria indicate six ways that courses **should** contribute to students' abilities. Please check all that apply. When you meet with the LSC, you may be asked to explain your check marks.

1. Confront the major ethical issues which pertain to the subject matter; realize that although "suspended judgment" is a necessity of intellectual inquiry, one cannot live forever in suspension; and make ethical choices and take responsibility for them.
2. Define and analyze problems, frame questions, evaluate available solutions and make choices.
3. Communicate knowledge and exchange ideas by various forms of expression, in most cases writing and speaking.
4. Recognize creativity and engage in creative thinking.
5. Continue learning even after the completion of their formal education.
6. Recognize relationships between what is being studied and current issues, thoughts, institutions, and/or events.

IV. Response to Liberal Studies questions

- A. 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.
- B. 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.
- C. One aspect of Space Exploration that is well covered in published works are 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.
- D. 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.

V. CHECK LIST -- NATURAL SCIENCES (Non-laboratory)

Knowledge Area Criteria which the course must meet:

- Treat concepts, themes and events in sufficient depth to enable students to appreciate the complexity, history and current implications of what is being studied; and not be merely cursory coverage of lists of topics.
- Suggest the major intellectual questions/problems which interest practitioners of a discipline and explore critically the important theories and principles presented by the discipline.
- Allow students to understand and apply the methods of inquiry and vocabulary commonly used in the discipline.
- Encourage students to use and enhance, wherever possible, the composition and mathematics skills built in the Skill Area of Liberal Studies.

Natural Science Criteria which the course must meet:

- Examine a body of knowledge of natural science that will contribute to an understanding of the natural world.
- Provide an understanding of the development of natural science theories and their modification.
- Teach students to formulate and test hypotheses.
- Provide an understanding of some of the "great moments" in the history of natural science and the individuals, including women and minorities, responsible for them.

Additional Natural Science Criteria which the course should meet:

- Encourage an appreciation of the complex interrelationship of natural science with the life of the individual.
- Develop in students the abilities necessary to cope with the consequences of natural science in the modern world.
- Develop an inquiring attitude consistent with the tenets of natural science, an attitude that is willing to expose fallacy on the basis of reason, that demands evidence for scientific assertions and yet is tolerant of hypotheses in the absence of contradictory evidence.

SYLLABUS OF RECORD

*Original -
has been revised*

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.

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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.
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III. Detailed Course Outline

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

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

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The Cold War: Von Braun and Korolyov

Sputnik and the Space Race begins

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Midterm Exam (1 hour)

Part C (6 hours): Robotic Missions

Robotic Missions and Space Science: 1960s

Planetary missions in 1970s and 1980s

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

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Who goes into space?: The elite vs. inclusion, past and future

What is next?

U.S. plans

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How much cost is too much? What is worth doing?
Return to the Moon/Visiting on 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%
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V. Example Grading Scale

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

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VIII. Special Resource Requirements

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Course Analysis Questionnaire

Section A: Details of the Course

A1. How does this course fit into the programs of the department? For which students is the course designed? Explain why this content cannot be incorporated into an existing course.

This course is an addition to the non-lab science courses offered by the Geoscience Department. The course is intended for students from majors outside the Geoscience Department to satisfy the Liberal Studies science requirement. No course presently offered addresses the topics of this course, which merit a full-semester treatment.

A2. Does this course require changes in the content of existing courses or requirements for a program?

This course does not require changing the existing content of any other courses or requirements for any program.

A3. Has this course ever been offered at IUP on a trial basis?

This course is being offered during the Spring 2008 semester as a special topic course (GEOS 281) with an enrollment of 40.

A4. Is this course to be a dual-level course?

This course is not a dual-level course.

A5. If this course may be taken for variable credit, what criteria will be used to relate the credits to the learning experience of each student?

This course cannot be taken for variable credit.

A6. Do other higher education institutions currently offer this course?

A survey of PASSHE and other universities in the region yielded only one course similar to the proposed course. The University of Pittsburgh offers the lecture course ASTRON 0087, Basics of Space Flight, for 3 credits. The description reads, in part: "This is a self-contained course for students not majoring in the physical sciences. Topics covered include overview of the solar system, gravitation and mechanics, the history of space flight, rocket propulsion, the Moon landings, interplanetary trajectories and planetary orbits, light, remote sensing, interstellar space travel and life in the universe. Specific examples of planetary space missions and their scientific instruments, goals and results will be discussed. Particular emphasis will be placed on current missions."

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- b. There is no special equipment required to teach this course.
- c. No expense for consumable supplies is expected for this course.
- d. Library materials will be acquired for this course within the regular library allotment for the Department.
- e. There will be no additional travel expenses.

C3. Are any of the resources for this course funded by a grant?

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C4. How frequently do you expect this course to be offered?

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C5. How many sections of this course do you anticipate offering in any single semester?

We anticipate offering a single section of this course in a given semester.

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C7. Does any professional society recommend enrollment limits or parameters for a course of this nature?

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C8. Not applicable.

Section D: Miscellaneous

None.

LIBERAL STUDIES COURSE APPROVAL, PARTS 1-3: GENERAL INFORMATION CHECK-LIST

I. Please indicate the LS category(ies) for which you are applying:

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 Humanities: Philos/Rel Studies Social Sciences
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II. Please use check marks to indicate which LS goals are primary, secondary, incidental, or not applicable. When you meet with the LSC to discuss the course, you may be asked to explain how these will be achieved.

Prim Sec Incid N/A

- A. Intellectual Skills and Modes of Thinking:**
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B. Acquiring a Body of Knowledge or Understanding Essential to an Educated Person

C. Understanding the Physical Nature of Human Beings

- D. Collateral Skills:**
1. Use of the library.
 2. Use of computing technology.

III. The LS criteria indicate six ways that courses should contribute to students' abilities. Please check all that apply. When you meet with the LSC, you may be asked to explain your check marks.

1. Confront the major ethical issues which pertain to the subject matter; realize that although "suspended judgment" is a necessity of intellectual inquiry, one cannot live forever in suspension; and make ethical choices and take responsibility for them.

2. Define and analyze problems, frame questions, evaluate available solutions and make choices.

3. Communicate knowledge and exchange ideas by various forms of expression, in most cases writing and speaking.

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IV. Response to Liberal Studies questions

- A. 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.
- B. 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.
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V. CHECK LIST -- NATURAL SCIENCES (Non-laboratory)

Knowledge Area Criteria which the course must meet:

- Treat concepts, themes and events in sufficient depth to enable students to appreciate the complexity, history and current implications of what is being studied; and not be merely cursory coverage of lists of topics.
- Suggest the major intellectual questions/problems which interest practitioners of a discipline and explore critically the important theories and principles presented by the discipline.
- Allow students to understand and apply the methods of inquiry and vocabulary commonly used in the discipline.
- Encourage students to use and enhance, wherever possible, the composition and mathematics skills built in the Skill Area of Liberal Studies.

Natural Science Criteria which the course must meet:

- Examine a body of knowledge of natural science that will contribute to an understanding of the natural world.
- Provide an understanding of the development of natural science theories and their modification.
- Teach students to formulate and test hypotheses.
- Provide an understanding of some of the "great moments" in the history of natural science and the individuals, including women and minorities, responsible for them.

Additional Natural Science Criteria which the course should meet:

- Encourage an appreciation of the complex interrelationship of natural science with the life of the individual.
- Develop in students the abilities necessary to cope with the consequences of natural science in the modern world.
- Develop an inquiring attitude consistent with the tenets of natural science, an attitude that is willing to expose fallacy on the basis of reason, that demands evidence for scientific assertions and yet is tolerant of hypotheses in the absence of contradictory evidence.