

LSC Use Only Proposal No: \_\_\_\_\_ UWUCC Use Only Proposal No: 11-1236  
 LSC Action-Date: AP-3/22/12 UWUCC Action-Date: App-4/19/12 Senate Action Date: App-5/01/12

**Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee**

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Proposing Department/Unit <b>Geosciences</b>	Phone <b>x2379</b>

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)**

<input type="checkbox"/> New Course	<input type="checkbox"/> Course Prefix Change	<input type="checkbox"/> Course Deletion
<input checked="" type="checkbox"/> Course Revision	<input type="checkbox"/> Course Number and/or Title Change	<input type="checkbox"/> Catalog Description Change

Current course prefix, number and full title: GEOS103 Oceans and Atmospheres Lecture

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)

<input type="checkbox"/> Learning Skills	<input checked="" type="checkbox"/> Knowledge Area	<input type="checkbox"/> Global and Multicultural Awareness	<input type="checkbox"/> Writing Across the Curriculum (W Course)
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Liberal Studies Elective (please mark the designation(s) that applies – must meet at least one)

<input type="checkbox"/> Global Citizenship	<input type="checkbox"/> Information Literacy	<input type="checkbox"/> Oral Communication
<input type="checkbox"/> Quantitative Reasoning	<input type="checkbox"/> Scientific Literacy	<input type="checkbox"/> Technological Literacy

**3. Other Designations, as appropriate**

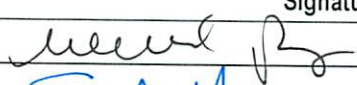
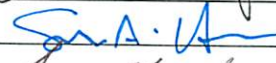
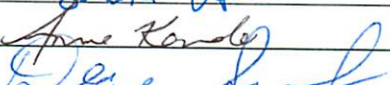

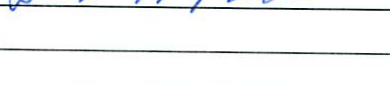
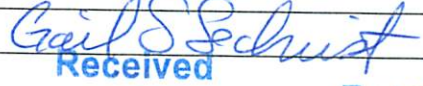
<input type="checkbox"/> Honors College Course	<input type="checkbox"/> Other: (e.g. Women's Studies, Pan African)
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**4. Program Proposals**

<input type="checkbox"/> Catalog Description Change	<input type="checkbox"/> Program Revision	<input type="checkbox"/> Program Title Change	<input type="checkbox"/> New Track
<input type="checkbox"/> New Degree Program	<input type="checkbox"/> New Minor Program	<input type="checkbox"/> Liberal Studies Requirement Changes	<input type="checkbox"/> Other

Current program name: \_\_\_\_\_

Proposed program name, if changing: \_\_\_\_\_

5. Approvals	Signature	Date
Department Curriculum Committee Chair(s)		3/6/12
Department Chairperson(s)		3/6/12
College Curriculum Committee Chair		3/8/12
College Dean		3/12/12
Director of Liberal Studies (as needed)		4/19/12
Director of Honors College (as needed)		
Provost (as needed)		
Additional signature (with title) as appropriate		
UWUCC Co-Chairs		4/19/12

<b>Received</b>	<b>Received</b>	<b>Received</b>
APR 11 2012	APR 5 2012	MAR 12 2012
<b>Liberal Studies</b>	<b>Liberal Studies</b>	<b>Liberal Studies</b>

## Part II.

### I. New Syllabus of Record

GEO 103 Oceans and Atmospheres 3 class hours, 0 lab hours, 3 credits (3c-0l-3cr)

Prerequisites: No Geoscience Majors/Minors

The Earth's oceans and atmosphere play a crucial role in determining the pace and extent of changes occurring to our global environment. Examines the composition and character of these components and their interaction with other major components of the Earth system.

### II. Course Outcomes and Assessment (Expected Undergraduate Student Learning Outcomes)

#### Objective 1:

Demonstrate that geological processes on the Earth such as plate tectonics are interconnected to the physical, chemical and biological systems of the ocean.

#### Expected Student Learning Outcomes 1 and 2

Informed and Empowered Learners

#### Rationale:

The Earth has one connected ocean that is shaped by geological and physical processes. Course content and assignments are designed to show that various components of the Earth System are linked over long periods of geological time.

#### Objective 2:

Students will assess human use of oceanic resources and think critically about the historical impact and future development of these resources. Students will consider current events such as climate change, pollution and fisheries industry, and the global economic and political regulation of these resources.

#### Expected Student Learning Outcomes 1, 2 and 3

Informed, Empowered and Responsible Learners

#### Rationale:

Assignments and course content will engage students about knowledge that although the ocean is large, it is finite and resources are limited. By looking at current issues related to resource development, students can begin to appreciate the complexities of managing and regulating these resources.

#### Objective 3:

Students will diagram and analyze how the ocean and life in the ocean shape the features of the Earth.

#### Expected Student Learning Outcomes 1, 2 and 3

Informed, Empowered and Responsible Learners

#### Rationale:

Assignments and course content will require students to have general knowledge of the hydrologic cycle and how coastal processes shape the shorelines. Assignments will also engage student to assess human development and how it impacts the coastal environment.

#### Objective 4:

Students will learn about the role the oceans play in the carbon cycle and greenhouse warming. Students also will be required to critically analyze geological records of climate change to assess the varying roles of natural and human influence.

#### Expected Student Learning Outcomes 1, 2 and 3

Informed, Empowered and Responsible Learners

#### Rationale:

Assignments and course content will engage students to examine and assess how the ocean is a major influence on weather and climate by examining the important role that the oceans have played throughout geological records of past climate changes.

**Objective 5:**

Students will consider how much of the seafloor environment has been explored and how much remains to be discovered. Students also will discover the impact oceans have on the cultural, political and economic development of society.

**Expected Student Learning Outcomes 1, 2 and 3**

Informed, Empowered and Responsible Learners

**Rationale:**

Assignments and course content will inspire students to understand that the ocean is largely unexplored but inextricably connected to humans and reflect on ways the oceans may have influenced their own cultural and societal history. Through these connections, we hope to show relevance to the study of the oceans to all humans, not just those living near the coast or studying it from afar.

**III. Course Outline:**

- |                                                       |                         |
|-------------------------------------------------------|-------------------------|
| <b>A. Origin of the Earth, Oceans, and Atmosphere</b> | <b>6 academic hours</b> |
| 1. The blue planet                                    |                         |
| Making the Earth                                      |                         |
| Making the Moon                                       |                         |
| The origins of water                                  |                         |
| 2. The early Earth                                    |                         |
| Geological evolution of the planet                    |                         |
| Mantle and crust origin                               |                         |
| Plate tectonics                                       |                         |
| <b>B. Marine provinces and sedimentation</b>          | <b>6 academic hours</b> |
| 1. Seafloor topography                                |                         |
| Shelves and slopes                                    |                         |
| Trenches and ridges                                   |                         |
| Seamounts and banks                                   |                         |
| 2. Coastal and pelagic sediments                      |                         |
| Processes of marine sedimentation                     |                         |
| Distribution of marine sediments                      |                         |
| Marine sedimentation, past and present                |                         |
| <b>Exam 1</b>                                         | <b>1 academic hour</b>  |
| <b>C. Seawater properties and ocean chemistry</b>     | <b>4 academic hours</b> |
| 1. Ocean composition                                  |                         |
| The major salts                                       |                         |
| What else is in there?                                |                         |
| 2. Ocean properties                                   |                         |
| Sound and light                                       |                         |
| Salinity and pressure                                 |                         |
| <b>D. Air and sea interactions</b>                    | <b>4 academic hours</b> |
| 1. Fluids in motion                                   |                         |
| Atmospheric circulation                               |                         |
| Waves                                                 |                         |
| 2. Ocean circulation                                  |                         |
| Surface circulation and currents                      |                         |
| Thermohaline (deep) currents                          |                         |
| <b>Exam 2</b>                                         | <b>1 academic hour</b>  |
| <b>E. Life in the oceans</b>                          | <b>5 academic hours</b> |
| 1. Primary productivity                               |                         |
| Photosynthesis                                        |                         |
| The base of the food chain                            |                         |
| 2. Marine food resources                              |                         |
| Availability of nutrients                             |                         |
| Upwelling zones                                       |                         |
| 3. Marine communities                                 |                         |
| Coral reefs: the oceans' rain forests                 |                         |

- A whole new world: hydrothermal vent communities
- F. The Earth's gaseous envelope 4 academic hours
1. What's up there?
    - Atmospheric structure
    - Atmospheric composition
  2. Energy makes the world go around
    - Solar energy
    - Energy from the earth
- Exam 3** 1 academic hour
- G. Weather and major weather phenomena 5 academic hours
1. The daily forecast
    - Mid-latitude storms
    - The jet stream
  2. Weather as a destructive force
    - Severe thunderstorms
    - Tornados and hail
  3. Rain, clouds and fog
- H. Climate and climatic changes 5 academic hours
1. Climate change versus weather
    - Scales of climate change
    - Proxy sediment records of climate change
  2. Cycles of climate change
    - Oceanic scale cycles
    - Orbital scale cycles
    - Tectonic scale cycles
  3. Human influences on climate
    - Carbon dioxide and the greenhouse effect
    - Oceanic carbon dioxide reservoirs
- Final Exam during exam time scheduled by the registrar** 2 hours

#### IV. Evaluation Methods

The final grade for this course will be determined as follows:

- 80% Tests. Four tests, consisting of multiple choice, true-false and matching questions, worth 100 points each.
- 10% Short in-class assessment or assignments
- 10% Non-text book review. A 2-4 page book review of the non-text reading is due the last day of class.

#### V. Grading Scale

A 90-100%, B 80-89%, C 70-79%, D 60-69%, F <60%

#### VI. Undergraduate Course Attendance Policy

IUP attendance policy will be followed as outlined in the undergraduate catalog.

#### VII. Required Textbook

Trujillo, A. and Thurman, H., 2011. Essentials of Oceanography (10<sup>th</sup> Ed), Prentice Hall, 551p.

#### Supplemental/Non-textbook reading

SPHERE By Michael Crichton. 385 pp. New York: Alfred A. Knopf

#### Suggested Readings

Bullard, E. (1969) The origin of the oceans, Scientific American, 221, p. 66-75.

#### VIII. Special Resource Requirements

none

**IX. Bibliography**

- Bekker, A., et al. (2004) Dating the rise of atmospheric oxygen, *Nature*, 427, p.177-120.
- Broecker, W. S., (1997) Thermohaline circulation, the Achilles heel of our climate system: Will man-made CO<sub>2</sub> upset the current balance? *Science*, 278, p. 1582-1588.
- Buesseler, K. and Boyd, P., (2003) Will ocean fertilization work? *Science*, 300, p.67-68.
- Irion, R. (1998) Instruments Cast Fresh Eyes on the Sea, *Science*, 281, p. 194-196.
- Kennett, J. (2002) Methane hydrates in Quaternary climate change: The smoking gun hypothesis, Washington, D.C., American Geophysical Union.
- Milliman, J. D. ed. (1998) Deep sea biodiversity: A compilation of recent advances in honor of Robert. R. Hessler, *Deep-Sea Research*, 45, p. 1-12.
- National Research Council. 2000. Reconciling Observations of Global Temperature Change, U.S. Govt. Printing Office, Washington, DC.
- Philander, G. (2001) El Niño Southern Oscillation phenomena, *Nature*, 302, p. 295-301.
- Ruddiman, W.F., 2001. *Earth's Climate – Past and Future*. W.H. Freeman and Co., 465p.
- Tarback, E.J., and Trujillo, A.P., 2010, *Introductory Oceanography (10th Ed.)*. Englewood Cliffs, NJ: Prentice Hall, 461 p.
- The Open University Course Team, (1989) *Ocean chemistry and deep-sea sediments*, Oxford: Pergamon Press, 211pp.

## Part II (continued)

### 2. Summary of the proposed revisions.

1. Objectives – the course objectives were revised from the original syllabus of record and aligned with the Expected Undergraduate Student Learning Outcomes (EUSLO) and Common Learning Objectives found in the criteria for a non-laboratory Natural Science course.
2. Common Learning Objectives for a non-laboratory Natural Science course are met in the content portion of the course (not necessarily a specific revision but it should be noted that the objectives for the new curriculum have been met). These objectives are:
  - 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 textbook and added an additional non-textbook reading to a classic paper that discusses the early ideas about how the oceans formed.
4. Added seven more current citations to the bibliography.

## Part II.

### 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.

## Part II (continued)

## 4. Old Syllabus of Record

**GEOS 103 Oceans and Atmospheres****I. Catalog Description:**

GEOS 103 Oceans and Atmospheres

3 credits

3 lecture hours

Prerequisites: No Geoscience Majors/Minors

(3c-01-3sh)

The Earth's oceans and atmosphere play a crucial role in determining the pace and extent of changes occurring to our global environment. This course will examine the composition and character of these components and their interaction with other major components of the Earth system.

**II. Course Objectives:**

1. Students will learn about the composition of the ocean environment and how physical, chemical, geological, and biological changes interact to cause important changes this important component of the Earth's system.
2. Students will learn what causes and controls weather phenomena and how these changes influence and are influenced by human interaction.
3. Students will learn how the atmospheres and oceans interact to create the present-day pattern of global climates and the possibility for further changes in the future.

**III. Course Outline:****A. Origin of the Earth, Oceans, and Atmosphere (6 hours)**

1. The blue planet
  - Making the Earth
  - Making the Moon
  - The origins of water
2. The early Earth
  - Geological evolution of the planet
  - Mantle and crust origin
  - Plate tectonics

**B. Marine provinces and sedimentation (6 hours)**

1. Seafloor topography
  - Shelves and slopes
  - Trenches and ridges
  - Seamounts and banks
2. Coastal and pelagic sediments
  - Processes of marine sedimentation
  - Distribution of marine sediments
  - Marine sedimentation, past and present

**C. Seawater properties and ocean chemistry (4 hours)**

1. Ocean composition
  - The major salts
  - What else is in there?
2. Ocean properties

Sound and light  
Salinity and pressure

D. Air and sea interactions (4 hours)

1. Fluids in motion
  - Atmospheric circulation
  - Waves
2. Ocean circulation
  - Surface circulation and currents
  - Thermohaline (deep) currents

E. Life in the oceans (6 hours)

1. Primary productivity
  - Photosynthesis
  - The base of the food chain
2. Marine food resources
  - Availability of nutrients
  - Upwelling zones
3. Marine communities
  - Coral reefs: the oceans' rain forests
  - A whole new world: hydrothermal vent communities

F. The Earth's gaseous envelope (4 hours)

1. What's up there?
  - Atmospheric structure
  - Atmospheric composition
2. Energy makes the world go around
  - Solar energy
  - Energy from the earth

G. Weather and major weather phenomena (6 hours)

1. The daily forecast
  - Mid-latitude storms
  - The jet stream
2. Weather as a destructive force
  - Severe thunderstorms
  - Tornados and hail
3. Rain, clouds and fog

H. Climate and climatic changes (6)

1. Climate distribution
  - Koppen classification
  - Zonal climate distribution
2. Local climate variation
  - Urban climates
  - Microclimates
3. Human influences on climate
  - Carbon dioxide and the greenhouse effect
  - Ozone destruction and pollution

#### IV. Evaluation Methods

The final grade for this course will be determined as follows:

85% Tests. Four tests, consisting of multiple choice, true-false and matching



questions, worth 100 points each. Tests will be computer-graded and adjusted to a mean of 75% so that 90-100%=A; 80-89%=B; 70-79%=C; 60-69%=D; below 60%=F. The same scale will be used for the final point score.  
 15% Non-text book review. A three to four page book review of the non-text reading is due the last day of class. Worth 75 points.

#### **V. Required textbooks, supplemental books and readings:**

Textbook: Thurman, INTRODUCTION TO OCEANOGRAPHY (6th ed).  
 New York:

Non-text: May vary with instructor, but will include choices such as:

Michael Crichton SPHERE  
 John Barnes MOTHER OF STORMS  
 WHAT LIGHT THROUGH YONDER  
 WINDOW BREAKS  
 SECRETS OF THE SEAS

#### **VI. Special resource requirements: None**

#### **VII. Bibliography**

Ahrens, C.D., 1994, METEOROLOGY TODAY: AN INTRODUCTION TO WEATHER, CLIMATE AND THE ENVIRONMENT (5th Ed.) New York: West Publishing 591 p.

Anthes, R.A., 1992, METEOROLOGY (6th Ed.). Columbus: Merrill Publishing, 218 p.

Lutgens, F.K. and Tarbuck, E.J., 1995, THE ATMOSPHERE (6th Ed.). Englewood Cliffs NJ: Prentice Hall, 461 p.

Gross, M.G., 1990, OCEANOGRAPHY (6th Ed). Columbus: Merrill Publishing, 190 p.

Ingmanson, D.E. and Wallace, W.J., 1993, OCEANOGRAPHY: AN INTRODUCTION (5th Ed.). New York: Wadsworth Publishers, 493 p.

Lutgens, F.K. and Tarbuck, E.J., 1995, THE ATMOSPHERE (6th Ed.). Englewood Cliffs NJ: Prentice Hall, 461 p.

Pickard, G.L. and Emery, W.J., 1990, DESCRIPTIVE PHYSICAL OCEANOGRAPHY: AN INTRODUCTION (5th Ed.) New York: Pergamon Press, 320 p.

Skinner, B.J. and Porter, S.C., 1995, THE BLUE PLANET: AN INTRODUCTION TO EARTH SYSTEMS SCIENCE. New York: John Wiley & Sons, 493 p.

Suckling, P.W. and Doyon, R.R., 1991, STUDIES IN WEATHER AND CLIMATE (3rd Ed.). Raleigh: Contemporary Publishing Co., 202 p.

## **Oceans and Atmospheres**

GEOS 103. Oceans and Atmospheres 3c-01-3sh

Prerequisite: No GEOS majors/minors

The earth's oceans and atmosphere play a crucial role in determining the pace and extent of changes occurring to our global environment. Examines the composition and character of these components of their interaction with other major components of the earth system.

### Answers to Liberal Studies Questions

- A. Multiple instructors will teach sections of the course, however they will use a common course outline, common assignments and exams. This course was developed collaboratively between the two faculty instructors and they regularly interact to update common components.
- B. Wherever possible, lectures and lab material for Oceans and Atmospheres will emphasize the contributions of women and racial & ethnic minorities. Examples will include those currently involved in active research programs (eg. aboard the Ocean Drilling Program vessel Resolution; Susan Solomon, Project Leader for the Ozone-CFC project) and in prominent government and administrative positions (eg. NSF Program Director; Margaret Leinen).
- C. As noted in the syllabus, non-text reading material for this course includes a selection from science fiction/adventure novels centering on oceanographic or climate issues (Sphere,) as well as non-fiction accounts of working geologists and the issues that confront them (Scientific American article detailing the scientific evolution of understanding about the formation of our oceans). Past experience with Liberal Studies sections indicates that some students respond enthusiastically to exciting fiction stories, while others prefer fact-based books that relate to real-life. This course will therefore continue to offer the option of both types, to give all students a meaningful non-text reading experience.
- D. Far more than in our major's classes, Oceans and Atmospheres will emphasize the social context and ramifications of global ocean resources and human interaction with oceans and climate. Examples to be discussed include 1) Harbor structures and the impact they have on shoreline development (eg. Santa Barbara, Santa Monica) 2) Zebra Mussel infiltration into the Great Lakes ecosystem and efforts to control them 3) the "Law of the Sea" and the Exclusive Economic Zone treaty 4) global ramifications of possible Greenhouse Warming and Ozone Depletion 5) social and economic impact of current weather events. Discussions such as these will probably arise in almost every class meeting of Oceans and Atmospheres

*EXAMPLE ASSIGNMENT and GRADING RUBERIC FOR GEOS103*

**Must be submitted to Moodle before December 3<sup>th</sup>, 2010**

Worth up to 10 Assessment Points

- The Ted Talks : There is a small nonprofit group that has an annual conference every year devoted to “Ideas Worth Spreading”. They have speakers on a wide variety of topics every year about poverty, health, literature, economics, science...and so much more.
- Your assignment is to watch 2 of the ted talks that they have posted online and in your own words write a 1 page response to each. This response should include a short summary of the talk followed by your own reactions and opinion on the talk. Please include the name of the speaker and the link to the ted talk on your assignment.

**Save your file as a Word.doc, .pdf or .RTF file-type (no others will be graded).**

**The name of your file should be:**

***last\_name tedtalk assignment***

- Talk #1 should be one of the following, which are about the ocean
  - a. Bob Ballard:  
[http://www.ted.com/talks/lang/eng/robert\\_ballard\\_on\\_exploring\\_the\\_oceans.html](http://www.ted.com/talks/lang/eng/robert_ballard_on_exploring_the_oceans.html)
  - b. Sylvia Earle:  
[http://www.ted.com/talks/lang/eng/sylvia\\_earle\\_s\\_ted\\_prize\\_wish\\_to\\_protect\\_our\\_oceans.html](http://www.ted.com/talks/lang/eng/sylvia_earle_s_ted_prize_wish_to_protect_our_oceans.html)
  - c. Capt. Charles Moore:  
[http://www.ted.com/talks/lang/eng/capt\\_charles\\_moore\\_on\\_the\\_seas\\_of\\_plastic.html](http://www.ted.com/talks/lang/eng/capt_charles_moore_on_the_seas_of_plastic.html)
  - d. Graham Hawkes:  
[http://www.ted.com/talks/lang/eng/graham\\_hawkes\\_flies\\_through\\_the\\_ocean.html](http://www.ted.com/talks/lang/eng/graham_hawkes_flies_through_the_ocean.html)
  - e. Tierney Thys:  
[http://www.ted.com/talks/lang/eng/tierney\\_thys\\_swims\\_with\\_the\\_giant\\_sunfish.html](http://www.ted.com/talks/lang/eng/tierney_thys_swims_with_the_giant_sunfish.html)
  - f. David Gallo:  
[http://www.ted.com/talks/lang/eng/david\\_gallo\\_shows\\_underwater\\_astonishments.html](http://www.ted.com/talks/lang/eng/david_gallo_shows_underwater_astonishments.html)
  - g. Cari Safina:  
[http://www.ted.com/talks/carl\\_safina\\_the\\_oil\\_spill\\_s\\_unseen\\_culprits\\_victims.html](http://www.ted.com/talks/carl_safina_the_oil_spill_s_unseen_culprits_victims.html)
- Talk #2 you can pick ANY of the talks that are available online. You can search the website for a particular topic

*EXAMPLE ASSIGNMENT and GRADING RUBRIC FOR GEOS103*

**Ted Talks  
Grading Rubric**

	<b>Outstanding (20-25 points)</b>	<b>Satisfactory (15-20 points)</b>	<b>Unsatisfactory (0 to 15 points)</b>
<b>ADMINISTRATION</b>  Pts _____	Completed entire assignment in timely manner. All deadlines made.	Some parts of assignment incomplete or turned in slightly late.	Assignments were turned in significantly beyond deadlines. Major components missing or incomplete..
<b>MECHANICAL</b>  Pts _____	Proper spelling, grammar and formatting throughout.	Only minor typographical mistakes in spelling or formatting.	Numerous mistakes in spelling or grammar. Proper format not followed.
<b>ORGANIZATION</b>  Pts _____	Concepts flow well and are important points are clearly identified.	Concepts follow a general outline and some of the important points are emphasized.	Concepts unclear, scattered. Difficult to determine what important points of paper were.
<b>UNDERSTANDING</b>  Pts _____	All concepts are well understood and explained very clearly at appropriate level.	Most concepts are understood and explained clearly.	Many concepts are not understood or are not explained clearly or are irrelevant.