**Curriculum Proposal Cover Sheet – form is available on-line as an interactive PDF**

| *LSC Use Only* Proposal No: | *UWUCC Use Only* Proposal No: 12-25a. |
|---|---|
| LSC Action-Date: App - 9/13/12 | UWUCC Action-Date: App-10/16/12 Senate Action Date: App-11/6/12 |

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

| Contact Person(s) **Karen Rose Cercone** | Email Address **kcercone@iup.edu** |
|---|---|
| Proposing Department/Unit **Geoscience** | Phone **7- 7650** |

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 _____ Course Prefix Change _____ Course Deletion

__X__ Course Revision _____ Course Number and/or Title Change _____ Catalog Description Change

*Current course prefix, number and full title:* ***GEOS 101 The Dynamic Earth***

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

**2. Liberal Studies Course Designations, as appropriate**

__X__ 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 Intensive (include W cover sheet)

_____ 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**

Received
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_____ Honors College Course _____ Other: (e.g. Women's Studies, Pan African)

**4. Program Proposals**

Liberal Studies

_____ 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) | | 4/13/12 |
| Department Chairperson(s) | | 4/13/12 |
| College Curriculum Committee Chair | | 4/20/12 |
| College Dean | | 4/20/12 |
| Director of Liberal Studies (as needed) | | 9/14/12 |
| Director of Honors College (as needed) | | |
| Provost (as needed) | | |
| Additional signature (with title) as appropriate | | |
| UWUCC Co-Chairs | Gail S Sechrist | 10/16/12 |

Part II.

## 1. Syllabus of Record

### I. Catalog Description

GEOS 101 The Dynamic Earth 3c-0l-3cr

Prerequisites: No Geoscience Majors/Minors

Examines the constant changes that affect the rocky surface of our planet. From volcanic eruptions and catastrophic earthquakes to the slow drift of continents and passage of ice ages, earth processes have shaped the history of life and altered the development of human civilization.

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

**Objective 1:**

Students will discover how the Earth's internal heat drives the process of plate tectonics which shapes our planet's surface and creates many of its worst natural disasters.

**Expected Student Learning Outcomes 1 and 2**

Informed and Empowered Learners

**Rationale:**

The Earth's landscape is the result of long-term tectonic processes, which also control the occurrence of natural disasters such as earthquakes, volcanic eruptions and resultant landslides and tsunamis. Course content and assignments are designed to show how surface landscapes and natural disasters are fundamentally linked in to the Earth's composition, structure and internal heat.

**Objective 2:**

Students will investigate the environments and processes which form the three major rock types (igneous, metamorphic and sedimentary and then learn how to interpret the historical rock record in terms of ancient environments, tectonic events and global climate changes.

**Expected Student Learning Outcomes 1 and 2**

Informed and Empowered Learners

**Rationale:**

Rocks hold the record of the Earth's geologic past in their structures, fossil content and composition. Course assignments and content will engage students in the critical interpretation of rocks, strengthening their ability to reconstruct past events based on their own observations.

**Objective 3:**

Students will examine stratigraphic sections using tools such as cross-bed inclination, unconformity geometry, rock deformation and fossil content in order to determine the relative age and geologic history of the sequence.

**Expected Student Learning Outcomes 1 and 2**

Informed and Empowered Learners

**Rationale:**

The order in which geologic events occur is a key component of reconstructing the ancient past. Assignments and course content will require students to master interpretive tools such as cross-bed inclination, unconformity geometry, rock deformation and fossil content in order to answer hypothetical questions that involve

the relative age and geologic history of rock sequences.

**Objective 4:**

Students will examine the movement of water through rivers, soils, groundwater, ice and oceans in order to develop an appreciation for the world's limited fresh-water resources. Students will also discover how water resources can be over-used and degraded by human activity.

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

Informed, Empowered and Responsible Learners

**Rationale:**

The Earth's water cycle is a key factor in the current distribution of resources and human conflicts around the globe. Students will learn what geological factors control this vital resource and engage in informed debate about the ways in which conflicts might be solved by better resource management.

**Objective 5:**

Students will investigate oceanographic and atmospheric circulation in order to predict the impact of variations such as El Nino and La Nina on climate variation in the United States. Students will also debate the ways in which scientific ethics may be impacted by political and economic forces in the contentious debate over whether or not to mitigate climate change.

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

Informed, Empowered and Responsible Learners

**Rationale:**

Fundamental geologic processes such as plate tectonics, orbital variation and volcanic activity create a complex system of dynamic balances that result in long-term climate variations. Assignments and course content will ask students to reflect on the ways in which natural and human-induced climate changing forces interact, and also to make critical judgments about future climate change.

## III. Course Outline

**Part A:** Introduction to the Earth — 6 hours
- The scientific method
- History of the Sun and solar system
- Minerals, the building blocks of rocks

**Part B:** How the Earth Works: Plate Tectonics — 6 hours
- Plate theory, plate evidence and types of plate boundaries
- Plate tectonic impacts: volcanoes, earthquakes and tsunamis

**Exam One** — 1 hour

**Part C:** The rock cycle — 10 hours
- Igneous processes and rock types
- Weathering, Erosion and Soils
- Sedimentary Processes, Environments and Rock Types
- Metamorphic Processes and Rock Types

**Exam Two** — 1 hour

**Part D:** Geologic time and stratigraphy — 6 hours
- Relative Age Dating
- Absolute Age Dating
- The Geologic Time Scale

**Part E:** The water cycle — 6 hours
- Rivers, floods and mass movement
- Groundwater and caves

- Deserts, Glaciers and Ice Ages

**Exam Three** 1 hour

**Part F:** Earth resources, environments and climate change 5 hours

- Mineral and energy resources
- Environmental issues and climate change

**Cumulative final during final exam period** 2 hours

## IV. Evaluation Methods

Each component of the course will contribute to final grade according to:

| | |
|---|---|
| Weekly Forum Assignments | 30% |
| Exam 1 | 15% |
| Exam 2 | 15% |
| Exam 3 | 15% |
| Final Exam | 25% |
| Total | 100% |

## V. Example Grading Scale

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

## VI. Attendance Policy

The attendance policy will conform to IUP's undergraduate course attendance policy as outlined in the undergraduate catalog.

## VII. Required textbooks, supplemental books and readings

Text: Lutkins, Frederick K., Tarbuck, Edward J. and Tasa, Dennis, 2011, Essentials of Geology 11th Edition: Prentice Hall, 576 pages.

Supplemental Reading: Kolbert, Elizabeth, 2006, Field Notes from a Catastrophe: Man, Nature and Climate Change: Bloomsbury USA, 240 pages.

## VIII. Special resource requirements

There are no special resource requirements for this course.

## IX. Bibliography

In addition to the required textbooks and supplemental readings from science journals, the following will be used to develop the course curriculum:

Asher, Pranoti, 2001, Teaching an Introductory Physical Geology Course to a Student with Visual Impairment. *Journal of Geoscience Education*, v49 n2 p166-69.

Fletcher, Chip, 2011, Introducing Critical Thinking to the Physical Geology Classroom. Wiley Faculty Network Peer-Reviewed Guest Lecture(Feb 17, 2011). Web Archive: https://wiley.adobeconnect.com/_a44433639/p224esq32s3/

Liben, Lynn S., Karstens, Kim A. and Christensen, Adam, 2011, Spatial Foundations of Science Education: The Illustrative Case of Instruction on Introductory Geological Concepts. *Cognition and Instruction*, v29 n1 p45-87

Marshak, Steve, Wilkerson, M. Beth & Wilkerson, M. Scott, 2009, Essentials of Geology 3rd Edition: Norton, 776 pages.

Lutkins, Frederick K., Tarbuck, Edward J. and Tasa, Dennis, 2010, Earth: An Introduction to Physical Geology 10th Edition: Prentice Hall 744 pages.
Wicander, Reed, and Monroe, James, 2008, Essentials of Physical Geology 5th Edition: Brooks Cole, 503 pages

**2. Summary of the proposed revisions.**

1. Objectives – course objectives were modified from the 1995 syllabus of record and 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.

4. Added more current citations to 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. This course was developed and has been taught by many different instructors in the department. During a single semester, the course is generally taught in one section by one instructor. Occasionally, one instructor may teach two sections, or two sections may be taught by two different instructors. Instructors frequently consult and collaborate on syllabi, textbooks and assignments for this course.

2. Readings taken from Vassar College Professor Jill S. Schneiderman's collection of essays entitled "The Earth Around Us: Maintaining a Livable Planet" [W.H. Freeman and Company: New York, 2000, 455p.; ISBN 0-7167-3397-8] will showcase contributions that female scientists have made to geology. Authors published in this collection include Marcia Bjornerud (Lawrence University), Allison McFarlane (George Mason University), Cathryn Manduca (Carleton College), Kirsten Menking (Vassar College), Naomi Oreskes (University of California at San Diego), and Jill Singer (Buffalo State University).

3. In addition to the textbook "Essentials of Geology", the class will read major portions of Elizabeth Kolbert's 2006 book entitled "Field Notes from a Catastrophe: Man, Nature and Climate Change". These readings will be used as a springboard for reflective assignments and group discussions on the ethics of climate research and responsible climate policy.

4. This course introduce students to the fundamental processes that impact our planet as a home for humanity, including plate tectonics and natural disasters, the water cycle and the climate change. This course is intended to give students enough knowledge of earth science to permit them to make informed and responsible decisions, both on the personal level ("Should I buy a house built in a floodplain? Should I move to California?") and on a broad national level ("Should I buy a hybrid vehicle? Should I bike to work?"). The strong emphasis on how nature impacts human civilization and how human activity in turn affects nature makes this course very different from our majors courses such as GEOS 201, 202 and 203 that go into more detail and depth about the materials and evidence required for actual geologic investigations.

## Example Assignment and Rubric

### Weekly Moodle Forum Assignment 1:

For this activity, you need to use the internet to find a specific example of your assigned plate boundary from some actual location on Earth. (Do not post a generic illustration of your boundary from Wikipedia!) Once you've found an example, download an illustration of it to your computer, then post that in your assigned forum along with the following information:

- Name of your feature
- Geographic location of your feature
- Source of your information (website)
- Explanation of why your chosen feature is an example of the forum topic

You must use the 'reply' option in the lower right hand corner of my initial post for each topic to keep your submission inside the appropriate discussion topic thread. You will be graded on your initial post for this weekend activity, so be sure you're posting in the right forum and have the correct information. Any stray threads you make by 'adding new question' will be deleted and you will not receive credit for your work.

Use the attachment tool to attach your illustration in jpg or gif format. You should see the illustration appear as soon as you post your example to the forum. If not, delete it immediately and try again.

**Group Assignments:**
First name beginning with letters A to D: Rifting Zones
First name beginning with letters E to I: Transform Zones
First name beginning with letters J to L: Subduction Zones
First name beginning with letters M to R: Collision Zones
First name beginning with letters S to Z: Spreading Zones

### Forum Post Grading Rubric

| | **Excellent** (5 points) | **Good** (3 to 4 points) | **Unsatisfactory** (0 to 2 points) |
|---|---|---|---|
| **Research**<br><br>**Pts _____** | Student chooses an original and thoughtful example of the assigned feature or geologic process. | Student uses an example of a feature or process that was previously discussed in class lecture. | Student uses an example of a feature or process that does not match the assigned forum topic. |
| **Mechanics** | Student posts a clear illustration to present their chosen example | Student posts an adequate illustration of their chosen example | Student either posts a poor illustration of their example or fails to |

| | | | |
|---|---|---|---|
| **Pts _____** | and notes both its geographic location and the source of info. | and notes either its geographic location or their source of info. | note its location and source of information. |
| **Understanding**<br><br>**Pts _____** | Student explains the rationale for their example clearly and with great insight into the processes which formed it. | Student explains the rationale for their example correctly and with specific geologic details about the processes involved. | Student fails to explain the rationale for their example or makes many incorrect statements about the processes involved. |

**Old Syllabus of Record**

## GS 101 The Dynamic Earth

**I. Catalog Description:**

| | |
|---|---|
| GS 101 The Dynamic Earth | 3 credits |
| | 3 lecture hours |
| Prerequisites: No Geoscience Majors/Minors | (3c-0l-3sh) |

Examines the constant changes that affect the rocky surface of our planet. From volcanic eruptions and catastrophic earthquakes to the slow drift of continents and passage of ice ages, earth processes have shaped the history of life and altered the development of human civilization.

**II. Course Objectives**

1. Students will learn about the earth's modern dynamic processes, including tectonic activity, climate change and astronomical impacts.
2. Students will study the earth's geologic and fossil record to gain a new perspective on our planet's past and future.
3. Students will examine the interactions of geologic processes with life on earth, in order to understand the complex connections between the earth and its inhabitants

**III. Course Outline**

A. Journey to the center of the earth (3 hours)
   1. Earth's origin
      Initial formation of the planets
      Differentiation of the earth and moon
   2. Earth's internal structure
      Crust, mantle and lithosphere
      Heat flow, magnetism and gravity

B. The rise of plate tectonics (5 hours)
   1. Plate tectonic theory
      Types of tectonic plates: continent versus ocean
      Types of plate boundaries: convergent, divergent and transform
   2. Plate tectonics and landforms

C. The endless cycle (9 hours)
   1. The rock cycle: igneous, sedimentary and metamorphic rocks
   2. Igneous rocks close-up
      Volcanoes versus plutons
      Where does magma come from?
      Plate tectonic controls
   3. Sedimentary rocks close-up
      Erosion and weathering
      Sediments on land: deserts, rivers, deltas and beaches
      Sediments at sea: reefs, turbidites, deep-sea muds
   4. Metamorphic rocks close-up
      Pressure versus temperature
      Plate tectonic controls

D. Dance of the continents (7 hours)
   1. Evolution of the earth's major continents

Archean micro-plates
Proterozoic and later supercontinents
Recent plate motions

2 Evolution of the earth's major mountain chains
The Appalachians
The Rocky Mountains
The Alps and Himalayas

E. No vestige of a beginning... (4 hours)
1. Geologic time
Radiometric age dating
Paleontology & stratigraphy
2. Development of the geologic time scale
Primary, Secondary ... no, that's not working
Can Old Senators Demand More Powerful Positions
Than Junior Congressmen? Put Eggs On My Plate Please.

F. Dinosaurs and other successes (9 hours)
1. The fossil record
Early life forms
The Cambrian explosion
2. The evolution of early life
Rise of land plants
The vertebrates emerge
3. The evolution of later life
Dinosaurs and mass extinctions
Mammals and birds

G. ... no prospect of an end? (5 hours)
1. Climate change
Ice ages & greenhouse times
Human impact on climate change
2. Earth and space resources
Energy resources, renewable and otherwise
Mineral resources at home and abroad
Genetic resources & the current mass extinction

**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. 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 four to five page book review of the non-text reading is due the last day of class. Worth 75 points.

Note that evaluation methods may differ slightly under different instructors (ie, additional quizzes and/or reading assignments).

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

Textbook: Thompson, G.R., Turk, J. and Levin, H.L., EARTH PAST AND AND PRESENT: AN ENVIRONMNTALAPPROACH. New York, Saunders College Publishing, 663 p.

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

John Horner DIGGING DINOSAURS
Michael Crichton JURASSIC PARK
John McPhee THE CONTROL OF NATURE
David Brin EARTH

**VI. Special resource requirements** None.

**VII. Bibliography**

Bakker, R.T., 1986, THE DINOSAUR HERESIES. New York: Zebra Books, 481 p.
Foster, R.J., 1991, GEOLOGY (6th Ed), Columbus: Merrill Publishing, 228 pp.
Lemon R.R., 1993, VANISHED WORLDS: AN INTRODUCTION TO HISTORICAL GEOLOGY. Dubuque, William Brown Publishers, 480 p.
Laing, D., 1991, THE EARTH SYSTEM: AN INTRODUCTION TO EARTH SCIENCE: Dubuque: Wm. C. Brown, 590 p.
Press, F. and Siever, R., 1986, EARTH. New York: W.H. Freeman and Company.656 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.
McKinney, M.L. and Tolliver, R.L., 1994, CURRENT ISSUES IN GEOLOGY: SELECTED READINGS. New York: West Publishing Company, 254 p.
Tarbuck, E.J. and Lutgens, F.K., 1994, EARTH SCIENCE (7th Edition). New York: McMillan College Publishing Company, 755 p.
Thompson, G.R. and Turk, T., 1995, EARTH SCIENCE AND THE ENVIRONMENT. New York: Saunders College Publishing, 607 p.