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Submission Date: 12/12/95
Action-Date: Senate App 2/6/96

CURRICULUM PROPOSAL COVER SHEET
University-Wide Undergraduate Curriculum Committee

I. CONTACT

Contact Person Karen Rose Cercone Phone 5623

Department Geoscience

II. PROPOSAL TYPE (Check All Appropriate Lines)

COURSE Dynamic Earth
Suggested 20 character title

New Course * GS 101 The Dynamic Earth / GS 102 The Dynamic Earth I
Course Number and Full Title

Course Revision _____
Course Number and Full Title

Liberal Studies Approval+ GS 101 Dynamic Earth / GS 102 Dynamic Earth Lab
for new or existing course Course Number and Full Title

Course Deletion _____
Course Number and Full Title

Number and/or Title Change _____
Old Number and/or Full Old Title

_____ New Number and/or Full New Title

Course or Catalog Description Change _____
Course Number and Full Title

PROGRAM: Major Minor Track

New Program * _____
Program Name

Program Revision * _____
Program Name

Program Deletion * _____
Program Name

Title Change _____
Old Program Name

_____ New Program Name

III. Approvals (signatures and date)

Karen Rose Cercone 5/7/95 FULLER 5/7/95
Department Curriculum Committee Department Chair

[Signature] [Signature]
College Curriculum Committee College Dean

+ Director of Liberal Studies (where applicable) * Provost (where applicable)

II. DESCRIPTION OF THE CURRICULUM CHANGE**1. New Syllabi of Record**

Two syllabi of record are attached for the new course sequence GS 101/102 The Dynamic Earth, part of a new non-major sequence entitled Introduction to Geoscience

GS 101 The Dynamic Earth**I. Catalog Description:**

GS 101 The Dynamic Earth 3 credits
3 lecture hours

Prerequisites: No Geoscience Majors/Minors (3c-01-3sh)

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 PRESENT: AN ENVIRONMENTAL APPROACH. 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.

VII. Bibliography (con't)

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.

IV. Evaluation Methods

- 30% Quizzes. Eight ten-point quizzes will cover previous week's lab or field trip.
- 70% Two non-cumulative lab exams, worth one-hundred points each. Exams will consist of sample identification, short essay and map-based questions. Tests will be 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.

V. Required textbooks, supplemental books and readings:

The IUP Dynamic Earth Lab Manual (Course Packet). This lab manual was locally developed to take advantage of the unique local geology of the area around IUP. Nationally published lab manuals were consulted during the development process to ensure quality, parity and relevance to national trends in the geological sciences.

VI. Special resource requirements: None

VII. Bibliography:

Foster, R.J., 1991, GEOLOGY (6th Ed), Columbus: Merrill Publishing, 228 pp.

Laing, D., 1991, THE EARTH SYSTEM: AN INTRODUCTION TO EARTH SCIENCE:
Dubuque: Wm. C. Brown, 590 p.

Tarbuck, E.J. and Lutgens, F.K., 1994, EARTH SCIENCE (7th Edition). New York:
McMillan College Publishing Company, 755 p.

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ENVIRONMENTAL APPROACH. New York, Saunders College Publishing, 663 p.

COURSE ANALYSIS QUESTIONNAIRE

Section A: Details of the Course

A1. The new sequence Introduction to Geoscience of which GS 101/102 The Dynamic Earth is a part is designed to be the primary department offering for non-major students who are fulfilling their Liberal Studies science requirement. Students may take any two of the three Introduction to Geoscience lecture/lab sequences to fulfill their Option I science requirement, or they may take all three lectures and one of the three labs to fulfill their Option II science requirement.

The new three-semester Introduction to Geoscience sequence functionally replaces the old two-semester Earth Science sequence. Earth Science is being simultaneously renumbered and converted to an introductory course for science education majors only. Introduction to Geoscience also functionally replaces the non-major portions of GS 121/122 Physical Geology and GS 131/132 Historical Geology. These course sequences are being renumbered and converted to introductory courses for department majors and minors only.

A2. This course does require changes in several department courses and programs. Accordingly, course revisions for the new GS 111-114 Earth Science, GS 121/122 Physical Geology and GS 131/132 Historical Geology are being submitted in conjunction with this new course proposal. In addition, the old non-lab General Astronomy (GS 110) will be dropped from the department course offerings. All science education programs which formerly required GS 101-104 Earth Science will now be changed to require GS 111-114 Earth Science. These minor program revisions have also been submitted as part of the total Geoscience Curriculum packet.

A3. The complete Introduction to Geoscience course sequence has never been offered at IUP. The lecture portion of GS 105 General Astronomy will draw heavily on the former GS 110 General Astronomy. All other components of the course sequence will be new.

A4. This is not a dual-level course.

A5. This is not a variable-credit course.

A6. Almost every institution with a geoscience department offers some type of introductory geology, oceanography and/or astronomy course. Several examples are given in Section D.

Section B: Interdisciplinary Implications

B1: Each component of the Introduction to Geoscience sequence (ie, GS 101, GS 102, etc) will be taught as a separate course by a single instructor.

B2: No other departments on campus offer courses in these three areas.

B3: Seats in this course will be made available to students from Continuing Education.

Section C: Implementation

C1: No additional faculty resources are required to teach this course sequence. As shown in the overview discussion of faculty resources, the faculty contact hours needed to teach GS 101/102, as well as GS 103/104 and GS 105/106, will be obtained primarily from the conversion of our existing introductory science courses to majors only (ie, much smaller) sections. The two additional hours needed to teach the new schedule will be obtained from alternate-year rotation of upper-level majors courses. The number of class preps in the department does increase, but will be accommodated through careful scheduling.

Please note that while the number of lecture seats for non-majors will be increased by this change, the number of lab seats will be decreased slightly. Please see the course package overview for a detailed discussion of this change.

C2: The department has sufficient lecture and lab space to accommodate this new course. Lecture and lab space previously used for the non-major portions of the old Earth Science and Physical/Historical Geology sequences will now be transferred to Introduction to Geoscience

The department also holds sufficient samples and equipment for the lab component of these new courses. Specimens, maps, student equipment and lab supplies previously designated for use by the non-major labs of Earth Science and Physical/Historical Geology will simply be transferred to use by Introduction to Geoscience.

Funds exist in the department for normal replacement of specimens, maps and equipment parts worn out or broken by student usage.

No additional library resources or travel funds are required for this class.

C3: No grant funding exists or is needed for this class.

C4: Two Introduction to Geoscience courses (usually GS 101/102 and GS 103/104) will be offered in both the Fall and Spring semesters. Courses will also be offered in each of the Summer sessions.

C5: In Fall and Spring, we anticipate offering two lecture sections with four corresponding lab sections for each lecture (ie, eight total). In summer, we will probably offer one lecture section with one or two corresponding lab sections.

C6: In Fall and Spring, lecture sections will accommodate 120 students each (the maximum number of students that can be scheduled in the newly-remodeled Weyandt Room 32 auditorium). Lab sections will always accommodate 25 students each.

C7: No professional society recommendations exist for a course like this.

Section D: Course descriptions from other universities

101. Earth and Ancient Life (I; 3, 3; U)

Aspects of Earth and ancient life selected to introduce the nature, the excitement, and the human dimension of modern historical science to the general student. Not open to students who have taken GE 104.

103. The Dynamic Earth (I; 3, 3; U)

General introduction to the earth's external and internal dynamic systems; processes that operate within plate tectonics to make Earth a unique planet.

***D103f Exploring the Dynamic Earth**

Earth is a dynamic and ancient planet. Geology, as the study of Earth, is concerned with understanding how the natural world operates as well as realizing the natural world's impact on society. In this field-oriented course, we evaluate the history of the planet; its structure and composition; and earth-shaping processes such as earthquakes, volcanic eruptions, mountain building, glaciation, and erosion. By learning how to read the landscape and rock record,

students can then evaluate the history and current state of the Earth. Lectures and weekly field and lab projects introduce the major concepts and techniques of geology. No previous knowledge of geology is required. Enrollment limited to 15.

Ms. Savoy

*Prereq. fy; soph. and permission of instructor;
2 meetings (11/4 hours), 1 laboratory (3 hours);
4 credits*

Liberal Studies Course Approval Form Instruction Sheet

Use this form only if you wish to have a course included in a Liberal Studies Learning Skill or Knowledge Area category. Do not use this form for synthesis or writing-intensive sections; different forms are available for these. If you have questions, contact the Liberal Studies Office, 352 Sutton Hall, telephone 357-5715.

This form is intended to assist you in developing your course to meet IUP's Criteria for Liberal Studies and to arrange your proposal in a standard order for consideration by the Liberal Studies Committee (LSC) and the University-wide Undergraduate Curriculum Committee. When you have finished, your proposal will have these parts:

- Standard UWUCC Course Proposal Cover Sheet, with signatures (one page)
- Completed copy of LS General Information Check-List--Parts 1-3 of this form (one page)
- One sheet of paper for your answers to the four questions in Part IV of this form (one page)
- Completed check-list for each curriculum category in which your course is to be listed--e.g. Non-Western Cultures, Fine Arts, etc. (one page each) [Check-lists are found in the appendix to this Handbook.]
- Course syllabus in UWUCC format.

Note: If this is a new course not previously approved by the University Senate, you will also need answers to the UWUCC Course Analysis Questionnaire. These are not considered by the LSC but will be forwarded to the UWUCC along with the rest of the proposal after the LSC completes its review. For information on UWUCC procedures for new courses or course revisions, see appropriate sections of this Handbook.

Submit one (1) copy of the completed proposal to the Liberal Studies Office (352 Sutton Hall.) The Liberal Studies Committee will make its own copies from your original; the committee does reserve the right to return excessively long proposals for editing before they are duplicated. (If you happen to have extra copies of the proposal, you are invited to send multiple copies to the LSC to save unnecessary copying.)

Please Number All Pages

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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:

- | | |
|---|---|
| <input type="checkbox"/> Humanities: History | <input type="checkbox"/> Fine Arts |
| <input type="checkbox"/> Humanities: Philos/Rel Studies | <input type="checkbox"/> Social Sciences |
| <input type="checkbox"/> Humanities: Literature | <input type="checkbox"/> Non-Western Cultures |
| <input checked="" type="checkbox"/> Natural Sci: Laboratory | <input type="checkbox"/> Health & Wellness |
| <input checked="" type="checkbox"/> Natural Sci: Non-laboratory | <input type="checkbox"/> Liberal Studies Elective |

GS 101/102
GS 101

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"/> |
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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.

- | | |
|--|---|
| <input checked="" type="checkbox"/> 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. |
| <input checked="" type="checkbox"/> 2. | Define and analyze problems, frame questions, evaluate available solutions and make choices. |
| <input checked="" type="checkbox"/> 3. | Communicate knowledge and exchange ideas by various forms of expression, in most cases writing and speaking. |
| <input type="checkbox"/> 4. | Recognize creativity and engage in creative thinking. |
| <input checked="" type="checkbox"/> 5. | Continue learning even after the completion of their formal education. |
| <input checked="" type="checkbox"/> 6. | Recognize relationships between what is being studied and current issues, thoughts, institutions, and/or events. |

Liberal Studies Approval Parts 4-6**IV. Liberal Studies Questions**

A. When GS 101 The Dynamic Earth is first taught, the lecture section will be handled by a single professor who will be responsible for organizing course content, collecting and documenting visual media, and developing the initial exams and quizzes. In later semesters, this instructor will be responsible for orienting any other faculty who are assigned to teach the course, and will share with them her outlines, notes and library of supporting media. She will also share sample exam questions, to ensure that all sections provide uniform and fair evaluation of the students.

When GS 102 The Dynamic Earth Lab is first taught, several faculty members will coordinate and share the work of developing and piloting the labs. These faculty will use a common course-pack, coordinate lab schedules, share lab materials and meet on a biweekly basis to critique and improve lab layouts as the course runs. In subsequent years, lab instructors will continue to coordinate lab schedules and share materials. In a small department such as ours, we have encountered no difficulty using this type of consulting procedure to keep Liberal Studies sections of Earth Science and Physical/Historical Geology equivalent.

B. Wherever possible, lectures and lab material for The Dynamic Earth will emphasize the contributions of women geologists and earth scientists from around the world. Examples include Tanya Atwater's development of plate theory for California; Luis Alvarez's theory of cometary impact for the extinction of the dinosaurs; and Anita Harris's contributions to the geology of the Appalachian Mountains. We hope to expand this list further as Dr. D.S. Richardson completes her on-going research on the contributions of early women geologists.

C. As noted in the syllabus, non-text reading material for this course includes a choice of science fiction and adventure novels centering on geologic issues (Jurassic Park; Earth) as well as non-fiction accounts of working geologists and the issues that confront them (The Control of Nature, Digging Dinosaurs). 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. To a much greater extent than in our majors courses, The Dynamic Earth will emphasize the political ramifications of natural resource distributions and the environmental issues that arise from human being's interaction with geologic processes. Examples to be discussed include flood damage along the Mississippi and whether it was worsened by Army Corps of Engineer's channelization; water storage and use in California, and its contribution to the growing schism between northern and southern parts of the state; desertification of sub-Saharan Africa and its contribution to political unrest in Rwanda, Somalia and other countries; and many more. It would not be an exaggeration to state that discussions such as these will arise in almost every class meeting of The Dynamic Earth.

CHECK LIST – NATURAL SCIENCES (Laboratory)

GS 101-102

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 Areas 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.

Natural Science Laboratory Criteria which the course must meet:

- Provide students with opportunities to learn and apply data-gathering techniques.
- Provide students with opportunities to develop skills in making accurate observations, in formulating concise and appropriate descriptions of natural phenomena, and in producing meaningful systems of classification for natural objects.
- Provide students with opportunities to apply theories to practice in the working world of science.

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 sciences, 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.

CHECK LIST -- NATURAL SCIENCES (Non-laboratory)

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GS 101

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:

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