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89-90

PROGRAM REVISION: Change from B.S. in Geoscience  
to B.S in Environmental Geoscience  
Geoscience Department  
Karen Rose Cercone, contact person

APPROVALS

<u>CSutton</u>	Connie J. Sutton, Curriculum Chair Geoscience Department
<u>FWHall</u>	Frank W. Hall, Chairperson Geoscience Department
<u>Boyer &amp; Ross</u>	Dean's Advisory Committee, Natural Sciences & Mathematics
<u>AKatz</u>	Anne Katz, Acting Dean, Natural Sciences & Mathematics
_____	Hilda Richards, Provost and Academic Vice-President

TIMETABLE: This change is proposed to take effect in Fall 1990 and should be included in the appropriate University Catalog for that academic year (publication deadline anticipated in Spring 1990).

DESCRIPTION OF CURRICULUM CHANGE:

- 1.) Catalog description: see Appendix A
- 2.) Justification for change:

The field of environmental geoscience is undergoing a remarkable cycle of growth. The present nation-wide demand for scientists trained in the fields of environmental geology, groundwater geology and geochemistry far outstrips the supply. This demand is expected to continue into the distant future, as governmental agencies continue to tighten environmental regulations, as increasing litigation forces industries to take precautions against future pollution and as our society faces the overwhelming need for safe disposal of municipal, toxic and radioactive wastes.

The Geoscience Department at IUP currently offers all the courses needed to provide a thorough training in environmental geoscience, both for students who plan to pursue post-graduate training in this field and for those who wish to enter directly into jobs in federal and state agencies and private consulting firms. We are seeking to formalize and clearly label this academic track by revising the B.S. in Geoscience degree to a B.S. in Environmental Geoscience. The older degree program was also designed for those students interested in environmental issues (see Appendix C, description of old program), but was created at a time when the Geoscience Department and its allied sciences offered fewer courses of direct application to environmental studies. The new degree program incorporates recently developed and already approved courses into a coherent program specific enough to merit the title Environmental Geoscience.

### 3.) Summary of changes:

The B.S. in Geoscience degree (see Appendix C for details) emphasized a broad, general background in all aspects of the geosciences, including meteorology, oceanography and astronomy. The B.S. in Environmental Geoscience (see Appendix B for details) has dropped these broad requirements and substituted specific courses in environmental geoscience, biology and chemistry. Please note that all indications of dropped and added refer ONLY to this program's requirements. Because all the courses listed below are already required by three other degree programs in the department, none of the proposed changes in the Geoscience degree will actually affect departmental course offerings.

### 4.) Comparison of old and new programs:

GEOSCIENCE CORE	REQUIRED IN OLD	REQUIRED IN NEW
retained:		
GS 121 Physical Geology	yes	yes
GS 123 Intens.Phys.Geo.Lab	yes	yes
GS 131 Historical Geology	yes	yes
GS 133 Intens.Hist.Geo.Lab	yes	yes
GS 325 Structural Field Geo.I	yes	yes
GS 480 Seminar	yes	yes
(these courses introduce the student to the fundamental concepts of geology and to techniques of geologic research)		
dropped:		
GS 321 Mineralogy	yes	no
GS 322 Ig./Metam. Petrology	yes	no
(these specific and in-depth geology courses are not directly applicable to environmental studies)		
GS 341 Solar System	yes	no
GS 261 Physical Oceanography	yes	no
GS 371 Meteorology	yes	no
(these broad background courses have been exchanged for specific courses in environmental fields, below)		
changed to controlled elective:		
GS 326 Structural Field Geo.II	yes	no
(this course offers additional training in geologic field work and report writing for those students who wish to pursue careers in field-based and/or engineering geology)		
added:		
GS 310 Environmental Geology	no	yes
GS 331 Hydrogeology	no	yes
GS 332 Geochemistry	no	yes
(these environmentally-oriented courses have only recently been approved by the UWCC and University Senate)		
TOTAL GEOSCIENCE REQUIREMENTS	30 sh	21 sh

BIOLOGY CORE	REQUIRED IN OLD	REQUIRED IN NEW
retained:		
BI 105 Cell Biology	yes	yes
BI 110or120 Plant or Animal Bio.	yes	yes
(these courses introduce the student to the fundamentals of biology)		
added:		
BI 321 Environmental Protection I	no	yes
BI 361 Microbiology	no	yes
(these advanced courses will provide the student with an overview of those biologic fields most pertinent to environmental geoscience)		
TOTAL BIOLOGY REQUIREMENTS	9 sh	15 sh

CHEMISTRY CORE	REQUIRED IN OLD	REQUIRED IN NEW
retained:		
CH 111 General Chemistry I	yes	yes
CH 112 General Chemistry II	yes	yes
(these courses introduce the student to the fundamentals of chemistry)		
added:		
CH 231 Organic Chemistry	no	yes
CH 323 Analytical Methods	no	yes
(these advanced courses will provide the student with an overview of those chemical fields most pertinent to environmental geoscience)		
TOTAL CHEMISTRY REQUIREMENTS	8 sh	16 sh (8 counted as Liberal Studies)

ALLIED SCIENCE	REQUIRED IN OLD	REQUIRED IN NEW
retained:		
MA 121 Calculus I	yes	yes
MA 122 Calculus II	yes	yes
changed to controlled elective:		
PY 111/121 Physics I (lec/lab)	yes	no
PY 112/122 Physics II (lec/lab)	yes	no
TOTAL ALLIED SCIENCE REQUIREMENTS	16 sh	8 sh
(all counted as as Liberal Studies)		

CONTROLLED ELECTIVES	REQUIRED IN OLD	REQUIRED IN NEW
Other Geoscience/Geology courses	6 sh	no
(No specific courses were listed for these electives) ?		
List of controlled electives	no	8-9 sh
(Specific appropriate courses have been selected from the departments of Geoscience, Biology, Chemistry, Geography, Computer Science and Physics - see appendix C for list)		

FREE ELECTIVES	ALLOWED IN OLD	ALLOWED IN NEW
	14-15 sh	14-16 sh

5.) Impact on students:

Because all courses to be required by the new program are already in-place and available, it is anticipated that some upper-level students may elect this degree program as soon as it is implemented by the department. For the same reason, incoming 1990 freshmen will have no problems enrolling in the proposed sequence of courses. Furthermore, because the first two years of the B.S. in Environmental Geoscience are so similar to the first two years of the B.S. in Geology (our primary degree program) we expect that students in coming years will be able to switch degree programs as their interests evolve.

6.) Required additions/deletions/revisions to actual departmental course offerings:

None.

LETTERS OF SUPPORT

See attached letters from Biology, Chemistry, Physics, Computer Sciences and Geography.

APPENDIX A

CATALOG DESCRIPTION

BACHELOR OF SCIENCE IN ENVIRONMENTAL GEOSCIENCE

LIBERAL STUDIES: As outlined in Liberal Studies section  
with the following specifications: 56-57

Mathematics: MA121

Natural Science: CH 111/112

Liberal Studies Electives: Foreign Language III/IV  
MA 122

MAJOR: 21

Required courses:

GS 121	Physical Geology	3 sh
GS 123	Intensive Physical Geology Lab	1 sh
GS 131	Historical Geology	3 sh
GS 133	Intensive Historical Geology Lab	1 sh
GS 310	Environmental Geology	3 sh
GS 325	Structure Field Geology I	3 sh
GS 331	Hydrogeology	3 sh
GS 332	Geochemistry	3 sh
GS 480	Seminar	1 sh

OTHER REQUIREMENTS: 31-32

BI 105	Cell Biology	4 sh
BI 110 or 120	Plant or Animal Biology	5 sh
BI 321	Environmental Protection I	3 sh
BI 361	Microbiology	3 sh
CH 231	Organic Chemistry	4 sh
CH 323	Analytical Methods	4 sh

Controlled electives: 8-9 sh

Courses from list

BI 272, BI 322, BI 362, CH 232, CH 340, CO 110, CO 220, CO 250,  
CO 310, GE 314, GE 415, GS 321, GS 326, GS 432, GS 440,  
PY 111/121, PY 112/122

FREE ELECTIVES: 14-16

TOTAL DEGREE REQUIREMENTS: 124

## B.S. in Environmental Geoscience

The B.S. degree in Environmental Geoscience is designed to offer the student a thorough preparation for employment or additional graduate education in the environmental sciences. The focus of the program is on geologic aspects of the earth's environment, augmented by advanced training in biology and chemistry.

## SUMMARY STATEMENT

Liberal Studies . . . . .	56-57 cr
Geoscience . . . . .	21 cr
Biology . . . . .	15 cr
Chemistry . . . . .	8 cr
Controlled electives . . . . .	8-9 cr
Free electives . . . . .	14-16 cr
TOTAL	124 cr

## STATEMENT OF PROGRAM

(124 semester hours required for graduation)

## LIBERAL STUDIES (56-57 cr):

Two English Composition Courses	7 cr
Mathematics Course (MA 121)	4 cr
Humanities - History	3 cr
Humanities - Phil/Rel Studies	3 cr
Humanities - Literature	3 cr
Fine Arts	3 cr
Health & Wellness or ROTC	3-4 cr
Social Science	3 cr
Social Science	3 cr
Social Science	3 cr
Natural Science (CH 111)	4 cr
Natural Science (CH 112)	4 cr
Liberal Studies Elective (MA 122)	4 cr
Liberal Studies Elective (Foreign Lang III)	3 cr
Liberal Studies Elective (Foreign Lang IV)	3 cr

## GEOSCIENCE (21 cr):

GS 121 Physical Geology	3 cr
GS 123 Intensive Physical Geology Lab	1 cr
GS 131 Historical Geology	3 cr
GS 133 Intensive Historical Geology Lab	1 cr
GS 310 Environmental Geology	3 cr
GS 325 Structure Field Geology I	3 cr
GS 331 Hydrogeology	3 cr
GS 332 Geochemistry	3 cr
GS 480 Seminar	1 cr*

\*The senior seminar and a senior laboratory assistance activity are professional training activities to be programmed in consultation with an advisor.

BIOLOGY (15 cr):

BI 105 Cell Biology	4 cr
BI 110 or 120 Plant or Animal Biology	5 cr
BI 321 Environmental Protection I	3 cr
BI 361 Microbiology	3 cr

CHEMISTRY (8 cr):

CH 111/112 - completed as part of Liberal Studies program	
CH 231 Organic Chemistry	4 cr
CH 323 Analytical Methods	4 cr

CONTROLLED ELECTIVES (8-9 cr):

Courses to be selected from the following list:

BI 272 Conservation of Plant/Animal Resources	3 cr
BI 322 Environmental Protection II	3 cr
BI 362 Ecology	3 cr
CH 232 Organic Chemistry II	4 cr
CH 340 Physical Chemistry for Biol. Sci.	4 cr
CO 110 Introduction to Computer Science	3 cr
CO 220 Applied Computer Programing	3 cr
CO 250 Introduction to Numerical Methods	3 cr
CO 310 Data Structures	3 cr
GE 314 Map and Photograph Interpretation	3 cr
GE 415 Remote Sensing	3 cr
GS 321 Mineralogy	3 cr
GS 326 Structure Field Geology II	3 cr
GS 432 Coal Geology	3 cr
GS 440 Subsurface Geology	3 cr
PY 111/121 Physics I Lecture and Lab	4 cr
PY 112/122 Physics II Lecture and Lab	4 cr

(NOTE: Students who plan to pursue an advanced degree in environmental geoscience are strongly advised to take the Physics sequence as their controlled elective)

FREE ELECTIVES (14-16 cr)

TOTAL 124 cr

B.S. IN GEOSCIENCE

The B.S. Degree in Geoscience offers the student a broad-based science background. In addition to the 38 hours of Geoscience (Astronomy, Geology, Meteorology, Oceanography) the student will also acquire a strong background in Math and the Allied Sciences of Chemistry, Biology, and Physics. The student who earns the B.S. degree in Geoscience may anticipate career openings in government or private industry in those expanding fields directly associated with environmental studies. The B.S. in Geoscience will also prepare the student for admission to graduate study, should he choose to pursue his academic preparation beyond the undergraduate level.

SUMMARY STATEMENT

Liberal Studies.....	56-57
Geoscience.....	36 cr.
Allied Sciences.....	17 cr.
Electives.....	14-15
TOTAL	<u>124 cr.</u>

STATEMENT OF PROGRAM

(124 Semester Hours required for graduation)

LIBERAL STUDIES: 56-57 cr.

(specified course)

Two English Composition courses:	7
Mathematics course: (MA) 121	4
Humanities-History	3
Humanities-Philos/Rel Studies	3
Humanities-Literature	3
Fine Arts	3
Health & Wellness or ROTC	3-4
Social Science	3
Social Science	3
Social Science	3
Natural Science (CH 111)	4
Natural Science (CH 112)	4
Liberal Studies Elective (MA 122)	4
Liberal Studies Elective (Foreign Language III)	3
Liberal Studies Elective (Foreign Language IV)	3
Synthesis	3
Total	<u>56-57</u>



ALLIED SCIENCES: 17 cr.

Biology

BI 105, Cell Biology	4 cr.	<u>AND</u>	
BI 110, Plant Biology	5 cr.	<u>OR</u>	
BI 120, Animal Biology	5 cr.		9 cr. 9 cr.

Chemistry

CH 111, General Chemistry I	4 cr.		
CH 112, General Chemistry II	4 cr.	8 cr.	8 cr.
			17 cr.

GEOSCIENCE: 36 cr.

Required:

GS 341, Solar System	3 cr.	
GS 371, Meteorology I	3 cr.	
GS 361, Physical Oceanography	3 cr.	
GS 121, Physical Geology	3 cr.	
GS 123, Intensive Physical Geology Lab	1 cr.	
GS 131, Historical Geology	3 cr.	
GS 133, Intensive Historical Geology Lab	1 cr.	
GS 321, Mineralogy	3 cr.	
GS 322, Igneous & Metamorphic Petrology	3 cr.	
GS 325, Structural Field Geology I	3 cr.	
GS 326, Structural Field Geology II	3 cr.	
GS 480, Seminar*	1 cr.	
Optional Geoscience or Geology Courses	<u>6 cr.</u>	
	36 cr.	36 cr.

The seminar and a senior laboratory assistant activity are training activities to be programmed in consultation with an advisor.

\*INCLUDES A SENIOR PROJECT AND A GEOSCIENCE DAY PRESENTATION.

ELECTIVES: 14-15

14-15 cr.

TOTAL

124 cr.

March 22, 1989

To: Karen Rose Carcone *M.H. Kesner*  
From: M. Kesner, Undergraduate Curriculum Committee, Biology  
Department  
Subject: BS in Environmental Science

The Biology Department supports the BS in Environmental Science program as documented in your communication of 21 February 1989. We do not feel that the influx of the few additional students into our courses will create any problems. We would like to mention two items that you might wish to take into consideration.

We note that you require BI241 Microbiology and perhaps you were unaware that this is the microbiology course specifically designed for health professions students (primarily nurses). BI361 is our majors microbiology course and would tend to give your students a broader understanding of the basics of this subject area. However the BI241 would contain more health related information and perhaps that is what you wish for your program. If you decide to require BI361 instead of BI241 it is recommended that your students take BI361 in their seventh semester and CH 231 Organic Chemistry (a prerequisite of BI361) in the sixth semester.

You should be aware that the Biology Department is currently reevaluating its' majors core. It is possible that in the near future courses such as BI105, BI110 and BI120 may be altered. We will keep you fully informed of any changes in these courses and of course we recognize our obligation to provide non-majors with equivalent courses if we should alter the core for our majors.

March 31, 1989

SUBJECT: Revision of B.S. in Geoscience to B.S. in Environmental Geoscience

TO: Dr. Karen Rose Cercone  
Geoscience Department

FROM: Dr. Nicholas Christodouleas, Chairperson  
Curriculum Committee, Department of Chemistry



Dr. Neil J. Astring, Chairperson  
Department of Chemistry



At its March 30, 1989 faculty meeting, the Chemistry Department considered the revision of B.S. in Geoscience to B.S. in Environmental Geoscience. Our department endorses the findings of our Curriculum Committee which concluded that this new revision would have little or no impact on the chemistry courses noted in the Geoscience document.

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Indiana, Pennsylvania 15705

Date: April 5, 1989

Subject: Revision of BS in Geoscience to BS in Environmental Geoscience

To: Karen Rose Cercone  
Geoscience Department

From: Richard D. Roberts *Richard D. Roberts*  
Chairman Curriculum Committee  
Physics Department

This program is quite acceptable to the Physics Department. We will be able to handle the physics course needs of the students in the Environmental Geoscience program.

Indiana University of Pennsylvania  
Computer Science Department

March 13, 1989

SUBJECT: Revision of BS in Geoscience to BS on Environmental  
Geoscience

TO: Karen Rose Cercone  
Geoscience

FROM: Katherine McKelvey, Curriculum Chair  
Computer Science

*Katherine McKelvey*

The Computer Science Department can accommodate Geoscience majors (approximately 3 - 6 per year) in our core courses. We recommend CO 110, CO 250, CO 310 and/or CO 220 for inclusion in the list of controlled electives for a BS in Environmental Geoscience.

KKM/cam

Date: March 29, 1989

Subject: BS in Environmental Geoscience

To: Dr. Karen Cercone, Geoscience

From: <sup>RF</sup> Dr. Bob Begg, Geography and Regional Planning

We are impressed with your curriculum restructuring. We will be happy to accommodate any of your students who wish to take our class. I hope you proceed through the approval process with no problems.