87-88/7A

INDIANA UNIVERSITY OF PENNSYLVANIA
SENATE CURRICULUM COMMITTEE B-2

NEW COURSE PROPOSAL

Department: Geoscience

Person to contact for further information: Joseph C. Clark

Course affected: GS 310 Environmental Geology

Desired semester of change: Fall 1987

Approvals:

Department Curriculum Committee Chairperson: [signature]

Department Chairperson: [signature]

College Advisory Committee Chairperson: _____

College Dean: [signature]

A. DESCRIPTION OF ACADEMIC NEED

A1. Catalog Description: (PLEASE ATTACH)

A2. Course Syllabus: (PLEASE ATTACH)

A3. Need Fulfilled: Students seeking jobs in the environmental sciences or planning to enter graduate school in this field should have this course on their transcripts. Most recent job openings for our Bachelor of Science graduates have been in environmental-related positions, such as with DER or with private consulting firms.

A4. Effect on other courses: No other courses presently deal in any depth with the topics covered in this course. It will provide an ideal optional package, along with Hydrogeology and Geochemistry, for students interested in the environmental sciences. All three are designated for upper-level majors.

A5. Does this course follow traditional offerings in the department? It will consist of 2 one-hour lectures and 1 three-hour lab per week, about half of which are field trips. Additionally, each student is required to conduct an independent field-oriented environmental research project.

A6. Has this course been offered at IUP on a trail basis? This course has been offered as GS 481 Special Topics: Environmental Geology in Spring 1981, Fall 1983, and Fall 1985.

A7. Is this a dual level course? No

A8. Do other universities offer this course? Penn State offers two similar courses: Introduction to Environmental Geology and Geological Aspects of Environmental Problems. Surprisingly, Pitt offers no courses in environmental geology.

A9. Is this course recommended or required by a professional society? So far as I know, although this course is useful and relevant, it is not now required by any professional society, accrediting authority, or other external agency.

B. INTERDISCIPLINARY IMPLICATIONS

B1. Will the course be offered by one instructor or will there be a team? This course has been and will be taught by one instructor; in addition, two or three guests will lecture in their specialties.

B2. Are additional or corollary courses needed? No

B3. What is the relationship of the content of this course to the content of courses offered by other departments?

It does not duplicate any other course on campus, but has been taken by and should continue to be of interest to students in Geography and Chemistry.

B4. Is this course applicable in a program of the school of continuing education directed at other than full-time students?

Possibly, if they wish to broaden their background for employment in the environmental field, or if they wish to increase their understanding of local environment problems and their reduction.

C. EVALUATION

C1. What procedures are expected to be used to evaluate student progress? Weekly lab exercises, one hourly exam, and a final exam will be used to evaluate student progress and understanding. An independent project with a written abstract and an oral presentation will enable each student to investigate and report on a specific environmental problem.

C2. Variable credit? No

D. IMPLEMENTATION

D1. What resources are needed to teach this course? Existing resources are adequate

D2. How many sections? One

D3. How often will the course be offered? Alternate Fall Semesters

D4. How many students will be accommodated? 20

A1. GS 310 ENVIRONMENTAL GEOLOGY 2C-31-3SH

Prerequisite: 8 sh in geology or geography or permission of instructor

The application of geologic information to the accommodation and reduction of natural hazards, to land-use planning, and to the utilization of earth materials. Includes field trips which may occur on weekends.

Course objectives: To familarize students with the range of geologic hazards and their prediction and control, to investigate the causes and abatement of local environmental problems, and to appreciate the utilization of earth-science information in land-use planning.

Evaluation methods: Written weekly lab exercises will consitutue 25% of grade, one written examination and a comprehensive final examination (both closed book) will count 50%, and a written abstract and oral presentation of an independent term project will count 25% of grade. A is 90% and above, B is 80% and above, and so forth. Below 59% is F.

ENVIRONMENTAL GEOLOGY

I. Introduction; background (Ch. 1,2,3) (1 lecture)
II. Erosion of the land (1 lecture)
  A. Rates
  B. Man's effect
III. Chemical weathering (1 lecture)
  A. Reactions: carbonates, silicates
  B. Rates
IV. Landslides (Ch.5) (4 lectures)
  A. Classification
  B. Causes: natural factors, manmade factors
  C. Control
    1. Japanese work
    2. Portuguese Bend landslide, CA
V. Earthquakes (Ch.6) (4 lectures)
  A. Effects: San Francisco, 1906
    San Fernando Valley, 1971
  B. Scales of measurement
  C. Relationship to faulting
    1. types defined
    2. evidence
    3. active
  D. Case Study: Davenport Nuclear Reactor Site
  E. USGS San Andreas fault program
  F. Prediction
  G. Control
VI. Hydrologic Cycle (Ch.9) (1 lecture)
  A. Man's effect
  B. Man's utilization
VII. Acid mine drainage (2 lectures)
  A. Problems
  B. Regulations & control
  C. Land reclamation
  D. Coal economics
VIII. Groundwater (2 lectures)
  A. Porosity; permeability
  B. Flow of fluids; Darcy's Law
  C. Wells
IX. Subsidence (p. 125-129) (1 lecture)
  A. Natural causes; karst
  B. Manmade causes
  C. Possible controls; cost
X. Gas Well Drilling & Production (Ch.11) (3 lectures)
  A. Environmental problems
  B. Brine
    1. origin & problems
    2. DER guidelines
    3. Barium problems; USPHS Drinking Water Standards
XI. Evaluation of Coal vs. Gas Well Contamination (1 lecture)
XII. Waste Disposal (Ch.10) (1 lecture)
  A. Hazardous waste example -- chromium
    1. geologic evaluation of site
    2. monitoring

XIII. Coastal Hazards (Ch.8) (2 lectures)
  A. Seacliff & beach erosion
    1. causes, rates, engineering
    2. examples: Santa Cruz jetties
      Santa Barbara breakwater
      Bolinas, CA seacliff retreat
  B. Tropical cyclones (hurricanes)
  C. Tsunami (seismic sea waves)
XIV. Volcanic Hazards (Ch.7) (1 lecture)
XV. Minerals, Energy, & Environment (Ch.12,13) (1 lecture)
XVI. Review (1 lecture)

Text: Keller, E.A., 1987, Environmental Geology, 5th ed.: Charles E. Merrill Publishing Company, 480p.