

INDIANA UNIVERSITY OF PENNSYLVANIA
SENATE CURRICULUM COMMITTEE B-2

NEW COURSE PROPOSAL

Department: Geoscience

Person to contact for further information: Karen R. Cercone

Course affected: GS 331 Hydrogeology

Desired semester of change: Fall 1987

Approvals:

Department Curriculum Committee Chairperson: _____

Department Chairperson: _____

College Advisory Committee Chairperson: _____

College Dean: ERK

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 must have this course on their transcripts. It introduces them to the practical tools used to study groundwater as well as to the geologic and social/technical problems related to it. It also introduces them to computer modeling techniques.

A4. Effect on other courses: No other courses presently deal with the topics of this course. It will provide a solid optional package for the environmentally oriented student when taken with other new courses, Environmental Geology and Geochemistry. All three are designed for upper-level majors.

A5. Does this course follow traditional offerings in the department? Yes, It will be a 3-credit course with 2 hours of lecture and 3 hours of lab.

A6. Has this course been offered at IUP on a trail basis? It was offered in Fall 1986 and attracted both upper-level majors and non-traditional students working in the local area. To make it more accessible to such students, it will be offered in the evening in future year.

A7. Is this a dual level course? No

A8. Do other universities offer this course? Yes, and the number is increasing daily as the job demand for hydrogeologists increases. For example, Penn State, Pitt and Slippery Rock all offer this course as an upper-level elective for their undergraduate geology majors

A9. Is this course recommended or required by a professional society? No

B. INTERDISCIPLINARY IMPLICATIONS

B1. Will the course be offered by one instructor or will there be a team? _____

One

B2. Are additional or corollary courses needed? Prerequisites are MA 121/122
and GS 121; 122 or permission of instructor.

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 course in other departments and should be of
particular interest to students in Geography.

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

Yes, particularly if they have had a background of geology courses and
wish to upgrade their qualifications for employment in the field.

C. EVALUATION

C1. What procedures are expected to be used to evaluate student progress? _____

Lab exercises, three hourly exams and a final will be used to develop students
quantitative and computer skills. A ten-page paper focuses on developing
their conceptual understanding of groundwater.

C2. Variable credit? No

D. IMPLEMENTATION

D1. What resources are needed to teach this course? _____

Well-testing equipment is needed to run several of the laboratory
exercises; computer software will be required for other labs and for
term projects.

D2. How many sections? One

D3. How often will the course be offered? Yearly

D4. How many students will be accommodated? 15

Catalog Description

A1. GS 331 HYDROGEOLOGY

Prerequisite: MA ~~111/112~~^{121/122}: GS 121/122 or permission of instructor
An overview of groundwater geology, including flow equations, graphical solutions to flow problems and computer modeling of flow systems, as well as the geotechnical and social implications of groundwater utilization. Includes field trips which may occur on weekends.

SYLLABUS
HYDROGEOLOGY - FALL 1987

Dr. Karen Rose Cercone
Office: 112 Walsh Hall
Office hours: MWF 9-10; TTh 3-4 or by appointment anytime.

| DATE | LECTURE | LAB | READING |
|-------|----------------------------|-------------------------|------------|
| 9/1 | The hydrologic cycle | | Chapter 1 |
| 9/7 | LABOR DAY | | |
| 9/8 | Darcy's Law | Darcian flow | Chapter 2 |
| 9/14 | Bernoulli's theorem | | |
| 9/15 | Fluid potential | Mapping heads | |
| 9/21 | Flow variables | | |
| 9/22 | Flow nets | Flow nets | Chapter 5 |
| 9/28 | Flow nets | | |
| 9/29 | Regional flow systems | Flow nets | Chapter 6 |
| 10/5 | Infiltration & recharge | | |
| 10/6 | Storm-flow & discharge | Flow problems | |
| 10/12 | FIRST EXAM | | |
| 10/13 | Flow equations | Intro to computers | |
| 10/19 | Numerical modeling | | |
| 10/20 | Using LOTUS | Lotus tutorial | |
| 10/26 | COMPUTER PROJECT | | |
| 10/27 | COMPUTER PROJECT | COMPUTER PROJECT | |
| 11/2 | Flow to wells | | Chapter 8 |
| 11/3 | Flow predictions | Image analysis | |
| 11/9 | Well tests | | |
| 11/10 | Well tests | Interpreting well tests | |
| 11/16 | SECOND EXAM | | |
| 11/17 | Seepage face flow | Seepage problems | Chapter 10 |
| 11/23 | Landslides & dams | | |
| 11/24 | Karstic & coastal flow | Saltwater intrusion | |
| 11/30 | Changing fluid density | | Chapter 11 |
| 12/1 | VISIT TO USGS | PITT LIBRARY VISIT | |
| 12/7 | Changing fluid temperature | | |
| 12/8 | Cross-formational flow | Review | |
| 12/14 | 10 PAGE PAPER DUE | | |
| 12/? | FINAL EXAM | | |

Course objectives: Review of the fundamental physics of groundwater flow; introduction to methodology of solving problems in groundwater flow including graphical, analytical and computer analysis; discussion of topical groundwater problems.

Text: Freeze, R.A. and Cherry, J.A., GROUNDWATER.

Grading: 20% each in-class exam
30% final exam
20% term paper
10% average grade on labs (including computer project)

Lab assignments are due on the Monday of the following week and will be handed back on Tuesday for review. You will need a calculator, ruler, protractor and a pad of 10-division graph paper for most labs.

Exams will include both problem-solving questions (similar to those done in lab) and essay questions. All exams will be closed-book.

A term paper concerning a technical or social problem in hydrogeology is required for this course. Since the IUP library is sadly deficient in hydrogeologic literature, we will try to make at least one evening trip to the Pitt Engineering Library during the latter part of the semester.

If possible, we will also visit the USGS Water Resources office in Pittsburgh on Tuesday, December 1 - be sure to make advance arrangements if you work or have other classes that day. Optional trips to well-sites and stream-monitoring stations being studied by the USGS and Pennsylvania state geologists will be announced throughout the semester.