PROPOSAL FOR INTERDISCIPLINARY CERTIFICATION PROGRAM
“Integrated Petroleum and Environmental Geosystems” (IPEG)

To be submitted for approval to the Graduate Council with endorsement of Dept. Chairs and College Deans.

A. INTRODUCTION

We propose an interdisciplinary, cross-college and interdepartmental certificate program that comprises a focused collection of courses that afford the student a coherent academic background in “Integrated Petroleum and Environmental Geosystems” (IPEG). This certification will equip students with a broad background in petroleum and environmental systems, and will help prepare them for industry or policy-making positions as well as contributing to a more informed citizenry. The certificate program will be open to undergraduate and graduate students. A separate but parallel proposal is being submitted the University Associate Vice President for Academic Affairs and Undergraduate Studies. The program is the same for either undergraduate or graduate students, to attract a wide range of students and to allow for flexibility and for transitions where interested undergraduates can initially be exposed to the program and might later complete the program as a graduate student. For this graduate certificate, it is expected that students (in consultation with their graduate advisor and graduate committee) will take appropriate graduate level courses for the certificate.

College of Mines and Earth Science
  Department of Geology & Geophysics (GEO)

College of Engineering
  Department of Chemical Engineering (ChEn)
  Department of Civil Engineering (Energy Geoscience Institute- EGI)

Certificate requirements will be 15 hours of completed credit hours selected from a designated list of core and option courses. Qualified students who complete the certificate requirements will receive a $1000 award (up to 25 awards for a 3-year assessment period). Award qualifications will be determined by the program chair and the IPEG steering committee.

CRITERIA FOR PROGRAM ADMINISTRATION

1. Need.

Energy is a critical global challenge. We need to educate students to become professionals who are prepared to face these challenges. The proposed certificate program is designed to train students in basic fundamentals of petroleum and environmental geosystems that are key to a wise stewardship of Earth resources.
Within the state of Utah since 1998, oil and gas extraction has consistently generated over $100 million dollars per year toward the gross state product. The proposed certificate program will help to maintain and increase this contribution by meeting the need for a flexible, broadly trained workforce with interdisciplinary skill sets that cut across several related disciplines. The proposed certificate program fits extremely well with the broader mission of the University of Utah.

The certificate program outlined here is not a degree program but offers Utah students the opportunity to partially direct their educational experience and to enhance and broaden their skills in directions in the petroleum and environmental science sector. Foremost among the strategic goals of the College of Engineering in 2005 is to “Grow the College of Engineering research enterprise with high-impact interdisciplinary research.” This certificate program fosters the type of interdisciplinary activity that can lead to such research. Similarly, the College of Mines and Earth Science encourages cross disciplinary interactions, and the goals of this program addresses a number of recommendations the Department of Geology and Geophysics has received from industry recruiters and supporters.

2. **Educational Objectives and Benefits.**

The educational objective is to bring Earth scientists and engineers together through a set of core courses that will facilitate and encourage interdisciplinary interactions among students in allied fields. This will provide breadth to student programs that will make our students more attractive to industry recruiters.

This interdisciplinary certificate will facilitate more interdisciplinary interactions of students, faculty and research. IPEG students could interview with oil companies and attend company information sessions in GEO. This certificate program will also benefit student recruitment, and utilize the international interface to industry provided by EGI. IPEG students will also be invited to attend appropriate sessions of EGI’s annual technical meetings. These meetings provide opportunities for students to meet representatives from industry.

3. **Impact on Existing Programs.**

This will have very little impact on any existing and related degree programs because it is only a certification defined by a small set of courses. However, it is designed to encourage more cross cutting communication that will enhance student learning experiences that will then carry over to the work place. To encourage student participation, EGI will put up to $25,000 in certificate awards to eligible students who complete the certification. This will translate to $1,000 per student for up to 25 students.

4. **Courses.**

The certification will have a required core of 8 credit hours, along with 7 credit hours out of the electives. The required courses cover all 3 of the participating academic/department units.
Although some courses have prerequisites, the required core will largely satisfy the prerequisites for the elective classes upon permission of the instructor.

**REQUIRED CORE (8 credit hours):**

TAKE 2 of the GG classes below:
- GEO 5260 PICP I: Geology (1)
- GEO 5260 PICP II: Basin Analysis (1)
- GEO 5260 PICP III: Seismic Interpretation (1)
- GEO 5260 PICP IV: Well Logging (1)
- GEO 5260 PICP V: Prospect Evaluation (1)

Note: Students can use any 2 module credits for the required core and can use any of the remaining 3 module credits towards the option core.

TAKE 1 of the CVEEN classes below:
- CVEEN 6110 GIS (3) or GEO 5920 GIS for Geoscientists (3)
- CVEEN 6630 Ecological Systems and Engineering (3)

TAKE 1 of the CH EN classes below:
- CHEN 5961 Basic Reservoir Engineering (3)
- CHEN 5962 Petroleum Fluids Characterization (3)

**Electives: (additional/remaining 7 credit hours out of any combination of these OR other classes in the required core):**

- GEO 5220 Seismology II: Exploration and Engineering Seismology (3)
- GEO 5240 Physical Fields II: Electrical Methods (3)
- GEO 5260 Petrophysics and Well Logging (2)
- GEO 5760 Stratigraphy and Sedimentary Processes (4)
- GEO 6370 Contaminant Partitioning for Engineers & Scientists (3)
- GEO 6390 Solute Transport and Subsurface Remediation (3)
- GEO 6690 Aqueous Geochemistry for Engineers & Scientists (3)
- GEO 6760 Advanced Sedimentology (3)
- GEO 6920 Seismic/Sequence Stratigraphy (3)
- GEO 6920 Advanced Sedimentary Environments (3)
- GEO 6920 Basin Analysis (3)

- CVEEN 6260 Applied Probability and Statistics (3)
- CVEEN 6305 Geotechnical Engineering II (3)
- CVEEN 6470 Surface Water Quality Prediction and Assessment (3)
- CVEEN 6555 Environmental Engineering Seminar (0.5)
- CVEEN 6605 Introduction to Environmental Engineering II (3)
- CVEEN 6610 Water Chemistry and Laboratory Analysis (3)
- CVEEN 6830 Project Management and Contract Administration (3)
- CVEEN 6850 Engineering Law and Contracts (3)
Total 15 credits required

5. **Assessment.** A statement of how the proposed course sequences associated with the certificate will meet the stated educational objectives and be assessed.

Assessment will be determined by review of grades (C- or better) and participation by the IPEG Steering Committee. The IPEG Steering Committee will also meet regularly (see later description under “Coordinator”).

An exit interview will be required for completion of the certification and in order to receive the monetary certificate awards.

6. **Faculty.** The names of regular and adjunct faculty associated with or contributing to the certificate program, either by teaching one or more of the courses associated with the program or participating in the design of the course sequence.

**Geology & Geophysics**
Dr. Ron Bruhn
Dr. Marjorie Chan
Dr. Cari Johnson
Dr. Bill Johnson
Dr. Rich Jarrard
Dr. Jerry Schuster
Dr. Michael Zhdanov
Dr. Bob Bereskin (adjunct)

**Civil and Environmental Engineering CVEEN**
Dr. Steve Bartlett
Dr. Janice Chambers
Dr. Craig Coburn
Dr. Don Hayes
Dr. Pui Kwan Hong
Dr. Evert Lawton
Dr. Denis Peterson

Research Faculty from Energy & Geoscience Institute (EGI) teaching in CVEEN
Dr. Greg Nash
7. **Coordinator.**

The position of program coordinator will rotate among the departments every 2 years, beginning in the Department of Geology & Geophysics (coordinator to be appointed by Dr. Marjorie Chan).

Each Department would assign a department faculty representative to the IPEG steering committee. The Steering Committee meet each semester to review the programs enrollment and any suggestions for improvement.

8. **Advisory Committee.**

The Certificate Advisory Committee would have seven total members. The Departments of Geology & Geophysics in the College of Mines & Earth Sciences, and Civil & Environmental Engineering (mostly through the Energy & Geoscience Institute (EGI)), and Chemical Engineering in the College of Engineering, all have well established track records with advisory committees and have active committees or advisory boards. One faculty member of each department will be appointed by the Department chair and will serve on a rotating basis. These would be three of the 7 members of the Certificate Advisory Committee.
In addition, the designated IPEG Department faculty representative from each of the three University of Utah departments would serve on the Certificate Advisory Committee.

The seventh member of the Certificate Advisory Committee would be an at-large member from the University of Utah Administration (e.g., Dean or Assoc. Dean of the Graduate School).

The Certificate Advisory Committee could conduct much of its business by e-mail and teleconferencing, but would convene at least one annual meeting in person.

9. **Budget.**

Yearly expenses would mainly be for advertising, including printing of brochures and postage ($1000), updates and add-ons to existing web pages, and printed certificates ($100). Any administrative support needed is expected to be minimal and handled by simply using existing departmental functions.

Responsibility for budget will be shared among the 3 departments, and there will be rotating efforts for various functions (described below) and will be shared among the departments and coordinated by agreement of the IPEG steering committee. In this initial year: EGI (Levey) will be responsible for designing and distributing printed brochures, CHEN (Deo) will oversee design of a IPEG web page that can be linked to all the participating department web pages, and GEO (Chan) will coordinate the program student records.

EGI's director, Dr. Raymond Levey, will commit $25,000 in certificate incentives over a 3 year assessment period to students who complete the IPEG requirements. Upon completion of all courses and award of the certificate, up to $1000 will be awarded to each student who qualifies. The schedule for awarding 25 certificates at $1000 each will be approximately 7, 8, and 10 awards offered respectively in years 1, 2 and 3. These funds for the certificate incentives are largely provided from industry funds to foster interdisciplinary petroleum studies and to interest students in applied technology fields.

**SUMMARY**

The “Integrated Petroleum and Environmental Geosystems” (IPEG) will be a valuable cross-college and cross-department certificate program that comprises a focused collection of courses. The certificate program will provide students a broad background in petroleum and environmental systems, and will help prepare them for industry or policy-making positions as well as contributing to a more informed citizenry. The commitment of certificate funds to encourage student participation will make this a very attractive program. The IPEG will foster more partnerships and communications between departments, students, and industry.

Version 9: 9/27/05: Draft by M.Chan, M. Deo, R. Levey