

Review of “Proposal for a Ph.D. in Applied Earth Sciences”

Environmental problems are sufficiently complex involving the geosphere, biosphere and human systems and thus necessitate a multidisciplinary approach. The frontiers in science now lie at the junction between multiple sciences, like biogeochemistry, which are providing new views of environmental systems. In the past 20 years, there are a number of broad-based environmental programs have been established at a bevy of Midwestern universities to address societal relevant environmental problems. This proposed program attempts to capitalize on apparent research strength at IUPUI in water resources, contaminant hydrology and associated human health issues, as core areas for a Ph.D. in Applied Earth Sciences.

The Earth Sciences is the lead Department for this degree program with associated faculty from seven different departments. Success of this program is highly dependent on how well faculty collaborate, share credit and compromise, with each Department having varying views on graduate training. It is unclear how low are the walls between departments and Schools at UIPUI. Are there faculty with joint appointments? How do the multitude of Centers, many with “environmental” appellations participate in graduate education? The Department of Earth Science’s current graduate program is small with a total of 16 graduate students and one should question if the momentum and financial support is there to sustain a Ph.D. program. Albeit the Ph.D. program would be small; accepting 5 or so students/year to a total of 20 students, which would more than double the current graduate enrollment. This proposed Ph.D. program is heavily focused on water quality issues and impact on human health, particularly for central Indiana, which limits faculty participation. The Department of Earth Sciences has ten professor-ranked faculty and two lectures, and by my count only 6 faculty members are “qualified” to participate in this Ph.D. program. There are four faculty members (Barth, Licht, Pachut and Rosenberg) whose interests and expertise are geologic and far removed topically and temporally from the Applied Ph.D. program. One interpretation is that the proposed Ph.D. program is mostly for the four recent hirers (Babbar-Sebens, Li, Vidon and Jacinthe) and the ambitious chair. I am concerned that this Ph.D. program would splinter the department between Ph.D. relevant, and irrelevant research; a new degree program should lift all boats. Below I outline specific comments to the Proposal for PhD in Applied Earth Sciences

Unique and Innovative Features

P. 4; Paragraph 2: It is a misnomer to state that “this will be the first Ph.D. in Applied Earth Sciences in the country...”. Stanford had an applied earth science Ph.D. in the 1980’s but revamped into a graduate program in Earth, Energy and Environmental Sciences. Also, Applied Earth Science Ph.D. programs are common in Europe and South Africa and the third world, under the more common “Applied Geology.” This is not a new or innovative designation, as stated in this proposal. Also, the word “applied” unfortunately has a pejorative connotation, lesser than basic research. In this proposal, applied is also linked to local environmental problems in central Indiana, which is why UIB departments see no conflict.

Description of the Proposed Program and Objectives

P. 5; Paragraph 2 : It is particularly unrealistic to compare IUPUI program to Stanford, Duke and UC-Davis which have much larger faculty, huge graduate programs with large pools of highly qualified students. More appropriate comparisons are state-supported schools that are ranked in tier 2 or 3 and have a similar mission as an urban research university.

P. 5 Paragraph 3: There is also potential overlap with Purdue University's Office of Interdisciplinary Graduate Program in Ecological Sciences and Engineering. It is surprising to see no linkages or letter of support from the Purdue end.

Admission requirements, student Clientele and Financial Support

I presume the GRE is required? What is the base score needed for admittance to the program; 1200?

3. Proposed Curriculum

It is relevant to have a new course that defines and discusses what are "applied earth sciences" for this degree program, which would enhance transdisciplinary inquiry. Also, what are the possible specializations and what are the prerequisites needed to complete the required courses.

Coordination

The described coordination plan is highly cumbersome. The Graduate Director for the Dept. of Earth Science can easily coordinate and promote this small PhD program. Applying graduate students may first opt for a masters degree or may go directly toward the PhD. I do not see the need for coordinators for sub-disciplines, nor what they will do. The most important task is to have a cross campus committee for evaluation and acceptance of students in to the AES Ph.D. program.

Dissertation, Qualifying exams and the Advisory Committee.

The current examination structure lacks rigor. Most Ph.D. programs in the Big Ten have three sets of examinations. The first is the preliminary exam, which is a test of basic knowledge, problem solving skills and intellectual rigor of the Ph.D. candidate. The preliminary exam has a written part, with individual questions coming from each of the 5 members of the PhD examining committee. Questions are usually broad, but may focus on the student's specialization, and can be open or closed book. The student usually has 4-8 hours to answer each set of questions from individual committee members, thus the exam takes about a week. Lastly, the student has an oral portion of the preliminary exam where he/she defends and /or discusses the written answers, with all five committee members present. The student must pass both the written and oral components of the examination, to advance on to the qualifying exam.

The second exam is the qualifying exam, which assess how prepared the student is to undertake Ph.D. level research. The student writes a research proposal (no more than 15 pages, excluding figures and references) which he/she defends in front of the committee of five faculty members.

The third exam is the defense of the Ph.D. which is initially introduced as an open talk to the Department, but a closed question and answering session with the committee.