New Course Request

Check Appropriate Boxes: Undergraduate credit □ Graduate credit ☑ Professional credit □

1. School/Division: School of Science 2. Academic Subject Code

3. Course Number: G486 (must be cleared with University Enrollment Services) 4. Instructor: Dr. P. A. Jacinthe

5. Course Title: Soil Biogeochemistry

6. First time this course is to be offered (Semester/Year): Spring 2007

7. Credit Hours: Fixed at 3 or Variable from __________ to __________

8. Is this course to be graded S-F (only)? Yes ___ No ☑

9. Is variable title approval being requested? Yes ___ No ☑

10. Course description (not to exceed 50 words) for Bulletin publication:

   Biological and geochemical processes controlling the cycling of elements in soils and freshwater sediments with emphasis on the cycles of carbon, nitrogen and phosphorus.

11. Lecture Contact Hours: Fixed at 3 or Variable from __________ to __________

12. Non-Lecture Contact Hours: Fixed at 3 or Variable from __________ to __________

13. Estimated enrollment: 15 of which 75 percent are expected to be graduate students.

14. Frequency of scheduling: Spring odd years

15. Will this course be required for majors? Yes, BSES Required for the degree Bachelor in Environmental Science

16. Are the necessary reading materials currently available in the appropriate library? Some

17. Please append a complete outline of the proposed course, and indicate instructor (if known), textbooks, and other materials. (See Attachment)

18. If this course overlaps with existing courses, please explain with which courses it overlaps and whether this overlap is necessary, desirable, or unimportant. (See Attachment)

19. A copy of every new course proposal must be submitted to departments, schools, or divisions in which there may be overlap of the new course with existing courses or areas of strong concern, with instructions that they send comments directly to the originating Curriculum Committee. Please append a list of departments, schools, or divisions thus consulted.

Submitted by: ___________________________ Date 3/29/07

Department Chairman/Division Director

Approved by: ___________________________ Date 3/30/07

Dean

Date ____________

Chancellor/Vice-President

University Enrollment Services

After School/Division approval, forward the last copy (without attachments) to University Enrollment Services for initial processing, and the remaining four copies and attachments to the Campus Chancellor or Vice-President.
New Course request

#10
For Bulletin publication
Geology, Soil Biogeochemistry (3 cr.)
G586

P: G406 or consent of instructor. Biological and geochemical processes controlling the cycling of elements in soils and freshwater sediments with emphasis on the cycles of carbon, nitrogen and phosphorus.

#18 – Overlap with existing courses?

Environmental Geochemistry (G585) is, among existing courses, the closest to the proposed Soil Biogeochemistry (G586) course. However, there are major differences between the two courses. While in G 585, the cycle of elements is examined at the global scale using paleoclimatic proxies, the proposed course focuses on process-level understanding of elements distribution and transformations in terrestrial ecosystems.
From: Filippelli, Gabriel M.
Sent: Tuesday, March 27, 2007 12:53 PM
To: Hurtuk, Janice Lee
Cc: Tedesco, Lenore P
Subject: FW: Proposed Soil Biogeochemistry course

Here is the support letter from Greg Lindsey for the proposed Soil Biogeochemistry course.

Gabe

Gabriel Filippelli
Professor and Chair
Department of Earth Sciences
Associate Director, Center For Environmental Health, Indiana University (http://ceh.iu.edu/)
Indiana University - Purdue University Indianapolis (IUPUI)
723 W. Michigan Street
Indianapolis, IN 46202
ph. 317-274-3795
fax 317-274-7966
gfilippe@iupui.edu

From: Lindsey, Greg H.
Sent: Wednesday, January 31, 2007 9:27 PM
To: Filippelli, Gabriel M.; Tedesco, Lenore P
Subject: Proposed Soil Biogeochemistry course

Dear Gabe and Lenore,

I have read the course proposal for Soil Biogeochemistry and have consulted with appropriate faculty from my school. We have no intention of offering this type of course in SPEA-Indianapolis and thus support this course proposal.

Greg

Greg Lindsey
Associate Dean and Duey Murphy Professor
School of Public and Environmental Affairs
BS 3025, 801 W. Michigan
Indianapolis, Indiana 46202

Telephone: 317-274-2016
Fax: 317-274-5153
Mobile: 317-840-0995
I. **Header**
Title: Soil Biogeochemistry.
Course #: G486
Instructor: Pierre-André Jacinthe
Prerequisites: introductory college chemistry and biology; G 406 or equivalent

II. **Course Description and Rationale**
This course focuses on the biochemical and physical processes controlling the
distribution and transformations of chemical elements in soils, sediments and waters.
Areas of emphasis include the bio-geochemical cycling of carbon, nitrogen and
phosphorus in terrestrial and aquatic ecosystems, and the impact of these transformations
on water quality. Processes will be examined from microbial to watershed scales.

III. **Educational Objectives**
At the end of this course, students are expected to:
- learn the fundamental chemical and biochemical reactions occurring in soils,
- gain insight into the fundamental aspects of element cycling in soil and sedimentary
  systems, and apply this knowledge to current environmental problems,
- become familiar with established and evolving methods in soil biogeochemistry research,
- gain an appreciation for the potentials and limitations of popular nutrient cycling
  models.

IV. **Course Content**
The course will include lectures, laboratory sessions, and student-led discussions
of assigned current literature and classical papers on special topics.

**Lecture #**
1. Introduction - The Gaia hypothesis.
2. Soil microbes and enzymes
3. Stable isotopes in soil biogeochemistry
4. Lithosphere: weathering, clay mineralogy, pedogenesis
5. Physical and chemical properties of soils
6. Colloid surface processes: Cation / anion exchange, sorption
7. Heavy metals in the environment and biochemical transformations
8. Organic geochemistry and biodegradation
9  The global water cycle
10  The atmosphere and the greenhouse effect
11  Carbon cycling and sequestration in sediment and soil ecosystems
12  Biogeochemistry of the rhizosphere
13  Phosphorus cycling
14  Nitrogen cycling
15  Biogeochemistry of freshwater wetlands

**Laboratory sessions**
- Landscape scale assessment of N/C cycling in terrestrial ecosystems using such techniques as lysimetry, resin bags, and static gas chambers.
- Exchange of nutrients between sediment and water column in freshwater reservoirs and wetlands using DET and DGT techniques.
- Assessment of carbon pools (inorganic, organic, labile, microbial biomass, non-hydrolyzable) in soils and sediments.
- Denitrification enzyme activity.
- Carbon cycling models (Century, Daisy, Casa).

In the 14th week of the semester, students will submit a report to describe the laboratory procedures and summarize their results.

V. **Required and Recommended Texts**

**Required:**

**Recommended textbooks**

Lecture notes: Printouts will be provided as needed.

VI. Evaluation and Grading

- Mid-term I: 25 %
- Mid-term II: 25 %
- Laboratory assignments and reports: 20 %
- Final exam: 30 %

Letter grades will be assigned as follows:

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VII. Cheating and Plagiarism

As a student in this course, you must not use or attempt to use unauthorized assistance, materials, or information in any class activity. Cheating specifically includes allowing others to conduct research or to prepare work for you without advance authorization from the instructor. You must not make any unauthorized use of materials obtained from commercial companies or from files of papers prepared by other persons. It is cheating to collaborate with others on a class activity or project and submit a copy of an exercise, computer program, computations, or a written report which is represented explicitly or implicitly as your individual work. It is plagiarism to adopt or reproduce ideas, words, or statements of another person without appropriate acknowledgment. You must give credit and acknowledge another person's actual words or ideas, either oral or written in text or electronic form, and you must credit facts or data borrowed from another person, including all facts or data acquired from print or electronic resources.
VII. American with Disabilities Act Statement

In compliance with the American with Disabilities Act (ADA), students needing accommodations because of a disability are encouraged to register with Adaptive Educational Services (AES; 274-3241). It is the student’s responsibility to provide AES with appropriate documentation regarding the nature and extent of a disability and complete the appropriate forms issued by AES (http://life.iupui.edu/aes/index.asp).