

JAN 23 2005

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		04-476	App 2/22/05	App 2/28/06

**Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee**

Contact Person John Benhart, Jr.	Email Address Jbenhart@iup.edu
Proposing Department/Unit Geography & Regional Planning	Phone 357-7652

Check all appropriate lines and complete information as requested. Use a separate cover sheet for each course proposal and for each program proposal.

1. Course Proposals (check all that apply)

New Course                       Course Prefix Change                       Course Deletion

Course Revision                       Course Number and/or Title Change                       Catalog Description Change

GEOG 419/519 GIS for Environmental Applications

Current Course prefix, number and full title                      Proposed course prefix, number and full title, if changing

2. Additional Course Designations: check if appropriate

This course is also proposed as a Liberal Studies Course.                       Other: (e.g., Women's Studies, Pan-African)

This course is also proposed as an Honors College Course.

3. Program Proposals

New Degree Program                       Program Title Change                       Other

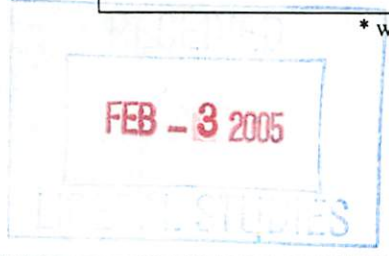
New Minor Program                       New Track

Catalog Description Change                       Program Revision

Current program name                      Proposed program name, if changing

4. Approvals		Date
Department Curriculum Committee Chair(s)	<i>John Benhart</i>	1/26/05
Department Chair(s)	<del>_____</del>	1/21/05
College Curriculum Committee Chair	<i>Gail Bue</i>	2/2/05
College Dean	<i>Tramm</i>	2/2/05
Director of Liberal Studies *		
Director of Honors College *		
Provost *		
Additional signatures as appropriate: (include title)		
UWUCC Co-Chairs	<i>Gail Sechrist</i>	2/22/05

\* where applicable



## Part II. Description of Curricular Change

### 1. Syllabus of Record

# GEOG 419 Geographic Information Systems (GIS) for Environmental Applications

**Texts:** A. K.C. Clarke. 2004. *Getting Started With Geographic Information Systems*. 4<sup>th</sup> Edition. Prentice Hall: Upper Saddle River, NJ. (required) B. S. Ormsby et. al.. 2000. *Getting to Know ArcGIS Desktop*. ESRI Press: Redlands, CA. (optional) Also, C. *Introduction to GIS Class Notes* available at Pro Packet (required). D. S. Morain, Ed. 1999. *GIS Solutions in Natural Resource Management*. OnWord Press: Santa Fe, NM. A course web site that you will be introduced to is also a resource.

**Catalog Description:** GEOG 419/519 Geographic Information Systems for Environmental Applications; 3c-0l-3sh; **Prerequisites:** Student must have completed 60 credits of coursework or have permission of instructor. Provides students with knowledge of the theoretical basis of Geographic Information Systems (GIS) and its applications for environmental scientific analysis. In the process of demonstrating some of the capabilities of GIS, the specifics of selected GIS and database software packages will also be covered. During the course of the semester, students will develop the skills to use GIS packages, manipulate and query geographic data to solve problems, perform simple spatial analysis, and understand how to utilize GIS for environmental analysis and resource management.

**Course Objectives:** By the end of the semester, students will be able to: 1) Understand the geographic dimensions of natural phenomena and human-environment interaction 2) Understand what geographic information systems are and how they work 3) Understand how geospatial technologies are presently being used by environmental scientists and natural and cultural resource managers 4) Understand how the capabilities of GISs enable the visualization and analysis of the natural environment 4) Use industry-standard GIS software to derive information from databases, and address environmental problems with spatial dimensions

**Attendance Policy:** Attendance will not be taken, but you are strongly encouraged to attend. Students who miss class will miss important class material, which will adversely affect their performance on exams and their class participation grade.

### Class Schedule

Week of

Topic(s)

.5 weeks	Introduction to course. Discussion of texts, computer facilities, how things are going to done. <i>What is a Geographic Information System (GIS)?</i> Unique functions and problem-solving capabilities of GISs. Applications areas. Functional elements of a GIS. Read A. Chs. 1-2 D. Chs. 1-2
1.5 weeks	<i>GISs Roots in Cartography:</i> Map Scale and Projections, Geographic coordinate systems, Characteristics of geographic information. <i>Maps as Numbers:</i> GIS Data Structures, Topology. Discussion of raster and vector data structures. Read A. Ch. 3, D. Ch. 3
1 week	<i>Maps as Numbers:</i> GIS Data Structures, Topology. Discussion of raster and vector data structures. Discussion of GIS functionality. Read A. Ch. 4 D. Ch. 4
1 week	<i>Getting the Map into the Computer:</i> Existing spatial data (reading and understanding metadata), Data input methods: digitizing, scanning, Global Positioning System (GPS), image and remote sensing data. <i>Introduction to ArcView 9 for environmental applications:</i> Adding data, working with themes, views, and project files Read A. Ch. 5
1 week	<i>What is Where?:</i> Database management, relational database management systems (RDBMS), searching by attribute, searching by geography. <i>Learning ArcView 9 continued: What is Where? (RDBMS and attribute data):</i> understanding RDBMS structure, relational join and link operations, database (attribute) queries. D. Chs. 5-6
1 week	<i>Learning ArcView 9 continued: What is Where? (Searching by Geography):</i> identify, classification (recoding), geographic selection, selecting features within a distance (buffer), overlay (spatial join) operations. Read A. Ch.7
1 week	<b>MIDTERM EXAM</b> <i>Learning ArcView 9 continued: What is Where? (Searching by Geography):</i> identify, classification (recoding), geographic selection, selecting features within a distance (buffer), overlay (spatial join) operations. <i>Making Maps with GIS:</i> Map elements, types of maps, map design. <i>Learning ArcView 9 continued:</i> Geocoding, and Displaying and representing spatial and attribute data. Read A. Ch. 6.,
1 week	<i>Why is it There?:</i> Describing attribute and spatial data statistically, Spatial analysis, GIS and Spatial Analysis. <i>Learning ArcView 3.2 continued:</i> Geocoding, Performing statistical and spatial analysis in ArcView. Read D. Chs. 3-4 D. Ch. 7
1 week	<i>Why is it There?:</i> Describing attribute and spatial data statistically, Spatial analysis, GIS and Spatial Analysis. <i>Learning ArcView 3.2 continued:</i> Performing statistical and spatial analysis in ArcView.
1 week	Advanced GIS functionality for Environmental Scientists: Spatial aggregation, spatial merges, hot links, editing tables, report generation.
1 week	Advanced GIS functionality: Spatial aggregation, spatial merges, hot links, editing tables, report generation. Advanced GIS functionality: ArcView Extensions... Spatial Analyst, Network Analyst, 3-D Analyst Read A. Ch. 9.
2 weeks	Some more advanced GIS functionality: ArcView Extensions...Spatial Analyst, Network Analyst, 3-D Analyst. Learning to think spatially...using GIS to analyze specific environmental problems. Read A. Ch. 10
2 weeks	Learning to think spatially...using GIS to analyze specific environmental problems.
	<b>FINAL EXAM TBA</b>

**Grading Procedure:** Grades are based on exercises, exams, and class participation. Exercises will be graded as follows: 80 to 85% of the total points will be awarded based on following instructions and/or deriving the correct answer; the other 10 to 15% of the points will be given based on initiative, care, creativity, and professionalism of the final product turned in. This means I want attention to detail and cartographic correctness to be evident in the exercises you turn in for evaluation. Late exercises will be penalized 20% of the total possible points for each day late (by the way I don't expect to have to deal with this). There will be two exams of equal value (a midterm and a final). Class participation (which includes attendance, hands-on computer work, in-class exercises and participation) will be worth 30% of your final grade. More than two unexcused absences will result in a 5% reduction in a student's final calculated percentage, with an additional 5% reduction for each additional unexcused absence. Students receiving 90% or more of the course total points will receive an A, 80%-90% a B, 70-80% a C, 60-70% a D, and below 60% an F.

## **Bibliography**

- Bolstad, Paul. *GIS Fundamentals: A First Text on Geographic Information Systems*. (White Bear Lake, MN: Eider Press, 2003).
- Brail, Richard K., and Richard E. Klosterman, Eds. *Planning Support Systems*. (Redlands, CA: ESRI Press, 2001).
- Chang, Kang-tsung. *Introduction to Geographic Information Systems*. (New York: McGraw-Hill, 2004).
- Convis, Charles L., Jr. *Conservation Geography: Case Studies in GIS, Computer Mapping, and Activism*. (Redlands, CA: ESRI Press, 2001).
- Goodchild, Michael F. et al Eds. *GIS and Environmental Modeling: Progress and Research Issues*. (Fort Collins, CO: GIS World Books, 1996).
- Lang, Laura. *Managing Natural Resources With GIS*. (Redlands, CA: ESRI Press, 1998).
- Leick, Alfred. *GPS Satellite Surveying*. (Hoboken, NJ: John Wiley & Sons, Inc., 2004).
- Lyon, John G., and Jack McCarthy. *Wetland and Environmental Applications of GIS*. (New York: Lewis Publishers, 1995).
- Morain, Stan Ed. *GIS Solutions in Natural Resource Management* (Santa Fe, NM: Lewis Publishers, 1999).
- Price, Maribeth. *Mastering ArcGIS*. (New York: McGraw-Hill, 2004).

## **2. Course Analysis Questionnaire**

### **Section A: Details of the Course**

2A1. The course is designed for principally for undergraduate students in natural sciences majors (especially Biology and Geosciences) and social sciences majors other than geography or planning (especially Anthropology) who would like to learn about geographic information systems (GIS) and increase their technical skills. The Department of Geography and Regional Planning presently offers GIS courses, however, they are oriented towards learning about GIS itself, rather than environmental analysis applications of the technology.

2A12. The course will not require changes in the content of other existing courses. The course will be an elective for all students who take it.

2A3. The course has not been offered on a trial basis. Some students from natural sciences majors have taken our existing Introduction to GIS course (GEOG 316/516) in the past, and in fact it was through these experiences that we identified the need for a new course.

2A4. This course will be proposed as a dual level course (GEOG 419/519). Graduate approval will be sought after the proposal has been reviewed by UWUCC.

2A5. The course will not be offered for variable credit.

2A6. Some other universities offer comparable courses, for example: Eastern Connecticut State University - GIS Applications in Environmental Science; Florida International University - Environmental Problem Solving Lab; University of South Florida - Environmental Applications of GIS.

2A7. The content of this course is not presently required for accreditation or professional membership.

#### Section B: Interdisciplinary Implications

2B1. This course will not be taught by instructors from more than one department.

2B2. There have been no conflicts regarding the content of this course with any other departments.

2B3. This course will not be cross listed with other departments.

2B4. Seats in this course could be made available to students in the School of Continuing Education.

#### Section C: Implementation

2C1. No additional faculty will be needed to teach this course. The department is already teaching a significant number of natural sciences students in existing GIS courses. The new course will allow the department to serve these students better by providing a more customized and focus course on environmental science and GIS.

2C2. The current resources are adequate to teach the course. All of the department's GIS courses require the use of the James Payne GIS Laboratory, which needs updated computing equipment every 2-3 years. The proposed course does not increase these facility maintenance requirements.

2C3. None of the resources for this course are funded by a grant.

2C4. We expect the course to be offered once an academic year.

2C5. Not Applicable (see above).

2C6. The course will be designed for a maximum of 18 students per section. The rationale for this is based upon the number of computer workstations in the James Payne GIS Laboratory.

2C7. No.

2C8. This course is not a distance education course.

**John Benhart**

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**From:** "Art Hulse" <ntcc@iup.edu>  
**To:** "John Benhart" <jbenhart@iup.edu>  
**Sent:** Tuesday, January 11, 2005 11:40 AM  
**Subject:** Re: GIS for Environmental Science

Hi John:

Thanks for sending me a copy of the GEOG 419 (Geographic Information Systems (GIS) for Environmental Science) proposal. I have looked over the proposal. I find no overlap in the topics that you will be covering in the course and anything information that is presented in existing courses within the Department of Biology. You have our enthusiastic support for this proposal. In addition I would like to say that it looks like it will be an excellent course both for your majors and also a course that could be of great benefit for a number of students (both Graduate and Undergraduate) within the Department of Biology.

Please do not hesitate to contact me if you have any questions.

Best wishes,

Art

----- Original Message -----

**From:** John Benhart  
**To:** Art Hulse  
**Sent:** Monday, January 10, 2005 2:09 PM  
**Subject:** Re: GIS for Environmental Science

Art, This is all of the GIS for Environmental Science (GEOG 419) proposal but the cover sheet...let me know what you think. John

----- Original Message -----

**From:** Art Hulse  
**To:** John Benhart  
**Sent:** Monday, January 10, 2005 7:22 AM  
**Subject:** Re: GIS for Environmental Science

Hi John:

Could you send me another copy of the proposal. I think that it may have been thrown out with some other papers as I was cleaning my office at the end of the semester. I will get on it ASAP.

Art

----- Original Message -----

**From:** John Benhart  
**To:** Arthur.Hulse@iup.edu  
**Sent:** Monday, January 03, 2005 10:28 AM  
**Subject:** GIS for Environmental Science

Art,

It was nice talking to you a few weeks ago at the happy hour (I can't believe it has been that long)...I'm just now getting to the e-mail that I said I would send you.

Specifically, I was hoping that you had a chance to look at the GIS for Environmental Science course proposal, and if so if the Dept. of Biology would be willing to provide a letter (or e-mail) of support for the course proposal. Happy New Year, and thank you for your attention.

John Benhart, Jr., Ph.D.  
Professor  
Manager, James Payne GIS Laboratory  
Department of Geography & Regional Planning  
Indiana University of Pennsylvania (IUP)  
421 North Walk, Room 10 Leonard Hall  
Indiana, PA 15705-1087  
E-Mail: [JBenhart@iup.edu](mailto:JBenhart@iup.edu)  
Voice: 724.357.7652

"Take the first step in faith...you don't have  
to see the whole staircase...just take the first step."  
Martin Luther King, Jr.