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*App - 12/13/94
Senate App 2/7/95*

CURRICULUM PROPOSAL COVER SHEET
University-Wide Undergraduate Curriculum Committee

I. CONTACT

Contact Person Dr. Robert Sechrist Phone x7653 or x2250
Department Geography and Regional Planning

II. PROPOSAL TYPE (Check All Appropriate Lines)

COURSE GIS Applications
Suggested 20 character title
GE 417 Geographic Information Systems
 New Course* Applications Development
Course Number and Full Title

 Course Revision _____
Course Number and Full Title

 Liberal Studies Approval + _____
for new or existing course Course Number and Full Title

 Course Deletion _____
Course Number and Full Title

 Number and/or Title Change _____
Old Number and/or Full Old Title

New Number and/or Full New Title

Course or Catalog Description Change _____
Course Number and Full Title

 PROGRAM: Major Minor Track

 New Program* _____
Program Name

 Program Revision* _____
Program Name

 Program Deletion* _____
Program Name

 Title Change _____
Old Program Name

New Program Name

III. Approvals (signatures and date)

Gail S. Sechrist _____
Department Curriculum Committee
[Signature] 9/21/94 _____
College Curriculum Committee
Susan Finber _____
Department Chair
[Signature] 9/21/94 _____
College Dean

+ Director of Liberal Studies (where applicable) *Provost (where applicable)

Catalog Description

GE 417 GIS Applications Development

3c-01-3sh

Prerequisites: GE316 Introduction to GIS

A project based class where students learn the skills to develop and maintain a Geographic Information System. Through cooperative learning students will design and implement functional systems. Methods for designing GIS systems to user specification, data collection, data input, project management, and system documentation are covered.

Geographic Information Systems Applications Development GE 417 Syllabus of Record

Texts

Beyond Mapping: Concepts, Algorithms and Issues in GIS by Joseph K. Berry, GIS World Books, Fort Collins, Colorado, 1993.

Profiting From A GIS by Gilbert H Castle, GIS World Books, Fort Collins, Colorado, 1993.

GIS for Urban and Regional Planning by Henk Scholten and John Stillwell. Kluwer Academic Publisher, 1990.

Special Resource Requirements

Transportable storage media for data backup.

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A project based class where students learn the skills to develop and maintain a Geographic Information System. Through cooperative learning students will design and implement functional systems. Methods for designing GIS systems to user specification, data collection, data input, project management, and system documentation are covered.

Course Description

This is a cooperative learning course. Students will be actively involved in creating a GIS system from the ground up. As much as possible we will endeavor to simulate a production environment. The functionality and usability of your system will be the principle components for evaluation in the course. Your ability to achieve milestones by specific dates will compose the remainder of your grade. Be forewarned, this will be a demanding and time consuming class where you will learn valuable integrative skills in addition to advanced GIS concepts. The successful completion of the course will require a substantial investment from you.

Course Objectives

1. Become familiar with tasks associated with constructing GIS. As a result students will be able to better evaluate GIS development proposals or to more realistically estimate time and costs associated with GIS development.
2. Be capable of associating attribute data with representations of physical objects and understanding the logical structures involved.
3. Be capable of creating a user interface for a GIS system.
4. Become capable of analyzing the nature of geographic phenomena.

5. Determine which data are necessary for inclusion in a GIS system.

Evaluation

Evaluation will be based on regular assignments (50%), submission of a final project (an operational GIS system) (25%), and a final examination (25%). Assignments are cumulative in nature, build to the completion of the final project, and must be completed sequentially. A late penalty of 10% per day will be assessed on any assignment submitted after the deadline.

Detailed Course Outline

<u>Week</u>	<u>Activity</u>
1	<p>Introduction, Review Syllabus, ArcCAD lesson & exercise. Review of GIS Application Areas. Categorizing GIS systems by functionality. Relating functionality to purpose. Assignment: ArcCAD review exercise.</p>
2	<p>System Planning.-- System Requirements. Writing, deciphering, & responding to RFPs for GIS. RFP Components. Determining system data requirements. Determining system analytic/reporting requirements. Determining resource, time, and materials requirements. Assignment: Write response to RFP issued in class. Select geographic region and application area for project.</p>
3	<p>System Implementation. Costs & Benefits. Legal Issues. Introducing new technology into large organizations. Project Sequencing - what to do when. Assignment: develop & submit time lines for your project.</p>
4	<p>Data collection - sources for information. Feds, State, Local Govt., Local Univ. Internet Access. Coding schemes - 2- Dimensional FIPS, Parceling 1- Dimensional Route number, 0- Dimensional ZIP Coordinate Systems & Projections Review.</p>

Assignment - obtain necessary information for project
(demonstrate query of internet as well as traditional
data collection from published sources).

- 5 Organizing your Information -- database concepts.
Data Models - flat, relational, hierarchial.
Data Structures - num, char, boolean, integer.
dBase Model.
ESRI Model.
Assignment - design data model and structures for
locational and attribute data.
- 6 Data input - methods, techniques, concepts.
Data file manipulation, extraction, translation.
Digitizing with ArcCAD vs. Atlas*GIS vs.
Assignment - begin entering/merging data .
- 7 Oversight of information entry / manipulation.
- 8 Oversight of information entry / manipulation.
- 9 Oversight of information entry / manipulation.
Assignment - completed spatial and attribute data bases.
- 10 Converting from developmental to usable system.
Documentation.
 Functions
 Metadata
 Standards (Accuracy, Projection,etc.)
Designing administrative functions.
 backup
 updates
 security
Translating ArcCAD to ArcVIEW.
- 11 Developing user interfaces.
AutoLISP.
Assignment: Simple autoLISP program.
- 12 More AutoLISP.
Assignment: AutoLISP program.
- 13 Project feedback Period.
Assignment: User interface completed.

Float draft system.

14 System Demonstrations.

15 Final Exam.

The Project

Each group will develop a GIS system covering a portion of Indiana County. Exactly where and for what purpose will be up to you. Completion of the project will involve the following activities:

0. Respond to a request for proposals for the construction of parcel based GIS system for your assigned municipality. (individual assignment).
1. Gather necessary materials to complete your project (tax maps, existing map files, existing attribute files).
2. Enter spatial and attribute data into your system.(how much will you digitize? how much is available?)
3. Link attribute & spatial data in ArcCAD.
4. Design user interface
5. Develop administrative procedures.
6. Prepare manuals of operation for end users.
7. Create and maintain metadata .

These aspects may not necessarily be done in that order. In fact, much of the work must be done simultaneously. You must specify and achieve project milestones in order to complete the entire project in the allotted time.

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Course Analysis Questionnaire

Section A: Details of the Course

A1. This course is designed as a majors course. It is intended to function as the capstone course in technical geographic training.

A2. No.

A3. Yes. Experimental versions of this course were offered in the springs of 1991, 1993, and 1994. It will be offered in the spring of 1995.

A4. Yes. Submission is occurring simultaneously to the senate graduate committee.

A5. No.

A6. Yes. Many other institutions offer an advanced applications oriented GIS course at the senior or dual level. In the brief listing that follows are all undergraduate/dual courses.

Central Connecticut State University	GE478 GIS Design & Implementation
Ohio University	GE479 Advanced GIS
Central Washington University	GE492.1 Advanced GIS Applications
University of South Carolina	GE863 Advanced Seminar in GIS
Nova Scotia Community College	GE1210 Advanced GIS
University of New South Wales	GE9330 Spatial Data Processing & Integration
Salem State College	GE584 Geographic Information System Applications
University of Wisconsin - Madison	IES/Soils/LA 695 Applications of GIS in Natural Resources
North Carolina State University	RRA 663 Application Issues in GIS
University of Washington	FTY480 Applied Geographic Information Systems
University of Rhode Island	NRS522 Advanced GIS Analysis of Environmental Data
Texas A&M	FRSC 689 Advanced Topics in GIS
University of Wisconsin - Milwaukee	UP945-792 Using GIS for Planning
	UP945-793 Applied Projects in Urban GIS

A7. Model curricula for this course were developed at the National Center for Geographic Information Analysis in 1990. Attached are extracted pages from the model curricula to document the recommended format and content.

"why not an existing course" The course content represents education in an emerging technology. Existing coursework leads up to this course. In order to provide the background necessary for this course, the existing courses must maintain their content. We cannot, therefore, incorporate this material into an existing course.

Section B: Interdisciplinary Implications

B1. One instructor will teach the course.

B2. No other department offers courses in designing and implementing geographic information systems. The course content is clearly divergent from courses in information management offered by MIS and computer science. While it is true that some topics may be similar (data base management design, for example), neither of these departments offer courses designed primarily to instruct students in how to create information systems designed around location. The proposal has been submitted to MIS and Computer Science. There has been no response to date.

B3. Yes.

Section C: Implementation

C1. The course, through experimental offerings, has become part of our regular offering. The resources are already allocated.

C2. The following is based on a maximum class size of 20.

Space - the Geography Department Lab (Room 8, Leonard Hall) will serve adequately.

Equipment - the course will be an equipment hog. Computer equipment necessary for the course will have a usable life of no more than three years. The lab currently houses three 486 computers and geographic related peripherals. Three additional 486 computers with geographic related peripherals are on order. Adequate copies of necessary software are available in the College Lab and on the departmental network. Several pieces of equipment and software have been acquired via grants and contracts.

Laboratory Supplies and other Consumable Goods - plotter paper and pens will be needed these will be purchased from the departmental budget.

Library Materials - Government Documents are adequate. The book and journal collection is thin, which is to be expected in a new field.

Travel Funds - attending training sessions instead of relying on self education would increase the efficiency of the instructors. Travel may be funded by the Spatial Sciences Research Center as their budget allows.

C3. Yes. No provisions have been made with the administration. Another grant/contract will have to be funded.

C4. Annually, in the Spring Semester.

C5. One.

C6. 16. Yes. Copies of software, available workstations, capacity of the instructor to provide extensive individualized assistance as befits a culminating course.

C7. No.

Section D: Miscellaneous None.

MAIL> 33

#33

1-DEC-1994 11:25:31.68

NEWMAIL

From: GROVE::JLWOLFE "Jim Wolfe"
To: RPSECRST
CC: JLWOLFE
Subj: GE 417/517 Geographic Information Systems

Bob Sechrist,

Bill Oblitey passed a copy of your proposal for the GE 417/517 course on to me, as chair of the Computer Science Dept Curriculum Committee. My committee has reviewed the proposal and has no objections to the course. In fact, I think it looks like a very interesting course.

I do have one question about GE 417. I noticed that you described it as a capstone course for majors; however, the only prerequisite for the course is GE 316. We recommend GE 316 to computer science majors who want to minor in geography. If one of our majors had completed GE 316, should we suggest possibly taking GE 417 or is the course restricted or constructed in such a way that only geography majors should take it?

Press RETURN for more...

MAIL>

#33

1-DEC-1994 11:25:31.68

NEWMAIL

If you would like a letter from the department indicating acceptance of the proposal, please let me know. Otherwise, we will assume that this message is sufficient response.

Jim Wolfe

PS I will send a copy of this message on to Bill Oblitey.

1-16

Marcia-

This is the only copy of the letter of support requested as an attachment to 94-59 GE 417 New Course Proposal. Committee does not need copies, please attach it to final proposal for record keeping. Thanks.

Jordan Kuzman