CGS Agenda Item: 12-52
Effective Spring 2013

Eastern Illinois University

NEW COURSE PROPOSAL

Please check one: **X New course** ___ Revised course

PART I: CATALOG DESCRIPTION

1. **Course prefix and number, *such as ART 1000*: GEG / ESC 5830**
2. **Title (*may not exceed 30 characters, including spaces*): GIS: Building Geodatabases**
3. **Long title, if any (*may not exceed 100 characters, including spaces*): GIS: Building Geodatabases**
4. **Class hours per week, lab hours per week, and credit [*e.g., (3-0-3)*]: 2-2-3**
5. **Term(s) to be offered:** ___ Fall **X Spring** ___ Summer ___ On demand
6. **Initial term of offering:** ___ Fall **X Spring** ___ Summer **Year: 2013**
7. **Course description: This course covers the fundamental concepts of building geographic databases and focuses on the storage, management, and quality control of GIS data. Students will learn how to create Esri Geodatabases, how to migrate existing data to a geodatabase, and how to edit data stored in a geodatabase.**
8. **Registration restrictions:**
   a. **Equivalent Courses**
      - **Identify any equivalent courses** (e.g., cross-listed course, non-honors version of an honors course). **GEG/ESC 3830 is an equivalent course.**
      - Indicate whether coding should be added to Banner to restrict students from registering for the equivalent course(s) of this course. __**X**_ Yes __ No

   b. **Prerequisite(s)**
      Identify the prerequisite(s), including required test scores, courses, grades in courses, and technical skills. Indicate whether any prerequisite course(s) MAY be taken concurrently with the proposed/revised course. **GEG 5810 or permission from the Instructor**
      - Indicate whether coding should be added to Banner to prevent students from registering for this course if they haven't successfully completed the prerequisite course(s). _**X**__ Yes _ No

        If yes, identify the minimum grade requirement and any equivalent courses for each prerequisite course:

   c. **Who can waive the prerequisite(s)?**
      ___ No one ___ Chair **X** **Instructor** ___ Advisor ___ Other (Please specify)

   d. **Co-requisites** (course(s) which MUST be taken concurrently with this one):

   e. **Repeat status:** _ **X** _ Course may not be repeated.
      ___ Course may be repeated once with credit.
      Please also specify the limit (if any) on hours which may be applied to a major or minor.

f. Degree, college, major(s), level, or class to which registration in the course is restricted, if any:

Students who have taken GEG/ESC 3830 for credit are restricted from taking this course. Student must be enrolled in graduate school.

g. Degree, college, major(s), level, or class to be excluded from the course, if any:

9. Special course attributes [cultural diversity, general education (indicate component), honors, remedial, writing centered or writing intensive] **None**

10. Grading methods (check all that apply): **X Standard letter** ___ CR/NC ___ Audit ___ ABC/NC ("Standard letter"—i.e., ABCDF--is assumed to be the default grading method unless the course description indicates otherwise.)

Please check any special grading provision that applies to this course:

___ The grade for this course will not count in a student's grade point average.

___ The credit for this course will not count in hours towards graduation.

If the student already has credit for or is registered in an equivalent or mutually exclusive course, check any that apply:

___ The grade for this course will be removed from the student's grade point average if he/she already has credit for or is registered in _____ (insert course prefix and number).

___ Credit hours for this course will be removed from a student's hours towards graduation if he/she already has credit for or is registered in _____ (insert course prefix and number).

11. Instructional delivery method: (Check all that apply.)

___ lecture ___ lab **X lecture / lab combined** ___ independent study/research

___ internship ___ performance ___ practicum or clinical ___ study abroad

___ Internet ___ hybrid ___ other (Please specify)

PART II: ASSURANCE OF STUDENT LEARNING

1. List the student learning objectives of this course:

Objectives:

Upon successful completion of this course, students will:

- **Create a Geodatabase; Learn the structure of an Enterprise Geodatabase**
- **Migrate GIS data; e.g., coverages, shapefiles, CAD files, and Excel spreadsheets, etc, to a file geodatabase and to the Enterprise Geodatabase using ArcSDE and SQL Server.**

- **Store and Manage vector and raster data in a file and Enterprise Geodatabase.**
- **Create and apply attribute domains, subtypes, topology, and relationship classes to model geographic data and enforce data integrity while editing in GIS.**
- **Create geodatabase annotation to store text and graphics that describe features or areas on a map.**
- **Create a geometric network to model and analyze a directed flow network such as a utility network.**
- **Define a geodatabase schema to efficiently model and store their data.**
- **Automate GIS tasks and analyses using automated models. Students will build a model applicable to their field of study.**

a. If this is a general education course, indicate which objectives are designed to help students achieve one or more of the following goals of general education and university-wide assessment:

- **EIU graduates will write and speak effectively.**
- **EIU graduates will think critically.**
- **EIU graduates will function as responsible citizens.**

b. If this is a graduate-level course, indicate which objectives are designed to help students achieve established goals for learning at the graduate level:

- **Depth of content knowledge**
  a. **Learn the structure of an Enterprise Geodatabase (SQL Server)**
- **Effective critical thinking and problem solving**
  a. **Automate GIS tasks and analyses using ArcGIS ModelBuilder. Graduate students will build a model applicable to their field of study.**
- **Effective oral and written communication**
  a. **Create a report outlining the Conceptual, Logical, and Physical design schema of a geodatabase**
- **Advanced scholarship through research or creative activity**
  a. **Create a geometric network to model and analyze a directed flow network such as a utility network.**
  b. **Create a linear reference model and analyze events along a network**

2. Identify the assignments/activities the instructor will use to determine how well students attained the learning objectives:

- **Lab Exercises 60%**
- **Mid-term Examination 20%**
- **Final Examination 20%**

3. Explain how the instructor will determine students' grades for the course:

Graduate Students will demonstrate proficiency in the building of ArcGIS Geodatabases and Geodatabase Models through application and completion of laboratory assignments, independent projects, and maps and written reports. Students are expected to employ advanced GIS tools and techniques, automate common GIS tasks, and examine, validate, and correct GIS topologies. Student' geodatabase models will be thoroughly examined and run to ensure the learner has attained a thorough and working knowledge of Building Geodatabases. Graduate students will submit an

additional model-building project based upon their field of study. The project will be a supplement to the final examination. Grading will consist of the following: Laboratory exercises 60%, Mid-term examination 20%, and Final examination 20%.

Learning Objectives	20% Mid-Term Exam	20% Final Exam	60% Lab Exercises
Create an Esri Geodatabase	X	X	X
Migrate GIS data	X	X	X
Store and Manage vector and raster data in a file geodatabase			X
Create and apply attribute domains, subtypes, topology, and relationship classes	X	X	X
Create geodatabase annotation to store text and graphics			X
Create a geometric network to model and analyze a directed flow network	X		X
Define a geodatabase schema to efficiently model and store data		X	X
Automate GIS tasks and analyses using ArcGIS ModelBuilder		X	X
ArcGIS ModelBuilder Exercise - Graduate Students		X	

4. **For technology-delivered and other nontraditional-delivered courses/sections, address the following:**
   a. **Describe how the format/technology will be used to support and assess students' achievement of the specified learning objectives:**
   b. **Describe how the integrity of student work will be assured:**
   c. **Describe provisions for and requirements of instructor-student and student-student interaction, including the kinds of technologies that will be used to support the interaction (e.g., e-mail, web-based discussions, computer conferences, etc.):**

5. **For courses numbered 4750-4999, specify additional or more stringent requirements for students enrolling for graduate credit. These include:**
   a. **course objectives;**
   b. **projects that require application and analysis of the course content; and**
   c. **separate methods of evaluation for undergraduate and graduate students.**

6. **If applicable, indicate whether this course is writing-active, writing-intensive, or writing-centered, and describe how the course satisfies the criteria for the type of writing course identified. (See Appendix *.) This course is NOT writing intensive**

PART III: OUTLINE OF THE COURSE

Provide a week-by-week outline of the course's content. Specify units of time (e.g., for a 3-0-3 course, 45 fifty-minute class periods over 15 weeks) for each major topic in the outline. Provide clear and sufficient details about content and procedures so that possible questions of overlap with other courses can be addressed. For technology-delivered or other nontraditional-delivered courses/sections, explain how the course content "units" are sufficiently equivalent to the traditional on-campus semester hour units of time described above.

Course Content:

Week 1: Introduction to the Geodatabase

- Types of geodatabases
- Geodatabase elements
- Geodatabase tables in a database management system (DBMS)

Week 2: Building Geodatabase Schema

- Geodatabase Design: Conceptual, Logical, and Physical
- Defining geodatabase schema
- Creating tables, feature classes, and feature datasets using geoprocessing tools
- Spatial Index Management
- Building a GPS-driven, GIS-compliant geodatabase

Week 3 / 4: Setting Attribute Validation Rules

- Subtypes and domains
- Creating subtypes and domains
- Editing with subtypes and domains in ArcMap
- Coded value domains versus range domains
- Subtypes and relationship rules

Week 5: Creating Relationship Classes

- Creating relationship classes
- Setting relationship class properties
- Using relationships in ArcMap
- Relationship rules
- Validation
- Simple versus composite relationships

Week 6: Annotation in the Geodatabase

- Creating, editing, and managing annotation features

Week 7 & 8: Building and Validating a Geodatabase Topology

- Topology management
- Building a topology
- Setting the properties of a topology
- Setting appropriate topological rules
- Fixing topological errors
- Editing topological data

Week 9 & 10: Building a Geometric Network

- Creating and editing geometric networks
- Performing analysis
- Setting and using connectivity rules

Week 11: Use and Implementation of XML Data Interchange

- Understanding XML schemas of the geodatabase
- Exporting geodatabase contents to XML
- Importing an XML file to define geodatabase schema

Week 12: Use and Implementation of KML / KMZ Data Interchange

- Understanding KML data structure
- Implementing KML in ArcMap
- Implementing KML in Google Earth applications

Week 13: Management & Storage of Vector Data in the Geodatabase

- Loading data from shapefiles, CAD files, coverages, and Excel spreadsheets
- ArcGIS vector data loading tools

Week 14: Management & Storage of Raster Data in the Geodatabase

- Managing and storing raster datasets, raster catalogs, and raster attributes in the geodatabase environment

Week 15: Geodatabase Workflows: Designing GPS Code-compliant Geographic Data

- Designing and managing a GPS-Compliant Geodatabase

***Above will include a Midterm and Final Exam**

PART IV: PURPOSE AND NEED

1. **Explain the department's rationale for developing and proposing the course.**

   Purpose and Need:

   - **This course introduces the student to an industry RDBMS (Relational Database Management System) standard for GIS Professionals – the Esri Geodatabase. As is the case in the well-sought, and widely recognized Esri Training Program core curriculum of Instructor-Led courses, by design, this course also follows a GIS I or GIS II course.**

   - **Building Geodatabases is a necessary and essential skill set for our students. Although many antiquated GIS formats are still widely used, the Esri Geodatabase format is the current and recommended standard among GIS Professionals. It is widely used and is both scalable and expandable in that this technology is compatible with many other RDBMS standards such as Oracle, Informix, DBII, and SQL Server.**

   - **Automating GIS tasks and analyses in GIS is an advanced practice often associated with GIS Analysts. In keeping with the fast-paced and ever changing industry of GIS technology, this course is an ideal follow up to GIS I or GIS II.**

   a. **If this is a general education course, you also must indicate the segment of the general education program into which it will be placed, and describe how the course meets the requirements of that segment.**
   b. **If the course or some sections of the course may be technology delivered, explain why.**

2. **Justify the level of the course and any course prerequisites, co-requisites, or registration restrictions.**

   This proposed level for this course is 5000. Most students will take this course after GIS I and GIS II, although students may take the course after GIS I. GEG 3810, Introduction to GIS, is a prerequisite for this course. The current course numbering is offered for an interim period of 3 years. The courses will be updated to provide separate 3000 and 5000 sections or the 4750-4999 numbering will be adopted at the conclusion of the interim period.

3. **If the course is similar to an existing course or courses, justify its development and offering.**

   a. **If the contents substantially duplicate those of an existing course, the new proposal should be discussed with the appropriate chairpersons, deans, or curriculum committees and their responses noted in the proposal.**
   b. **Cite course(s) to be deleted if the new course is approved. If no deletions are planned, note the exceptional need to be met or the curricular gap to be filled.**

   GEG/ESC 3830 is a similar course.

4. **Impact on Program(s):**

a. **For undergraduate programs, specify whether this course will be required for a major or minor or used as an approved elective.**
b. **For graduate programs, specify whether this course will be a core requirement for all candidates in a degree or certificate program or an approved elective.**

This course will serve as an elective in the following programs:

Physical Science Discipline of the Professional Science Master's Program in GIS (PSM)
Biology Graduate GIS Certification (as proposed)

If the proposed course changes a major, minor, or certificate program in or outside of the department, you must submit a separate proposal requesting that change along with the course proposal. Provide a copy of the existing program in the current catalog with the requested changes noted.

PART V: IMPLEMENTATION

1. **Faculty member(s) to whom the course may be assigned: This course will be delivered by Steven Di Naso. Later, any qualified departmental faculty member may teach this course. Steven Di Naso has applied to the Graduate School to serve as Graduate Faculty.**

   If this is a graduate course and the department does not currently offer a graduate program, it must document that it employs faculty qualified to teach graduate courses. Department faculty members are registered with the Graduate School as qualified to teach graduate courses.

2. **Additional costs to students:**

   Include those for supplemental packets, hardware/software, or any other additional instructional, technical, or technological requirements. (Course fees must be approved by the President's Council.)

   Yes, a course fee of $35 will be necessary to provide a guide for this course (which the students will retain), lab equipment maintenance, and software upgrades.

3. **Text and supplementary materials to be used (Include publication dates):**

   There is no textbook for this class however there will be many supplemental handouts and maps for most lectures and laboratory exercises.

PART VI: COMMUNITY COLLEGE TRANSFER

If the proposed course is a 1000- or 2000-level course, state either, "A community college course may be judged equivalent to this course" OR "A community college course will not be judged equivalent to this course." A community college course will not be judged equivalent to a 3000- or 4000-level course but may be accepted as a substitute; however, upper-division credit will not be awarded.

PART VII: APPROVALS

Date approved by the department or school: March 7, 2012

Date approved by the college curriculum committee: April 20, 2012

Date approved by CGS:

*In **writing-active courses**, frequent, brief writing activities and assignments are required. Such activities -- some of which are to be graded – might include five-minute in-class writing assignments, journal keeping, lab reports, essay examinations, short papers, longer papers, or a variety of other writing-to-learn activities of the instructor's invention. Writing assignments and activities in writing-active courses are designed primarily to assist students in mastering course content, secondarily to strengthen students' writing skills. In **writing-intensive courses**, several writing assignments and writing activities are required. These assignments and activities, which are to be spread over the course of the semester, serve the dual purpose of strengthening writing skills and deepening understanding of course content. At least one writing assignment is to be revised by the student after it has been read and commented on by the instructor. In writing-intensive courses, students' writing should constitute no less than 35% of the final course grade. In **writing-centered courses** (English 1001G, English 1002G, and their honors equivalents), students learn the principles and the process of writing in all of its stages, from inception to completion. The quality of students' writing is the principal determinant of the course grade. The minimum writing requirement is 20 pages (5,000 words).

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