Eastern Illinois University

NEW COURSE PROPOSAL

CGS Agenda Item: 08-03
Proposal Effective Date: Spring 2009

GEG 5860 Geographic Information Systems II

Please check one: ☒ New course ☐ Revised course

PART I: CATALOG DESCRIPTION

1. **Course prefix and number:** GEG 5860
2. **Title:** Geographic Info Systems II
3. **Long title:** Geographic Information Systems II
4. **Class hours per week, lab hours per week, and credit:** 2-2-3
5. **Term(s) to be offered:** ☐ Fall ☒ Spring ☐ Summer ☐ On demand
6. **Initial term of offering:** ☐ Fall ☒ Spring ☐ Summer ☐ Year: 2009
7. **Course description:** The principle focus is learning to use advanced features of the ESRI ArcGIS software to perform advanced thematic mapping and spatial analysis, automation of spatial and attribute data, advanced editing, and advanced options for cartographic display. Supplemental to this course, students may work towards and obtain the ESRI Introduction to ArcGIS II Certificate.
8. **Registration restrictions:**
   a. **Identify any equivalent courses:** None
   b. **Prerequisite:** GEG 5810 Geographic Information Systems 1
   c. **Who can waive the prerequisite(s)?**
      ☒ No one ☐ Chair ☐ Instructor ☐ Advisor ☐ Other (Please specify)
   d. **Co-requisites** (course(s) which MUST be taken concurrently with this one): None
   e. **Repeat status:** ☒ Course may not be repeated.
   f. **Degree, college, major(s), level, or class** to which registration in the course is restricted, if any: None
   g. **Degree, college, major(s), level, or class** to be excluded from the course, if any: None
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): ☒ Standard letter ☐ C/NC ☐ Audit ☐ ABC/NC
    ("Standard letter"—i.e., ABCDF--is assumed to be the default grading method unless the course description indicates otherwise.)
11. **Instructional delivery method:** lecture lab combined

PART TWO: ASSURANCE OF STUDENT LEARNING

1. List the student learning objectives of this course:

   Students will be provided an opportunity to gain advanced knowledge of GIS theory, spatial data management and analysis, how to make meaningful spatial queries and how to present the results in an easily understood graphic format. Specific tasks include:

   - Perform complex Spatial Analysis (Advanced scholarship through research or creative activity)
   - Manage Spatial / Tabular Data in an Enterprise Geodatabase (Depth of content knowledge)
   - Geocode Data using multiple Address Locator Services
   - Perform Data Conversion between a wide variety of spatial and attribute formats
   - Advanced Editing of Spatial and Attribute data; Editing in a multi-editor environment (Effective critical thinking and problem solving)
   - Creating and Editing Metadata; using Metadata Stylesheets
   - Produce advanced maps and reports in numerous formats (Effective oral and written communication)

2. Assignments/activities the instructor will use to determine how well students attained the learning objectives:
   - Mid term Examination 30%
   - Laboratory Exercises 30%
   - Oral Presentation 10%
   - Final Examination 30%

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

   Graduate students will demonstrate advanced knowledge and comprehension in GIS theory and application through completion and submittal of laboratory assignments and written reports. Students are expected to organize and analyze spatial and tabular data, compare and contrast varying methodologies, explain and discuss their methods, derive detailed conclusions from their analysis, and evaluate the outcome of geoprocessing techniques. Students will produce and use maps, graphs, charts, and reports providing support to a number of proposed problems, scenarios, and theoretical events thereby applying their cartographic skills and ability to use GIS as a problem-solving tool through often complex spatial analyses. Graduate students will additionally be expected to submit an oral presentation, supplemented with maps produced, using GIS methodologies, about an appropriate research project in GIS.

Learning Objectives	30% Mid-Term Exam	30% Final Exam	30% Lab Exercises	10% Oral Presentations
Perform Complex Spatial Analysis	X	X	X	
Manage Spatial / Tabular Data in an Enterprise Geodatabase	X	X	X	X
Geocoding Data using Multiple Address Locator Services	X	X	X	

Perform Data Conversion between a wide variety of spatial and attribute data formats	X	X	X	
Advanced Editing of Spatial and Attribute data; Editing in a multi-editor environment	X	X	X	
Creating and Editing Metadata; using Metadata Stylesheets	X	X	X	
Produce advanced maps and reports in numerous formats	X	X	X	
				X

4. Not technology-delivered.

5. For courses numbered 4750-4999, specify additional or more stringent requirements for students enrolling for graduate credit. Not Applicable.

   Graduate students will demonstrate advanced proficiency in GIS theory and application through completion and submittal of all class requirements including tests, laboratory assignments and written reports. Graduate students will additionally be required to present an oral presentation supplemented with maps, graphs, and charts using ArcGIS on an appropriate research project in their field of study. Additional meetings will be scheduled with the graduate student to assist with mapping endeavors related to their individual theses. Laboratory exercises 30%, Mid-term examination 30%, Oral presentation 10%, Final examination 30%.

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 *.)

   Not applicable

PART III: OUTLINE OF THE COURSE

The course will meet 30 times during the semester (two 100 minute periods per week)

Week 1
Advanced Map Symbology I

Quantitative displays and map classification

Week 2
Advanced Map Symbology II

Using and creating Stylesheets

Week 3
Advanced Labels & Annotation

Using the Maplex Extension, Creating Expressions for Labeling

Week 4
Advanced Geocoding

Creating Address Locators, Using ESRI Geocoding Services

Week 5
Modifying the ArcGIS Interface

Customizing the ArcGIS Interface, Creating custom toolbars, saving customizations

Week 6
Designing a GIS Database I

Introduction to Geodatabase Design Concepts, Creating and Editing Geodatabase Schema

Week 7
Designing a GIS Database II

Introduction to Geodatabase Design Concepts, Creating and Editing Geodatabase Schema

Week 8
Geodatabase Population

Importing and Exporting GIS data into the Geodatabase, Spatial Reference and Coordinate Domains

MIDTERM EXAM

Week 9
Validating the Geodatabase I

Creating and Using Geodatabase Subtypes and Domains

Week 10
Validating the Geodatabase II
Creating and Using Topologies, Spatial Integrity

Week 11
Advanced Editing I

Editing Spatial and Attribute Data

Week 12
Advanced Editing II

Editing Topologies

Week 13
Spatial Adjustment

Spatially Adjusting GIS and CAD data

Week 14
Advanced Geoprocessing I

Geoprocessing Techniques in ArcGIS

Week 15
Advanced Geoprocessing II

Geoprocessing Techniques using ModelBuilder

FINAL EXAM

PART IV: PURPOSE AND NEED

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

   This course will directly address goals 1 through 5 in the Geography Program Student Learning Assessment Plan. Geographic Information Systems allow us to see spatial patterns, relationships and trends in physical, cultural and economic variables in ways that charts, graphs, and tabular datasets cannot present. This course provides the framework upon which students will develop advanced ArcView, ArcEditor, and ArcInfo skills necessary to perform complex spatial analyses and advanced cartographic design. Whether mapping how, when, where or why, GIS is important over a wide range of disciplines. GIS is both tool and science and imparts the framework with which geographic data is organized, analyzed and disseminated.

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

   The prerequisite for the course is GEG 5810 Geographic Information Systems I. ~~The course is set up to accommodate juniors, seniors who have experience in using basic drafting programs and introductory GIS functionality.~~ It will expand what the students have learned in GEG 5810 and related courses in their discipline.

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

   The course, along with GEG 5810, will replace GEG 4890 Geographic Information Systems. As mapping software becomes more sophisticated and complex, it takes additional class time to introduce the basics and then move on to higher order functionality of the software. We are setting up the proposed GEG 5810 and GEG 5860 courses to extend the instruction time spent on the GIS software and replace the one semester long GEG 4890 course.

4. Impact on Program(s):

   It will provide graduate students throughout the university to be versed in Geographic Information Systems theory and practical applications in their home departments.

PART V: IMPLEMENTATION

1. Faculty member(s) to whom the course may be assigned:

   This course will initially be delivered by Mr. Steven Di Naso, FA, under the guidance, direction, and supervision of Dr. Vincent P. Gutowski, Professor of Geography. Later, any qualified Geography faculty may teach this course.

   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.

   Dr. Gutowski is a member of the EIU Graduate faculty.

2. Additional costs to students:

   $30 course fee for use of the Geology/Geography Department computer lab.

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

   Getting to Know ArcGIS Desktop, Second Edition: Tim Ormsby, Eileen Napoleon, Robert Burke, Laura Feaster, and Carolyn Groessl, *ESRI Press, 2004, 588 pp.* ISBN: 158948083X

PART VI: COMMUNITY COLLEGE TRANSFER

A community college course will not be judged equivalent to this course.

PART VII: APPROVALS

Date approved by the Department of Geology/Geography _29 October 2007_____

Date approved by the College of Sciences Curriculum Committee _30 November 2007_____

Date approved by CGS _____