Eastern Illinois University
NEW/REVISED COURSE PROPOSAL FORMAT
(Approved by CAA on 9/29/11 and CGS on 10/18/11, Effective Fall 2011)

This format is to be used for all courses submitted to the Council on Academic Affairs and/or the Council on Graduate Studies.

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

PART I: CATALOG DESCRIPTION

1. **Course prefix and number,** *such as ART 1000***:** GEG 5880

2. **Title (***may not exceed 30 characters, including spaces***):** GIS Modeling

3. **Long title, if any (***may not exceed 100 characters, including spaces***):**

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:** _2014_

7. **Course description:**
An introduction to spatial models used in geographical analysis. Covers models of geographic information including topological models, networks and cost distance functions, as well as an introduction to dynamic process models including cellular automata and agent based modeling. Applications to physical, social, political and environmental contexts are discussed.

8. **Registration restrictions:**
   a. **Equivalent Courses**
      - **Identify any equivalent courses** (e.g., cross-listed course, non-honors version of an honors course).

      - Indicate whether coding should be added to Banner to restrict students from registering for the equivalent course(s) of this course. ___ Yes   _**X**_ 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.

      (1) GEG 3885 or equivalent introductory statistics course at the undergraduate or graduate level
      (2) GEG 3810/5810 (GIS I) or equivalent

      - 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). ___ Yes   _**X**_ 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:

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]

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:**

   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**
   - **Effective critical thinking and problem solving**
   - **Effective oral and written communication**
   - **Advanced scholarship through research or creative activity**

   1. Describe alternative data models used to represent geographical space, including raster, vector, topological, cost-distance and network models. (depth of content knowledge)
   2. Distinguish between alternative process modeling paradigms such as cellular automata and agent-based modeling. (depth of content knowledge)
   3. Determine when different data models and process modeling paradigms are appropriate (effective critical thinking and problem solving)
   4. Model the structure(s) or process(es) of a real-world landscape and report findings (effective oral & written communication, advanced scholarship through research or creative activity)

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

Learning Objective	Exams	In-Class Discussions	Individual Research Project
Describe alternative data models used to represent geographical space, including raster, vector, topological, cost-distance and network models. (depth of content knowledge)	X	X	X
Distinguish between process modeling paradigms such as cellular automata and agent-based modeling. (depth of content knowledge)	X	X	X
Determine when different data models and process modeling paradigms are appropriate	X	X	X
Model the structure(s) or process(es) of a real-world landscape and report finding	X	X	X

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

Assignment	Ea.	Total
2 Exams	20%	40%
10 Discussions	2%	20%
Individual Research Project	40%	40%
Total		100%

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 *.)**

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.

UNIT	WEEK & THEME	SELECTED TOPICS
Foundations	Week 1: Introduction to Spatial Modeling	Examples of applications from physical & human geography; data & software overview
	Week 2: Model types and building blocks	Data models vs. process models; geometry primitives; distance metrics; topology
	Week 3: Modeling scenarios & frameworks	Problem identification & the PPDAC model; hypothesis testing; Monte Carlo simulation
Representational Models	Week 4: Surface Representation & Terrain Modeling (I)	Grids & digitial elevation models; contours Triangular Irregular Networks (TINs); Warntz Networks
	Week 5: Surface Representation & Terrain Modeling (II)	Surface geometry metrics; visibility analysis; drainage & watershed analysis
	Week 6: Surface Representation & Terrain Modeling (III)	Cost distance functions, accumulated cost surfaces, least cost paths
	Week 7: Network Modeling (I)	Network representation & graph theory; network construction; network distances and shape metrics; linear referencing
	Week 8: Network Modeling (II)	Optimal routing, facility location, traveling salesman problems

	Week 9: Network Modeling (III)	Flow & migration; building setbacks and other within-polygon distance problems; medial axis transform & river flow modeling
Process Models	Week 10: Spatial Process Models (I)	Descriptive vs. predictive modeling; model validation & sensitivity analysis; linking, coupling and embedding
	Week 11: Spatial Process Models (II)	Cellular automata
	Week 12: Spatial Process Models (III)	Transportation modeling
	Week 13: Spatial Process Models (IV)	Agent-based models
Wrap-up & Project Guidance	Week 14: Outstanding problems in geographical modeling	Modifiable areal unit problem; scale effects; uncertainty & gradation; ontology
	Week 15: Project Presentations	Project Presentations

PART IV: PURPOSE AND NEED

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

   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.**

   This course will support the new Professional Science Masters degree program in Geographic Information Science, and will serve as an elective in the discipline component for students in that program. Spatial modeling is a core component of geographical information science, which seeks methods to understand geographic patterns, processes and relationships. The course will provide students participating in the PSM program a foundation for modeling which can be applied to a broad range of problems in physical, social, political and environmental contexts.

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

   The course will be targeted toward graduate students. The prerequisites are designed to ensure that students will already have some familiarity with standard (non-spatial) statistical concepts such as central tendency, sampling distributions, correlation, etc., and with managing data and creating maps using geographic information systems software.

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.**

The proposed course does not substantially duplicate any existing course at Eastern Illinois University. The course will fill a "curricular gap" that exists within the PSM in GIS program. GIS modeling is an increasingly sought-after skill in the GIS marketplace and is not addressed in other courses.

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.**

   The course will serve as an elective in the PSM in GIS program under the "Physical Sciences category of the "Discipline Component."

   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:**

   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.

   Barry Kronenfeld (member of the Graduate Faculty) or any other qualified department faculty member.

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.)

   n/a

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

   de Smith, Goodchild and Longley, 2009. Geospatial Analysis – a comprehensive guide, 3rd edition. Leicester, UK: Troubador Publishing Ltd.

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: October 12, 2012

Date approved by the college curriculum committee: October 26, 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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