PART I: CATALOG DESCRIPTION

1. Course prefix and number, such as ART 1000: **GEG/ESC 3850**
2. Title (may not exceed 30 characters, including spaces): **GPS: Mapping the Modern Way**
3. Long title, if any (may not exceed 100 characters, including spaces): **GPS: Mapping the Modern Way**
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  □ Spring  □ Summer  □ On demand
6. Initial term of offering:  □ Fall  □ Spring  □ Summer  Year: **2011**
7. Course description (not to exceed four lines): **Introduction to the Global Positioning System, with an emphasis on GPS theory, GPS field applications, GPS data manipulation, and GPS data presentation using computer mapping techniques.**
8. Registration restrictions:
   a. Identify any equivalent courses (e.g., cross-listed course, non-honors version of an honors course). **There are no similar courses.**
   b. 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. **There are no prerequisites for this course.**
   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):
   e. Repeat status:  □ Course may not be repeated.
      □ Course may be repeated to a maximum of _ hours or _ times.
   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] **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 and lab combined  □ independent study/research
    □ internship  □ performance  □ practicum or clinical  □ study abroad  □ other
PART II: ASSURANCE OF STUDENT LEARNING

1. List the student learning objectives of this course:

Objectives:

Upon successful completion of this course, students will:

- comprehend Global Positioning System theory
- understand basic geodesy and GPS operating principles through hands-on application of standard and precise-positioning GPS instrumentation
- apply field navigation and orienteering activities to collect GPS data and require them to process, compile, and manipulate these data
- analyze real-world mapping problems while applying GPS field mapping techniques
- apply best practices for automated mapping and data management using GPS processing software providing them with a powerful tool that can be employed to process, edit, manage, and display spatial data for use in a Geographic Information System.
- synthesize modeling techniques and ideas as they relate historically to the development of Geographic thought

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

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

- Mid-term Examination  20%
- Class Exercises  60%
- Final Examination  20%

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

Students will demonstrate proficiency in GPS theory and application through completion and submittal of laboratory assignments and written reports. Students are expected to use handheld and survey-grade GPS instrumentation, navigate using GPS
with maps, and generate GPS satellite reports providing support to a number of proposed field problems, scenarios, and theoretical events. In turn, this will demonstrate their skills and ability to use GPS as a navigational and mapping tool. Laboratory exercises 60%, Mid-term examination 20%, Final examination 20%.

<table>
<thead>
<tr>
<th>Learning Objectives</th>
<th>20% Mid-Term Exam</th>
<th>20% Final Exam</th>
<th>60% Lab Exercises</th>
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</thead>
<tbody>
<tr>
<td>· Comprehend Global Positioning Systems Theory</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>· Understand basic geodesy</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>· Apply navigation &amp; orienteering methodologies</td>
<td></td>
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<td>X</td>
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<tr>
<td>· Analyze applications of GPS field mapping techniques</td>
<td>X</td>
<td>X</td>
<td></td>
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<tr>
<td>· Apply automated mapping &amp; data management processes</td>
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<td>X</td>
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<tr>
<td>· Synthesize development of Geographic thought</td>
<td>X</td>
<td>X</td>
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</tbody>
</table>

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.

Course Details

Lesson 1  **GPS: Mapping the Modern Way: Introduction**

Part One: What is GPS? How is GPS used? How does GPS Work?

Lesson 2  **Introduction to Geographic Coordinate Systems**

Part Two: Lab Exercise: Geographic Coordinate Systems

Lesson 3  **NAVSTAR GPS: A Global Satellite Navigation System**

Part One: An introduction to the GPS Space Segment, Control Segment, and User Segment.
Part Two: The Ellipsoid: WGS84, GRS80, and Clarke 1866
Part Three: Using the Garmin Etrex: Instrument Basics

Lesson 4  **GPS for Navigation**

Part One: GPS Navigation Techniques
Part Two: Field Exercise: GPS for Navigation

Lesson 5  **Geodetic Datum’s & Geographic Transformations**

Part One: Introduction to the World Geodetic System of 1984 (WGS84)
Part Two: Introduction to the North American Datum of 1927 (NAD27)
Part Three: Introduction to the North American Datum of 1983 (NAD83)
Part Four: Field Exercise

Lesson 6  **Topographic Mapping**

Part One: Introduction to 7.5' Quadrangle Maps and Topography
Part Two: Field Exercise: Topographic Mapping
Lesson 7  Introduction to Map Projections

Part One:  Introduction to Map Projections
Part Two:  Understanding Scale & Distortion: Shape, Area, Distance, and Direction

Lesson 8  GPS in the Field: Measurement and Attribute Collection

Part One:  Obtaining accurate field measurements and attribute data
Part Two:  Data Dictionaries & Code Lists

Lesson 9  Universal Transverse Mercator & State Plane Coordinate Systems

Part One:  Introduction to the Universal Transverse Mercator Grid System
Part Two:  Introduction to State Plane Coordinate Systems

Lesson 10  GPS for Mapping

Part One:  GPS for the Physical Sciences
Part Two:  GPS for Infrastructure & Facilities Management

Lesson 11  Differential GPS / Error Sources & Mission Planning

Part One:  Differential GPS (DGPS)
Part Two:  Sources of GPS Error: Selective Availability, Positional Dilution of Precision, Ionospheric Effects, Satellite Geometry, Multipath Effects, Ephemeris Errors, and Clock Drift
Part Three:  GPS Mission Planning

Lesson 12  Development of Geographic Thought

Part One:  Development of Geographic Thought: From Aristotle to Columbus

Lesson 13  Geocaching: GPS for Recreation

Part One:  Navigation Using the Garmin eTrex: Way Points, Routes, and Markers
Part Two:  Field Exercise: Geocaching
Lesson 14  GPS Then & Now

Part One: NAVSTAR History
Part Two: Advancement of the GNSS

PART IV: PURPOSE AND NEED

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

Purpose and Need:

- Global Positioning System technology is found everywhere - in our cell phones, in our vehicles, and in just about everything related to navigation and mapping.

- GPS as a Geospatial Technology is among the most rapidly-growing technological applications to date and is a becoming a commonplace mapping tool in any field that warrants acquisition of accurate horizontal and vertical measurement on the Earth’s surface.

- GPS is an integral part of Geographic Information Systems with respect to the collection of geographic data. Our current Geography curriculum is in need of a Global Positioning Systems course to maintain pace with of an ever-increasingly complex array of geospatial technological advancements in modern mapping (GPS & GIS).

  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 3000. Most students, especially transfer students, will take the course in their Junior year. There are no prerequisites for this course.

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.

This is a new and unique course, there are no similar 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.

   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.

   Program Impact: This course will be used as an approved elective in the Geography Major, specifically as an elective choice in the Geographic Techniques/Spatial Analysis Concentration.

PART V: IMPLEMENTATION

1. Faculty member(s) to whom the course may be assigned: Initially Steven Di Naso, or other qualified members of the Geography Program.

   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.

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 proposed to provide for field maps and equipment maintenance and upgrades.

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

   There is no textbook for this class however there will be supplemental handouts and maps for most lectures and 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: Nov 4, 2009

Date approved by the college curriculum committee: December 11, 2009

Date approved by the Honors Council (if this is an honors course):

Date approved by CAA: January 21, 2010

*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).