CGS Agenda Item: 12-51
Effective: Fall 2012

Eastern Illinois University

NEW COURSE PROPOSAL FORMAT

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

PART I: CATALOG DESCRIPTION

1. **Course prefix and number, *such as ART 1000*: GEG/ESC 5850**
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:** __X_ Fall ___ Spring ___ Summer ___ On demand
6. **Initial term of offering:** __X_ Fall ___ Spring ___ Summer **Year: 2012**
7. **Course description: 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. **Equivalent Courses**
      - **Identify any equivalent courses** (e.g., cross-listed course, non-honors version of an honors course). **GEG 3850 is the undergraduate equivalent of this course however**; **there are no other similar courses**
      - 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.
        There are no prerequisites for this course.
      - 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 ___ 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 3850 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 and 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:

- **comprehend Global Positioning System theory**
- **understand geodesy and advanced GPS operating principals 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 advanced 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 to students' individual disciplines**

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**

Depth of content knowledge

a) **comprehend Global Positioning System theory**
b) **understand basic geodesy and GPS operating principals through hands-on application of standard and precise-positioning GPS instrumentation**
c) **apply field navigation and orienteering activities to collect GPS data and require them to process, compile, and manipulate these data**

- **Effective critical thinking and problem solving**

a) **analyze real-world mapping problems while applying GPS field mapping techniques**
b) **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.**

- **Effective oral and written communication**

a. **Describe GPS mission planning initiatives through interpretation of various GPS ephemeris plots.**

- **Advanced scholarship through research or creative activity**

a) **apply field navigation and orienteering activities to collect GPS data and require them to process, compile, and manipulate these data**
b) **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.**

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:

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.

Graduate students will be required to submit a supplemental field mapping exercise directly related to their discipline thereby demonstrating thorough knowledge of the application of GPS and analysis of the data collected. Laboratory exercises 60%, Mid-term examination 20%, and Final examination 20%.

Learning Objectives	20% Mid-Term Exam	20% Final Exam	60% Lab Exercises
Comprehend Global Positioning Systems Theory	X	X	X
Understand basic geodesy	X	X	X
Apply navigation & orienteering methodologies			X
Analyze applications of GPS field mapping techniques		X	X
Apply automated mapping & data management processes			X
Synthesize development of Geographic thought		X	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 *.)**

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

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

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

Week 2 **Introduction to Geographic Coordinate Systems**

Part One: Introduction to Geographic Coordinate Systems: Understanding Spherical & Spheroidal Coordinate Systems.
Part Two: Lab Exercise: Geographic Coordinate Systems

Week 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 Four: Global National Satellite Systems (GNSS): NAVSTAR, GALILEO, GLONASS, BeiDou I, BeiDou II.

Week 4 **Basic GPS Data Collection: Garmin ETrex: Instrument Basics**

Part One: Waypoints, Tracks, and Routes
Part Two: DNR Garmin: Data Upload / Download

Week 4 **GPS for Navigation**

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

Week 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: Lab Exercise

Week 6 **Topographic Mapping**

Part One: Introduction to 7.5' Quadrangle Maps and Topography
Part Two: Lab Exercise: Topographic Mapping

Week 7 **Introduction to Map Projections**

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

Week 8 **GPS in the Field: Measurement and Attribute Collection**

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

Week 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

Week 10 **GPS for the Physical Sciences**

Part One: GPS Applications and Mapping in the Physical Sciences
Part Two: Lab Exercise

Week 11 **Differential GPS / Error Sources & Mission Planning**

Part One: Differential GPS (DGPS) Techniques; Static, Rapid Static, and Kinematic

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

Week 12 **Development of Geographic Thought**

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

Week 13 **Geocaching: GPS for Recreation Use**

Part One: Navigation Using the Garmin eTrex: Way Points, Routes, and Markers
Part Two: Lab Exercise: Geocaching using U.S.G.S. 7.5' Quadrangle Maps

Week 14 **GPS Then & Now**

Part One: NAVSTAR History

Part Two: Advancement of the GNSS

***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:

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

   - **GPS as a Geospatial Technology is among the most rapidly-growing technological applications to date, and is 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 (GIS) with respect to the collection of geographic data. Our current Geography curriculum is in need of a Global Positioning Systems course for graduate students to maintain pace with an ever-increasingly complex array of geospatial technological advancements in modern mapping (GPS & GIS).**

   - **This course is needed for the Professional Science Master's in GIS program due to the importance of GPS in the GIS curriculum. The course is also required for the proposed Biology Certificate in 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 5000. Graduate students, especially those in the physical sciences, are often required to collect data in the field; this course offers the methods and procedures necessary to complete such tasks. 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 3850 is a similar course. Graduate students, especially those in the physical sciences, are often required to collect data in the field; this course offers the methods and procedures necessary to complete such tasks.

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.

   This course is expected to be used as an elective in the following programs:

   Professional Science Master's Degree (PSM)
   Biology Graduate Certification

PART V: IMPLEMENTATION

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

   This course will initially be delivered by Steven Di Naso. Later, any qualified department faculty member 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.

   Geology/Geography faculty members are registered with the Graduate School as qualified to teach graduate courses. Steven Di Naso has applied to the Graduate School to serve as Graduate Faculty.

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 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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