

UWUCC Proposal # 12-829.  
 UWUCC Action-Date: AP: 3/5/13

Senate Action Date: App-3/26/13

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Proposing Department/Unit Geography & Regional Planning	Phone 724.357.2250

Check all appropriate lines and complete all information. Use a separate cover sheet for each course proposal and/or program proposal.

**1. Course Proposals (check all that apply)**

New Course                       Course Prefix Change                       Course Deletion  
 Course Revision                       Course Number and/or Title Change                       Catalog Description Change

Current course prefix, number and full title:

Proposed course prefix, number and full title, if changing: GEOG 445/545 Energy Development and Compliance II

**2. Liberal Studies Course Designations, as appropriate**

This course is also proposed as a Liberal Studies Course (please mark the appropriate categories below)

Learning Skills     Knowledge Area     Global and Multicultural Awareness     Writing Intensive (include W cover sheet)

Liberal Studies Elective (please mark the designation(s) that applies – must meet at least one)

Global Citizenship                       Information Literacy                       Oral Communication  
 Quantitative Reasoning                       Scientific Literacy                       Technological Literacy

**3. Other Designations, as appropriate**

Honors College Course                       Other: (e.g. Women's Studies, Pan African)

**4. Program Proposals**

Catalog Description Change     Program Revision     Program Title Change                       New Track  
 New Degree Program                       New Minor Program     Liberal Studies Requirement Changes     Other

Current program name:

Proposed program name, if changing:

**5. Approvals**

	Signature	Date
Department Curriculum Committee Chair(s)	<i>Gail Sechrest</i>	1/28/13
Department Chairperson(s)	<i>John Benhart, Jr.</i>	1/28/13
College Curriculum Committee Chair	<i>John Benhart, Jr.</i>	2/6/13
College Dean	<i>John Benhart, Jr.</i>	2/6/13
Director of Liberal Studies (as needed)		
Director of Honors College (as needed)		
Provost (as needed)		
Additional signature (with title) as appropriate		
UWUCC Co-Chairs	<i>Gail Sechrest</i>	3/14/13

Received

MAR 3 2013

Liberal Studies

Received

MAR 1 2013

Liberal Studies

Received

FEB 8 2013

Liberal Studies

To grad. school 3/25/13

# GEOG 445/545 Energy Development and Compliance II

## Syllabus of Record

### I. Catalog Description

Catalog Description  
GEOG 445/545 Energy Development and Compliance II

3 class hours  
0 lab hours  
3 credits  
(3c-01-3cr)

Prerequisites: GEOG 316; GEOG 335; GEOG 444; Or permission of instructor.

Reviews and characterizes the spatial representation and analysis techniques used by public, private and non-profit entities engaged in the energy industries. Focuses in particular on the implementation of energy resource applications such as exploration and development, environmental and cultural compliance, logistics, production analysis, and infrastructure maintenance.

### II. Course Outcomes

*By the end of the semester students will be able to:*

- 1. Identify the types of spatial representation and analysis applications used by various entities within the energy industries.*
- 2. Explain the logic and criteria of energy spatial analysis applications.*
- 3. Apply energy-related spatial analysis applications using geographic information systems (GIS) software*
- 4. Calculate quantitative answers to energy development, compliance, logistics, and production-related questions.*
- 5. Assess results from energy-related spatial analysis applications to determine how they might be integrated into decision-making processes.*
- 6. Compare the applicability of various spatial analysis procedures to industry-standard reporting systems\**
- 7. Assess the utility of various spatial analysis procedures to governmental compliance and regulatory requirements for the energy industries. \**

\* Graduate student-specific course outcomes

### III. Detailed Course Outline

#### Topic

Review syllabus / Introduction to energy development, exploration and compliance (3 hours)

Review of spatial approaches to energy exploration, compliance, logistics, analysis, and management

Energy Spatial Applications Typology/ Unit/Lease Analyses; Landman Applications; Site Mapping/ Base Mapping; Production Analyses; Geodatabase Structures and Data Management Issues (3 hours)

Energy Spatial Applications Typology/ Unit/Lease Analyses; Landman Applications; Site Mapping/ Base Mapping; Production Analyses; Geodatabase Structures and Data Management Issues (3 hours)

Exam 1 (1 hour): Spatial Application: Unit/Lease Analysis – Existing Lease Analysis; Geologic Analysis (2 hours)

Spatial Application Implementation: Unit/Lease Analysis – Integrating Seismic and Production Data (3 hours)

Spatial Application Implementation: Unit/Lease Analysis – Pipeline/Transmission Proximity and Logistics (3 hours)

Spatial Application: Environmental Compliance – Permitting-based Analyses (3 hours)

Spatial Application: Environmental Compliance – Permitting-based, Groundwater and Surface Water Analyses (3 hours)

Spatial Application: Environmental Compliance – Groundwater and Surface Water Analyses (3 hours)

Spatial Application: Cultural Compliance – Site and Pipeline Cultural Resource Analyses (3 hours)

Spatial Application: Landman Applications –Cadastral and Permit Investigation (3 hours)

Spatial Applications: Landman Applications/Production Analysis – Capital lease investment and timeframe (3 hours)

Spatial Applications: Production Analysis – Time series analysis, technique vs. production (3 hours)

Spatial Applications: Production Analysis – Time series analysis, technique vs. production (3 hours)

SEMESTER FINAL ACTIVITY (2 hours)

### IV. Evaluation Methods

#### Undergraduate Students

<u>Exam 1</u> – multiple choice, short essay	25%
<u>GIS-based Assignments</u>	60%
<u>Class Participation</u> – Learning Spatial Application Procedures	15%
	100%

#### Graduate Students

<u>Exam 1</u> – multiple choice, short essay	20%
<u>GIS-based Assignments</u>	50%
<u>White Paper</u> – Analysis-Reporting Comparison or Analysis-regulatory Assessment	20%
<u>Class Participation</u> – Learning Spatial Application Procedures	10%
	100%

V. **Example Grading Scale.**

**A = 90% - 100%**

**B = 80% - 89%**

**C = 70% - 79%**

**D = 60% - 69%\***

**F = below 60%**

*\* For graduate students there will be no D grades assigned; if a student's percentage is below 70%, they will receive an F grade.*

VI. **Undergraduate Course Attendance Policy**

The university encourages course attendance. The instructor of this course will develop a policy consistent with the IUP attendance policy.

VII. **Required Textbook(s), Supplemental Books and Readings**

**Required Texts:** American Association of Professional Landmen. *Oil and Gas Land*. AAPL. 2012. Ft. Worth, TX.; and Wong, D.W. and J. Lee. *Statistical Analysis of Geographic Information*. John Wiley & Sons, Inc. 2005. New York, NY.

VIII. **Special Resource Requirements.** List any materials or equipment the student is expected to supply for this course. Is there a lab fee associated with the course?

*There are no special resource requirements for this course*

IX. **Bibliography**

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Arthur, J.D., Bohm, B., and M. Layne. "Hydraulic Fracturing Considerations for Natural Gas Wells of the Marcellus Shale." *Gulf Coast Association of Geological Societies Transactions*, Vol. 59. 2009. pp. 49-59.

Considine, Timothy. "The Economic Impacts of the Pennsylvania Marcellus Shale Natural Gas Play: An Update." N.p., n.d. Web. 28 Feb 2011.

Craig, R. K. *The Clean Water Act and the Constitution 2<sup>nd</sup> ed.* ELI Press. 2009. Washington, DC.

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Drohan, P.J. and Brittingham, M. "Topographic and Soil Constraints to Shale-Gas Development in the Northcentral Appalachians," *Soil Science Society of America Journal*. Vol. 76. September-October 2012, pp. 1696-1706.

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Energy Institute, University of Texas-Austin. *Fact-Based Regulation for Environmental Protection in Shale Gas Development*. Feb. 2012.

The General Assembly of Pennsylvania. House Bill No. 1950 "Amending Title 58 (Oil and Gas) of the Pennsylvania Consolidated Statutes (Act 13 of 2012)." February 14, 2012.

Goldemberg, Jose and Oswaldo Lucon. *Energy, Environment and Development* 2<sup>nd</sup> ed. Taylor & Francis, Inc. 2009. New York.

Gregory, K.B., Vidic, R.D., and D. A. Dzombak. "Global Water Sustainability: Water Management Challenges Associated with the Production of Shale Gas by Hydraulic Fracturing."

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Heinrichs, R.A., and Kleinback, A.H. *Energy: Its Use and the Environment*, 5<sup>th</sup> Ed. Brooks/Cole Publishing, 2013. Boston, MA.

Henning, S.H. "GIS-based Multi-Criteria Analysis of Wind Farm Development." *Proceedings ScanGIS'2005*. 2005. pp. 75-87.

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Kargbo, M., Wilhelm, R.G., and Campbell, D.J. "Natural Gas Plays in the Marcellus Shale: Challenges and Potential Opportunities." *Environmental Science and Technology*, 2010, 44 (15), pp 5679–5684.

Lein, J. K. *Integrated Environmental Planning*. 2006. Blackwell. Malden.

Maguire, D., Batty, M., and M. Goodchild. *GIS, Spatial Analysis, and Modeling*. ESRI Press. 2005. Redlands, CA.

Marsh, William, M. *Landscape Planning; Environmental Applications* 4<sup>th</sup> ed. Wiley. 2005. Hoboken.

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Reeder, L.C. "Creating a Legal Framework for Regulation of Natural Gas Extraction from the Marcellus Shale Formation." 34 *William & Mary Environmental Law & Policy Review* (2009-2010). pp. 999-1011.

Rodman, L.C., and Meentemeyer, R.K. "A Geographic Analysis of Wind Turbine Placement in Northern California." *Energy Policy*. Vol. 34, 2006. pp. 2137-2149.

Strassberg, G., Jones, N., and D.R. Maidment. *Arc Hydro Groundwater: GIS for Hydrogeology*. ESRI Press. 2011. Redlands, CA

Thomas, C., Parr, B., and B. Hinthorne. *Measuring Up: The Business Case for GIS, Volume 2*. ESRI Press. 2012. Redlands, CA.

Westman, W. E. *Ecology, Impact Assessment and Environmental Planning*. Wiley. 1985. New York.

## **Course Analysis Questionnaire**

### **Section A: Details of the Course**

- A1** How does this course fit into the programs of the department? For what students is the course designed? (majors, students in other majors, liberal studies). Explain why this content cannot be incorporated into an existing course.

*This course will be a requirement for the BA Geography-Energy Geotechnology/Energy Environmental Compliance Concentration.*

- A2** Does this course require changes in the content of existing courses or requirements for a program? If catalog descriptions of other courses or department programs must be changed as a result of the adoption of this course, please submit as separate proposals all other changes in courses and/or program requirements.

*The course will not require changes in the content of other existing courses.*

- A3** Has this course ever been offered at IUP on a trial basis (e.g. as a special topic) If so, explain the details of the offering (semester/year and number of students).

*No.*

- A4** Is this course to be a dual-level course? If so, please note that the graduate approval occurs after the undergraduate.

*This course will be listed as a dual-level course.*

- A5** If this course may be taken for variable credit, what criteria will be used to relate the credits to the learning experience of each student? Who will make this determination and by what procedures?

*The course will not be offered for variable credit.*

- A6** Do other higher education institutions currently offer this course? If so, please list examples (institution, course title).

*For the most part they do not, and that is one of the reasons we want to offer this curriculum at IUP. There are a few exceptions: Columbia University, SDEV W3450 Spatial Analysis and Modeling for Sustainable Development; Columbia University, SDEV W3390*

*GIS for Sustainable Development; Harvard University, Engineering Sciences 103 Spatial Analysis of Environmental and Social Systems; Pennsylvania State University, GEOG 469 Energy Industry Applications of GIS.*

- A7** Is the content, or are the skills, of the proposed course recommended or required by a professional society, accrediting authority, law or other external agency? If so, please provide documentation.

*No.*

### **Section B: Interdisciplinary Implications**

- B1** Will this course be taught by instructors from more than one department? If so, explain the teaching plan, its rationale, and how the team will adhere to the syllabus of record.

*This course will not be taught by instructors from more than one department.*

- B2** What is the relationship between the content of this course and the content of courses offered by other departments? Summarize your discussions (with other departments) concerning the proposed changes and indicate how any conflicts have been resolved. Please attach relevant memoranda from these departments that clarify their attitudes toward the proposed change(s).

*There are no other courses similar to this being offered by other departments.*

- B3** Will this course be cross-listed with other departments? If so, please summarize the department representatives' discussions concerning the course and indicate how consistency will be maintained across departments.

*This course will not be cross-listed with other departments.*

### **Section C: Implementation**

- C1** Are faculty resources adequate? If you are not requesting or have not been authorized to hire additional faculty, demonstrate how this course will fit into the schedule(s) of current faculty. What will be taught less frequently or in fewer sections to make this possible? Please specify how preparation and equated workload will be assigned for this course.

*Yes, faculty resources are adequate, as the department has hired a new tenure track faculty member to teach the course.*

- C2** What other resources will be needed to teach this course and how adequate are the current resources? If not adequate, what plans exist for achieving adequacy? Reply in terms of the following:

*\*Space - Adequate  
\*Equipment - Adequate*

- \*Laboratory Supplies and other Consumable Goods - Adequate**
- \*Library Materials - Adequate**
- \*Travel Funds - Adequate**

**C3 Are any of the resources for this course funded by a grant? If so, what provisions have been made to continue support for this course once the grant has expired? (Attach letters of support from Dean, Provost, etc.)**

*No resources for this course are funded by a grant.*

**C4 How frequently do you expect this course to be offered? Is this course particularly designed for or restricted to certain seasonal semesters?**

*This course is expected to be taught once per year (every other semester).*

**C5 How many sections of this course do you anticipate offering in any single semester?**

*One section of this course will be offered in any single semester.*

**C6 How many students do you plan to accommodate in a section of this course? What is the justification for this planned number of students?**

*Twenty five (25) students is the anticipated maximum number of students expected for this course. The justification for this maximum is because more students than 25 would diminish the level of 400-level instruction.*

**C7 Does any professional society recommend enrollment limits or parameters for a course of this nature? If they do, please quote from the appropriate documents.**

*No.*

**C8 If this course is a distance education course, see the Implementation of Distance Education Agreement and the Undergraduate Distance Education Review Form in Appendix D and respond to the questions listed.**

*This course is not a distance education course.*