

# COMMISSION FOR HIGHER EDUCATION

Thursday, June 13, 2013

**DECISION ITEM B-2: Bachelor of Science in Environmental Science To Be Offered by the University of Southern Indiana at Evansville**

**Staff Recommendation** That the Commission for Higher Education approve the Bachelor of Science in Environmental Science to be offered by the University of Southern Indiana at Evansville, in accordance with the background discussion in this agenda item and the *Program Description*.

**Background** The Academic Affairs and Quality Committee discussed this program on May 8, 2013 and reacted favorably to the proposal. Committee members and staff felt it appropriate to bring the program to the Commission for action as an expedited item.

**Similar Programs in Indiana.** According to the Independent College of Indiana (ICI) web site, there are 10 Environmental Science programs at the baccalaureate level in the *independent* or private not-for-profit sector (Earlham College, Goshen College, Hanover College, Taylor University, University of Evansville, University of Indianapolis, University of Notre Dame, University of St. Francis, Valparaiso University, and Trine University).

The Board for Proprietary Education (BPE) data base indicates there is one baccalaureate –level Environmental Science program in the *proprietary* or private for-profit sector (Kaplan University).

Within the *public* sector, there are only two Environmental Science programs at the baccalaureate level, which graduated a total of 27 students in FY2012\_.

<u>Campus</u>	<u>FY2012 Bachelor's Graduates</u>
IU Bloomington	18
IUPUI	9
Total	27

**IWIS Analysis.** Wage data were extracted from IWIS on Indiana residents who graduated in FY2011 from public university Environmental Science programs and who were employed in Indiana in industries included in IWIS. The average annual earnings one year

after graduation for these graduates could not be reported because the was too small for the salary to be reported.

**Standard Credit Hour Expectation.** This program requires students to complete a total of 120 semester credit hours, which meets the standard credit hour expectation of for baccalaureate programs.

**Concluding Points.** Adding this program is consistent with the mission of USI.

**Supporting Document**

*Program Description* – March 28, 2013

**Bachelor of Science in Environmental Science**  
**To be offered by the University of Southern Indiana at Evansville**

**1. Characteristics of the Program**

- a. Campus(es) Offering Program: University of Southern Indiana
- b. Scope of Delivery (Specific Sites or Statewide): Evansville, Indiana
- c. Mode of Delivery (Classroom, Blended, or Online): Classroom /Laboratory
- d. Other Delivery Aspects (Co-ops, Internships, Clinicals, Practica, etc.): None required
- e. Academic Unit(s) Offering Program: Department of Geology and Physics in the Pott College of Science, Engineering, & Education

**2. Rationale for the Program**

- a. Institutional Rationale (Alignment with Institutional Mission and Strengths)

The University of Southern Indiana proposes a 120 credit hour curriculum for the Bachelor of Science degree in Environmental Science. The Environmental Science degree program will provide the student with a rigorous introduction to, and survey of, the hydrologic cycle as it pertains to human-environment interactions, connections of the geosphere, atmosphere, hydrosphere, and biosphere, use and exploitation of natural resources, environmental impact of growing energy needs, and the ability to integrate important scientific principles across disciplines. The study of biological and ecological interactions as well as threats to our water resources, both to quantity and quality, will be explored in this degree program. Students will also gain valuable knowledge about green business and the need for renewable energy sources. Furthermore, the program will explore the dynamics of coupled social and natural systems and the bases of environmental disorganization in social and economic structures.

Students enrolled in the Environmental Science degree program at USI will develop analysis and decision making skills for assessment and management of the environment. These students will also be exposed to the state-of-the-art measurement and analytical techniques for measuring contaminants in water and biological materials in the environment. Furthermore, students will be able to pursue graduate work in environmental science, environmental engineering, and/or resource management. The graduates will find career opportunities at consulting firms and industries specializing in water resources and environmental engineering; government agencies responsible for regulation and management of energy, land use, natural resources, and not-for-profit organizations.

Overall, the USI degree will provide students with a broad exposure to the natural, physical, and social sciences. It also permits students to gain depth in a particular area, in this case, water resources. This differs from most environmental science programs in our region that tend to focus on the social sciences (e.g. Human and Environmental Systems at Indiana State University), or have a focus on biology (e.g. Environmental Science at Thomas More College). It does not mean that these

programs are not strong; it just means that the USI program will be unique to its approach to water resources and environmental science. Furthermore, most of the workforce data suggests that future environmental scientists will focus their careers on issues associated with water resources and/or energy. To this end, the USI environmental science degree program will prepare graduates for these careers, both regionally and across the nation.

The goals of the proposed Bachelor of Science degree program in Environmental Science are consistent with the University's mission to have an "engaged learning community advancing education and knowledge, enhancing civic and cultural awareness." Not only will students in this program have a broad understanding of environmental science, but they will be involved in projects that will address cultural awareness to overcoming environmental problems. The program curricula will prepare students to seek additional training in graduate and professional schools; to pursue careers in public sectors such as environmental consulting, environmental science, engineering, and environmental health; and to seek employment in public sectors such as state, federal and local government agencies that regulate land use and pollution.

Finally, the proposed program will have positive impact on the community, since it will attract new students to the campus and will provide a new major for students. The new course that will be offered due to implementation of this program will also provide science and engineering majors and other University students with the opportunity to gain knowledge in this interdisciplinary field. In addition, the program will enhance and encourage interdisciplinary scholarship and assist with building a "community of scholars" at our University. Further, it is predicted that a focus on Environmental Science at the institution will have a positive influence, and play a leadership role on fostering needed environmental initiatives in the larger regional community.

b. State Rationale

The proposed Environmental Science degree program at USI addresses several of the state priorities identified in "*Reaching Higher, Achieving More*". First, there are abundant employment opportunities for graduates with a Bachelor of Science degree in Environmental Science in Indiana, the Tri-State region, and across the nation. According to a report by the Indiana Department of Workforce Development (2011), the number employed in Professional, Scientific, and Technical Services associated with Green Jobs in Indiana is 5,322, which makes up 11.4 percent of all Green Jobs in Indiana. In addition, this report shows that engineering, testing and consulting services jobs (including environmental scientists) have increased by 22.7 percent from 2005 to 2009, and growth is projected to continue in this area. Furthermore, the long-term occupational projections (to 2018) for Indiana, as provided by statistics through the U.S. Department of Labor indicate an increased need, both within Indiana and nationally, for graduates in fields where environmental science graduates are employed. During this period, growth is estimated to be 32 percent, with an additional 80 new jobs in environmental science each year in Indiana over this ten-year period. This is close to the national average in estimated growth of 26 percent, with an additional 4,240 positions available each year. This meets the

emphasis stated in “*Reaching Higher, Achieving More*” for degree programs that will contribute to the Indiana workforce. Second, we are providing many opportunities for students to complete the Environmental Science degree program in 4 years or less, in line with the goal in “*Reaching Higher, Achieving More*” for higher completion rates. To make sure students have the ability to complete this degree on time, we will: (1) provide multiple offerings of required coursework, especially at the freshman and sophomore level and (2) use current articulation agreements for those students with an Associate’s degree that provides them with automatic completion of our core curriculum. Additionally, USI has established course transfer agreements with Vincennes University and Ivy Tech Community College that provide a smooth transition for students into the Environmental Science degree program at USI. The agreements established with Ivy Tech Community College include Chemistry (CHEM 261, CHEM 262), English (ENG 101, ENG 201), Geology (GEOG 112), and Physics (PHYS 175) coursework required for the proposed Environmental Science degree program. Similarly, agreements with Vincennes University include Chemistry (CHEM 261, CHEM 262, CHEM 321, CHEM 353), English (ENG 101, ENG 201), Geology (GEOG 112, GEOL 161, GEOL 234), and Physics (PHYS 175) coursework required for the proposed Environmental Science degree program. Furthermore, USI emphasizes advising to better connect students and faculty members. This advising relationship is vital for the retention and degree completion of students in the Environmental Science degree program. Finally, we have developed a rigorous assessment program that will be implemented for the newly created Environmental Science degree program, similar to assessment plans already in place for the biology, chemistry, geology, and mathematics programs in the Pott College at USI. This plan outlines the objectives for the new degree program and defines outcomes for environmental science majors. The assessment will also assist in refining coursework, streamlining degree content, and identifying the most important elements of the Environmental Science degree program at USI. Assessment is paramount in maintaining the quality of a program, especially with the evolving needs of our graduates in the workplace and in pursuit of advanced degrees. Again, establishing and maintaining quality programs is consistent with the goals of “*Reaching Higher, Achieving More*”.

c. Evidence of Labor Market Need

i. National, State, or Regional Need

The USI Environmental Science program will serve as a leader in southwest Indiana for resolving environmental concerns and setting an example with respect to environmental stewardship. Ample employment opportunities presently exist and are expected to continue to exist in sufficient numbers to provide graduates with a wide variety of employment choices. The following information provides details on job outlook and employment opportunities for environmental scientists:

**National**

The information from the Occupational Handbook (2012-13 Edition) from the U.S. Department of Labor provides the following summary for environmental scientists and specialists.

<b>Environmental Scientists and Specialists</b>	
2010 Median Pay	\$61,700 per year
Entry-Level Education	Bachelor's degree
Work Experience in a Related Occupation	None
On-the-job Training	None
Number of Jobs, 2010	89,400
Job Outlook, 2010-20	19% (About as fast as average)
Employment Change, 2010-20	16,700

The following data suggest a “faster than average” employment outlook for environmental scientists in the United States. In most cases, these employment opportunities require a Bachelor of Science degree in Environmental Science. The following data is provided from the Bureau of Labor Statistics as of October 2012.

	<b>Est 2008</b>	<b>Proj 2018</b>	<b>Change</b>	<b>Growth</b>	<b>Replace</b>	<b>Total</b>
Environmental Scientists	85,900	109,800	27.8%	2,390	2,450	4,840

The following table summarizes the types of industry employing environmental scientists, with projected growth to 2018:

<b>Industry</b>	<b>2008</b>	<b>2018</b>	<b>Change</b>
State government, excluding education and hospitals	21,420	23,220	8.4%
Management, scientific, and technical consulting services	18,010	33,380	85.4%
Local government, excluding education and hospitals	10,460	11,290	8.0%
Federal government, excluding postal service	6,080	6,540	7.6%
Educational services, public and private	3,660	4,100	12.1%

### **Indiana**

- 2008-2018 Growth Projection: Faster than average
- 1,336 Environmental Scientist employed in Indiana (2008)
- 1,763 Environmental Scientist projected to be employed in Indiana in 2018 (+32%)
- 2010 Mean Wage : \$55,710
- Evansville Area
  - Primary Occupation Area: Environmental Scientist
  - Mean Annual Income 2010: \$60,990
  - Change from 2006 to 2010: +27.3%

The data for Indiana is from: <http://www.occsupplydemand.org/> (Bureau of Labor Statistics and IPEDS) as of October 2012.

#### ii. Preparation for Graduate Programs or Other Benefits

Successful completion of the Environmental Science degree program at the University of Southern Indiana will provide graduates with a number of opportunities for further graduate study or professional programs in environmental science.

iii. Summary of Indiana DWD and/or U.S. Department of Labor Data

According to a report by the Indiana Department of Workforce Development (2011), the number employed in Professional, Scientific, and Technical Services associated with Green Jobs in Indiana is 5,322, which makes up 11.4 percent of all Green Jobs in Indiana. The average annual salary for this group is \$53,504. In addition, this report shows that engineering, testing and consulting services jobs (including environmental scientists) have increased by 22.7 percent from 2005 to 2009, and growth is projected to continue in this area. Furthermore, the report indicates that occupations in Life, Physical, and Social Science represent the 4<sup>th</sup> largest Indiana Green and Growing Occupations with an average annual salary of ~\$57,000.

Furthermore, the long-term occupational projections (to 2018) for Indiana, as provided by statistics through the U.S. Department of Labor indicate an increased need, both within Indiana and nationally, for graduates in fields where environmental science graduates are employed. During this period, growth is estimated to be 32 percent, with an additional 80 new jobs in environmental science each year in Indiana over this ten-year period. This is close to the national average in estimated growth of 26 percent, with an additional 4,240 positions available each year.

iv. National, State, or Regional Studies

The need for environmental scientists was also highlighted in a report from the Indiana Business Research Center. In particular, “Indiana’s concentration of environmental scientists and specialists also lags behind that of the rest of the nation. In 2007, the state’s 1,160 workers in this occupation represented a location quotient of 0.66” (Indiana Business Research Center, 2009, p. 17). Ample employment opportunities presently exist and are expected to continue to exist in sufficient numbers to provide graduates with a wide variety of employment choices. To this end, a job search using Indeed.com in October 2012 provided a listing of 45 environmental science related jobs within 150 miles of Evansville Indiana. A summary of job descriptions from this search is provided in Appendix 4.

v. Surveys of Employers or Students and Analyses of Job Postings

Using Indeed.com, a job postings search in October 2012 provided a listing of 45 environmental science jobs within 150 miles of Evansville Indiana. The increasing demand for environmental scientists may also be observed in job posting trends. Please see the graph below:



Overall, a Bachelor of Science degree in Environmental Science prepares students for an advanced degree in a variety of fields, including environmental health, resource management, engineering, law, and public policy. Some titles associated with available jobs include: Environmental Scientist, Water Resource Specialist, Earth Scientist, Ecologist, Forester, Environmental Chemist, Environmental Biologist, and Natural Resources Manager (U.S. Department of Labor, 2012).

A review of jobs posted on the internet (March 2012) revealed both local and national opportunities. Local employment opportunities (within 150 miles of Evansville) include working with [Alcoa](#), [Environmental Management Consultants](#), [HDR Environmental Services](#), [Illinois Department of Natural Resources](#), [PARS Environmental](#), [Patriot Engineering and Environmental](#), [Pro2Serve](#), and [SAIC](#).

vi. Letters of Support

The letters of support for the proposed Environmental Science degree program at USI include those from both industry and government agencies. Those from industry attest to the regional and state needs for students educated as environmental scientists to ensure companies are in compliance with current government regulations and are that these businesses are pursuing sustainable growth. Additionally, those from government agencies indicate a need for students educated in environmental science to solve pollution issues and to ensure companies are in compliance with government regulations related to the environment.

**3. Cost of and Support for the Program**

a. Costs

i. Faculty and Staff

At this time, the USI Environmental Science degree program will operate with existing faculty members in biology, chemistry, engineering, geography,

geology, mathematics, physics, and social sciences. The bulk of the coursework will be taught by geology and geography faculty members and will be administered by the Department of Geology and Physics in the Pott College of Science, Engineering, and Education.

In the future, if program growth warrants, additional faculty members will be justified and funded through the normal budgetary process. These new faculty members will add breadth to the program through the creation of additional electives (two examples are ecological economics and sustainability). It is envisioned that any new faculty members to this program will have environmental science as their educational background.

## ii. Facilities

The University of Southern Indiana campus has well-equipped classrooms and laboratories for instruction and research as well as a library, administrative offices, and student support services. The proposed Environmental Science program will be housed primarily in the Science Center of the Pott College of Science, Engineering, and Education. The Science Center was completed in 2004 with teaching laboratories, computer laboratories, research space, and modern instrumentation. Classroom and modern laboratory space for biology, chemistry, geography, geology, physics, and mathematics courses exists on all three levels of the building. Other relevant facilities include an OSHA-compliant chemistry stockroom, tissue culture facilities, an animal rearing facility, a state-of-the-art greenhouse, and an SPSS 14.0 equipped lab in the sociology/political science department of the Liberal Arts Center. Additionally, some of the courses and research activities of this proposed Environmental Science program will take place in the Business and Engineering Center. This building includes a state-of-the-art fluid mechanics laboratory, a soil mechanics laboratory, and a water resources and environmental engineering laboratory.

Additional learning resources specifically related to each of the major contributing disciplines include field equipment such as boat and motor for field excursions, maps (geological, topographic, and soils), Giddings soil probe, rock saws, rock crushers, rock polishers, sediment particle analyzer, multi-parameter water quality meters, stream flow meters, ground water-level meters, pressure transducers and data loggers, digital meteorological station sensors, aquatic biology sampling equipment (nets, seines, plankton nets), a Hach portable water quality lab/spectrophotometer, and a backpack electrofishing unit.

Laboratory equipment and resources include an ion chromatograph, polarizing microscopes, microscopes (light, phase-contrast, inverted, and fluorescence), micro and ultracentrifuges, thermocyclers, photo documentation stations, luminometer, micro titer plate reader, electrophoresis equipment, environmental control chambers, HPLC, G.C., spectrophotometers, 300 MHz JEOL Nuclear Magnetic Resonance (NMR) Spectrometer, Perkin-Elmer

Fouier Transform Infrared (FTIR) Spectrometer, Varian Atomic Absorption (AA) Spectrometer, Gas Chromatograph Mass Spectrometer, Gas Chromatographs (GC), Differential Scanning Colorimeter (DSC), HPLC Electrospray Mass Spectrometer, Capillary Electrophoresis, Electrochemical Analyzer, Cary UV - Visible Spectrometer, Hewlett-Packard Diode Array Spectrophotometer, Flourescence Spectrometer, and a Nicolet Nexus 470 Fouier Transform Infrared (FTIR) Spectrometer.

Currently, the David L. Rice Library at the University of Southern Indiana provides digital access to full text articles that focus on environmental science in over 180 journals. Specifically, the online database JSTOR provides access to full text articles that focus on environmental science in the following journals: *Conservation Biology*, *Environmental History*, *Global Ecology and Biogeography*, and *Journal of Ecology*. In addition, the David L. Rice Library at USI also provides access to Geoscience World with access to full text articles in *Environmental Geoscience*, and *Environmental and Engineering Geoscience*. Furthermore, the David L. Rice Library already owns over 900 books related to environmental science that will be used to support this new degree program. Thus, there is a minimal need for acquisition of books, periodicals, and media for the proposed Environmental Science degree program.

The proposed Environmental Science degree program will require additional laboratory and field resources, including an additional Hach portable spectrophotometer/portable water quality lab, hand held dissolved oxygen field probes, additional stream flow meters, and general equipment for the sorting and counting of aquatic biological samples. Furthermore, ion specific electrodes for water and soil quality testing will be essential. The cost for the above equipment is about \$6,000 per year for the first two years of the program, and then about \$3,000 per year for following years for consumables and replacement equipment. These costs will be covered by normal budgetary procedures by the Department of Geology and Physics and the Pott College of Science, Engineering, and Education.

iii. Other Capital Costs (e.g. Equipment)

This program does not require capital costs or new equipment beyond that described in the previous section.

b. Support

i. Nature of Support (New, Existing, or Reallocated)

There is no reallocation of staff and/or faculty members to implement this program. The proposed Environmental Science degree program uses current courses taught in numerous programs across the University. In addition, no programs have been eliminated or downsized in order to provide resources for this program.

ii. Special Fees above Baseline Tuition

Some of the courses that will be part of the Environmental Science degree program currently have lab fees that are assessed per student. No new fees are being proposed for this program at this time.

**4. Similar and Related Programs**

a. List of Programs and Degrees Conferred

i. Similar Programs at Other Institutions

The following information and tables provide information on current degrees awarded in environmental science, and the number of degrees awarded nationally and in Indiana:

In the 2009-10 academic year, 477 schools in the United States offered a program in Environmental Science. The following table summarizes the degrees awarded for both environmental studies and environmental science:

Program Completers by Degree Level (2009 - 2010) National											
CIP Code	Program Title	Cert1	Cert2	Assc	Assc+	Bach	CertB	Mast	CertM	Doct/Prof	Total
03.0103	Environmental Studies	5	18	90		3,575	7	556	6	45	4,302
03.0104	Environmental Science	28	17	117		3,116	7	826	1	100	4,212
13.1338	Environmental Education							9			9
	<b>Total</b>	33	35	207		6,691	14	1,391	7	145	8,523

Overall, in Indiana, there are 13 institutions offering 19 programs in Environmental Science. These institutions awarded 180 Bachelor’s degrees, 192 Master’s degrees, and 16 doctorate level degrees in Environmental Science between the 2005-06 and 2009-10 academic years.

The closest programs to USI: University of Evansville (Environmental Science Degrees Awarded in 2010: 3), IU-Bloomington (Environmental Science Degrees Awarded in 2010: 8), and DePauw University (Environmental Science Degrees Awarded in 2010: 2).

Source: <http://www.occsupplydemand.org/> (Bureau of Labor Statistics and IPEDS) as of October 2012

ii. Related Programs at the Proposing Institution

Currently, there are no related programs to environmental science at the University of Southern Indiana.

b. List of Similar Programs Outside Indiana

The current degrees awarded in environmental science and number of degrees awarded in Illinois and Kentucky are provided below:

### Illinois

- In Illinois, there are 16 institutions offering 19 programs in Environmental Science. These institutions awarded 439 Bachelor's degrees, 171 Master's degrees, and 43 doctorate level degrees in Environmental Science between the 2005-06 and 2009-10 academic years.
- Closest programs to USI: University of Illinois- Urbana-Champaign (Environmental Science Degrees Awarded in 2010: 57), Bradley University (Environmental Science Degrees Awarded in 2010: 1), and Benedictine University (Environmental Science Degrees Awarded in 2010: 2).

### Kentucky

- In Kentucky, there are two institutions offering two programs in Environmental Science. These institutions awarded 24 Bachelor's degrees in Environmental Science between the 2005-06 and 2009-10 academic years.
- Closest programs to USI: Thomas More College (Environmental Science Degrees Awarded in 2010: 3), and Northern Kentucky University (Environmental Science Degrees Awarded in 2010: 10).

Source: <http://www.occsupplydemand.org/> (Bureau of Labor Statistics and IPEDS) as of October 2012.

#### c. Articulation of Associate/Baccalaureate Programs

The Pott College of Science, Engineering, and Education has already established a number of general articulation agreements with community colleges in our region for our degree programs in biology, chemistry, and geology. Currently, students that are admitted to USI with an Associate's degree receive credit for the completion of our University Core Curriculum. In addition, USI will accept up to 60 credits of transfer hours toward the completion of the Environmental Science degree program. Additionally, USI has established course transfer agreements with Vincennes University and Ivy Tech Community College that provide for a smooth transition for students into the Environmental Science degree program at USI. The agreements established with Ivy Tech Community College include Chemistry (CHEM 261, CHEM 262), English (ENG 101, ENG 201), Geology (GEOG 112), and Physics (PHYS 175) coursework required for the proposed Environmental Science degree program. Similarly, agreements with Vincennes University include Chemistry (CHEM 261, CHEM 262, CHEM 321, CHEM 353), English (ENG 101, ENG 201), Geology (GEOG 112, GEOL 161, GEOL 234), and Physics (PHYS 175) coursework required for the proposed Environmental Science degree program.

#### d. Collaboration with Similar or Related Programs on Other Campuses

Currently, there is no collaboration planned with similar or related programs on other campuses.

## **5. Quality and Other Aspects of the Program**

### a. Credit Hours Required/Time To Completion

Completion of the Environmental Science program will require 120 credit hours. All students within this program will complete the University Core Curriculum, a 56 hour core of biology, chemistry, environmental science, geology, and social science courses, 26 hours of supporting science and math courses, and 3 credit hours of supporting social science courses. The course distribution will form a common foundation of knowledge for all students in the Environmental Science program. In addition, several of the supporting science and math courses, as well as the social science supporting courses, fulfill a portion of the University Core Curriculum requirements. Furthermore, only one new course is needed for the implementation of the Environmental Science degree program.

Additional strengths of this proposed program include: 1) a core of geology and biology courses that will bring all of the environmental science students together to produce a community of students; 2) the breadth of faculty expertise within the Pott College and College of Liberal Arts; and 3) the strong interdisciplinary infrastructure in place at USI. Finally, every student earning an Environmental Science degree with the curriculum outlined for this new degree program will also satisfy the requirements for an environmental biology minor.

### b. Exceeding the Standard Expectation of Credit Hours

The proposed Environmental Science degree program will not exceed the 120 semester credit hours limit.

### c. Program Competencies or Learning Outcomes

The specific objectives of this program are to:

- Educate students on aspects of environmental science and societal issues related to the environment by focusing on hands on experiences in the field and laboratory.
- Explicitly show that environmental issues are multidisciplinary in nature, demanding natural, physical, and social science perspectives and concepts, to provide expertise in working with Earth/human interactions.
- Expose students to short and long-term environmental problems across local, regional and global scales, and the critical reasoning necessary for their resolution.
- Provide students with a rigorous, comprehensive, and truly interdisciplinary program that allows them to understand, interpret, and address the diversity of environmental challenges that currently exist, and those yet to materialize.
- Prepare students to derive the scientific and engineering solutions to current and future environmental challenges that transcend traditional disciplinary, institutional, societal, and political boundaries.

Graduates of the Environmental Science program will be able to:

- Understand the impacts of humans on the natural environment at different scales.
- Think critically and quantitatively about environmental processes and human-environment interactions.
- Advance environmental stewardship and awareness, and inspire work for the public good with integrity and ethical practices.
- Advance into a variety of graduate-level and professional programs that span the diversity of natural science, physical science, social science, and law.
- Find employment regionally or nationally in the private sector and state or federal government agencies.

d. Assessment

The proposed undergraduate program in environmental science will be offered for the first time in Fall 2013. The marketing and recruitment of students will be done in collaboration with the University Admissions Office.

Evaluation of the proposed program will be accomplished in two ways. First, the program will be evaluated internally every five years, beginning in the sixth year after implementation, through the existing USI institutional assessment program. The proposed Environmental Science program will use multiple measures for evaluation including, but not limited to the following:

1. Student recruitment success will be measured by the number of students in the major in relation to enrollment goals.
2. Student advising success will be measured by student satisfaction with advising.
3. Student progression in the program will be measured by program attrition and the average length of time for a student to graduate after major declaration.
4. Curriculum design and delivery effectiveness will be measured by survey data obtained from students, graduates, faculty, and alumni of the program.
5. Adequacy of learning resources will be measured by survey and focus group data obtained from students and faculty.
6. Teaching effectiveness will be measured in part by student evaluations.
7. Job placement of graduates will be included in the annual survey conducted by the University of Southern Indiana Career Services and Placement Office.

Second, a detailed assessment plan will be implemented for the newly created Environmental Science degree program, similar to assessment plans already in place for the Biology, Chemistry, Geology, and Mathematic degree programs in the Pott College of Science, Engineering, and Education. The assessment will also assist in refining coursework, streamlining degree content, and identifying the most important elements of the Environmental Science degree program.

The Pott College of Science, Engineering, and Education established a college-wide assessment program that is based primarily on the student outcomes/program

objectives continuous improvement model promulgated by ABET. We have developed a formal, rigorous, quantitative procedure by which outcomes and objectives will be evaluated and used to improve program learning and instruction for the Environmental Science degree program.

The Program Objectives for the Environmental Science degree are:

1. Find and evaluate scientific data, models, hypotheses, and conclusions published in publicly available scientific literature that focuses on environmental science. Apply knowledge and techniques from biology, chemistry, geology, physics, mathematics, and computing to help solve environmental problems.
2. Conduct an independent scientific investigation.
3. Make cogent presentations of data, observations, interpretations, and conclusions in written and oral formats.
4. Be aware of environmental issues that affect society at large. Collaborate with others, including multidisciplinary groups, to solve environmental problems. Understand ethical issues in the profession.
5. Understand the need for, and develop the abilities to engage in, lifelong learning.

The Student Outcomes for the Environmental Science degree program include:

1. Understand how the scientific method is applied to environmental science.
2. Be able to identify problems for study, conduct independent studies, and be productive members of collaborative teams.
3. Have a thorough knowledge and understanding of core concepts in environmental science, including:
  - a. Interactions of the biosphere, atmosphere, geosphere, and hydrosphere.
  - b. Recognition that environmental issues are multidisciplinary in nature, demanding natural, physical, and social science perspectives and concepts.
  - c. Understand short and long-term environmental problems across local, regional and global scales, and the critical reasoning necessary for their resolution.
4. Have a basic set of skills that can be applied to research and employment as an environmental scientist, including:
  - a. Use modern technology to record, illustrate, and present published data, models, hypotheses, and conclusions.
  - b. Interpret topographic maps and other spatial data unique to the environmental sciences.

- c. Apply existing field and laboratory procedures, or devise new ones, to acquire original data, and use appropriate means (e.g., statistics) to analyze research data.
5. Be able to effectively communicate results of their work to other scientists and the public in both oral and written form.
6. Know and adhere to high professional and ethical standards of work as an environmental scientist.
7. Understand the need to continue learning new concepts and skills throughout life to remain competent and responsible in the conduct of professional and personal activities.

The following table maps the program objectives to the student outcomes for the proposed Environmental Science degree program at USI:

Student Outcomes ► ▼ Program Objectives	1 scientific method	2 team approach	3 core concepts	4 skill set	5 effective comm.	6 ethics	7 continue learning
1. Successful in study and practice	X	X	X	X	X		
2. Conduct investigations	X	X	X	X	X		
3. Make cogent presentations		X	X		X		
4. Aware of issues and ethics					X	X	
5. Lifelong learning							X

All of the learning objectives will be embedded within required core environmental science course work. We will develop performance criteria (rubrics) to assess the quality of student learning with respect to each outcome and whether each outcome was met, partially met, or not met. Rubrics for evaluation of class assignments, lab projects, research papers and critiques, oral discussions, and exam questions, oral presentations, poster presentations, and professional, group and travel activities will be put together. This assessment program will also involve inquiry of graduating seniors regarding their experience in the Environmental Science program at USI. Assessment of program outcomes will also be accomplished via course assessment and the monitoring of course outcomes that specifically address stated program outcomes.

Student Outcomes ► ▼ Required Courses	1 scientific method	2 team approach	3 core concepts	4 skill set	5 effective comm.	6 ethics	7 continue learning
GEOG 112 or GEOL 131	X		X	X			
GEOL 151 or GEOL 161	X		X	X			X
GEOL 234	X		X	X			
BIOL 215	X	X	X	X	X	X	
CHEM 321	X	X	X	X			
GEOL 311	X	X	X	X	X	X	X
PHIL 366		X	X		X	X	
GEOL 407	X	X	X	X	X		X
GEOL 411	X	X	X	X	X		X
SOC 415 and/or POLS 464		X	X		X	X	X
BIOL 452	X	X	X	X	X	X	X
GEOL481	X	X	X	X	X	X	X

To this end, the Environmental Science degree program will assess 2 to 3 program outcomes each academic year. Program outcomes will be targeted in specific courses at the introductory level (100- and 200- level courses), in the middle of the program (300-level courses), and near graduation (400-level courses). To evaluate progress toward achieving the program outcomes, 2 to 4 course outcomes that tie directly to a program outcome will be measured. Results of each course assessment will be reported in a standard manner.

In a five year rotation, assessment of program outcomes for introductory courses will be first, followed by assessment of program outcomes from 300- and 400- level courses. This timeline will permit us to follow a cohort of students through the program and enable us to measure their progress toward achieving program outcomes. The following table identifies which courses will be assessed in the next 5 years:

Year	Spring	Fall
<b>2013</b>	x	GEOG 112, GEOL 131
<b>2014</b>	GEOL 151, GEOL 161	BIOL 215, GEOL 234
<b>2015</b>	GEOG 215, CHEM 321	GEOL 311, POLS 464
<b>2016</b>	GEOL 407, GEOL 441	GEOL 481, PHIL 366
<b>2017</b>	BIOL 452, GEOL 499	SOC 415, GEOL 499

Reports will be prepared for each of these courses and will include the following quantitative information:

1. Student outcomes being evaluated

2. Student outcomes being used to evaluate progress towards the program objectives
3. Means of assessment (e.g. pre-test, imbedded examination questions, paper, project, etc.)
4. Criteria for success (e.g. rubrics used to evaluate performance)
5. Assessment results (quantitative)
6. Use of the results (a.k.a., how will the results be used to improve the course)

As mentioned above, the goal is to assess 2 to 3 program outcomes each academic year. In addition to this internal data, environmental science majors will also complete a major field test that will provide supplementary information for graduating seniors that focuses specifically on program outcomes of the scientific method, core concepts, and skill sets.

After the 5-year rotation of assessing program outcomes at the various levels of the Environmental Science degree program, relevant data will be used to evaluate program objectives. The evaluation of program objectives will also include exit interviews conducted with graduating seniors, alumni surveys, and conversations with employers of our graduates. A report will be prepared summarizing the results of this data with respect to program objectives. Finally, the results of the program assessment will be used to make adjustments to the future environmental science curricula and coursework.

e. Licensure and Certification

There is currently no licensure and/or certification programs for environmental science.

f. Placement of Graduates

As stated previously, this program will provide the appropriate environmental science title on students' diplomas and the opportunity to earn an interdisciplinary degree that will prepare students for a wide range of jobs in the environmental field and for pursuing advanced degrees in numerous environmental fields. A job search using Indeed.com in October 2012 provided a listing of 45 environmental science jobs within 150 miles of Evansville Indiana. Some titles associated with available jobs include: Environmental Scientist, Water Resource Specialist, Earth Scientist, Ecologist, Forester, Environmental Chemist, Environmental Biologist, and Natural Resources Manager (U.S. Department of Labor, 2012). The types of businesses and specific venues where graduates could work are identified in the following table.

**Potential employment opportunities in Environmental Science.**

Type of business	Examples of specific ventures	USI Environmental Science Degree
Private consulting firms	Environmental assessments, remediation projects, contamination delineation	<input checked="" type="checkbox"/>
State/local Government	Land-use planning, resource assessment, environmental health	<input checked="" type="checkbox"/>
Business and industry	Regulatory Compliance, environmental oversight	<input checked="" type="checkbox"/>
Private practice	Contracting with environmental law firms, consultants, industries	<input checked="" type="checkbox"/>
Community & public health	Local, regional and state health departments	<input checked="" type="checkbox"/>
Non-profit agencies, NGO's	Community surveys, resource allocation studies	<input checked="" type="checkbox"/>

Furthermore, successful completion of the Environmental Science degree program at the University of Southern Indiana will provide graduates with a number of opportunities for further graduate study or professional programs. Students will be prepared to pursue graduate level study within the environmental Earth, physical, and life sciences.

g. Accreditation

There is no accrediting body for Environmental Science.

**6. Projected Headcount and FTE Enrollments and Degrees Conferred**

The table on the next page estimates headcount, FTE enrollment, and degrees conferred data for the proposed Environmental Science degree program. The degree will only be provided through the University of Southern Indiana at Evansville, so only one table is provided. The fifth year projects steady state enrollment for the proposed Environmental Science degree program at USI.

Institution/Location: University of Southern Indiana at Evansville  
 Program: Bachelor of Science in Environmental Science

	Year 1 FY2013	Year 2 FY2014	Year 3 FY2015	Year 4 FY2016	Year 5 FY2017
Enrollment Projections (Headcount)					
Full-Time	<u>5</u>	<u>10</u>	<u>20</u>	<u>40</u>	<u>50</u>
Part-Time	<u>2</u>	<u>4</u>	<u>4</u>	<u>6</u>	<u>6</u>
Total	<u>7</u>	<u>14</u>	<u>24</u>	<u>46</u>	<u>56</u>
Enrollment Projections (FTE)					
Full-Time	<u>5</u>	<u>10</u>	<u>20</u>	<u>40</u>	<u>50</u>
Part-Time	<u>1</u>	<u>2</u>	<u>2</u>	<u>3</u>	<u>3</u>
Total	<u>6</u>	<u>12</u>	<u>22</u>	<u>43</u>	<u>53</u>
Degrees Conferred Projections	<u>0</u>	<u>0</u>	<u>2</u>	<u>6</u>	<u>12</u>

CHE Code: 12-XX  
 Campus Code: 1808  
 County: Vanderburgh (082)  
 Degree Level: Bachelor of Science degree  
 CIP Code: Federal - 03.0104; State - 03.0104

## *Appendix 1: Institutional Rationale*

The University of Southern Indiana’s vision is a simple but powerful one: Shaping the future through learning and innovation. The mission statement is: USI is an engaged learning community advancing education and knowledge, enhancing civic and cultural awareness, and fostering partnerships through comprehensive outreach programs. We prepare individuals to live wisely in a diverse and global community. More information about USI’s Mission and Vision is available at: <http://www.usi.edu/about/mission-vision> For detailed information about the University of Southern Indiana’s Strategic Plan, please see: <http://www.usi.edu/president/strategicplan/>

## *Appendix 2: Summary of Indiana DWD and/or U.S. Department of Labor Data*

The following are tables from the Indiana Department of Workforce Development, 2011, Green Jobs in Indiana – Employment Prospects in the Green Economy. The complete document may be accessed at:

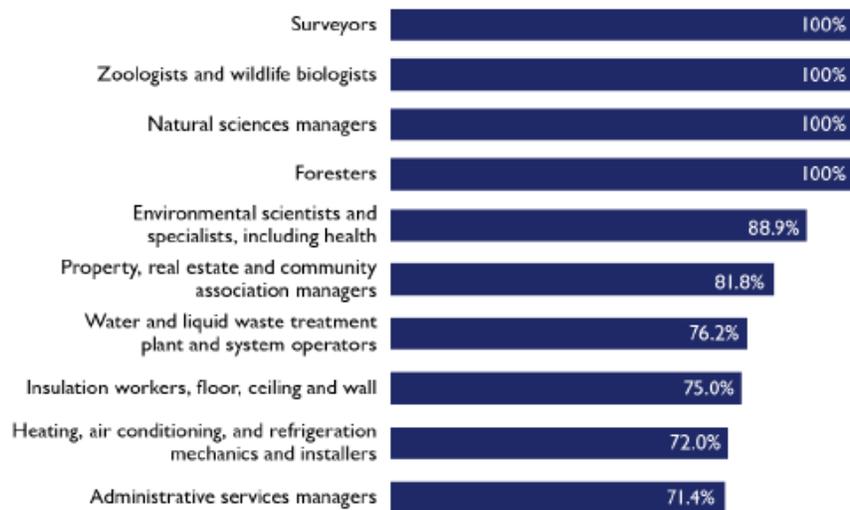
<http://drivingworkforcechange.org/reports/indianagreenjobs.pdf>

**Table 1: Summary of Indiana Direct Green Jobs by Core Area**

Core Area	Direct Green Jobs	Percentage of All Direct Green Jobs
<b>Total Direct Green Jobs</b>	<b>46,879</b>	<b>100.0%</b>
Increasing Energy Efficiency	15,715	33.5%
Agriculture and Natural Resource Conservation	10,334	22.0%
Pollution Prevention and Environmental Cleanup	9,003	19.2%
Renewable Energy Production	4,152	8.9%
Clean Transportation and Fuels	2,234	4.8%
Green Jobs Not Assigned to a Core Area	5,442	11.6%

Source: IBRC, using Indiana Green Jobs Survey data

**Figure 4: Occupations that Require Unique Skills for Green-Related Projects**



Source: IBRC, using Indiana Green Jobs Survey data

### Appendix 3: National, State, or Regional Studies

The following information, figure, and table are from the Indiana Business Research Center for the Indiana Economic Development Corporation, 2009, *Indiana's Life Science Industries*. Please see the average annual employment change and income for environmental scientists and specialists. The complete document may be accessed at: [http://www.ibrc.indiana.edu/studies/life-science-industries\\_2009.pdf](http://www.ibrc.indiana.edu/studies/life-science-industries_2009.pdf)

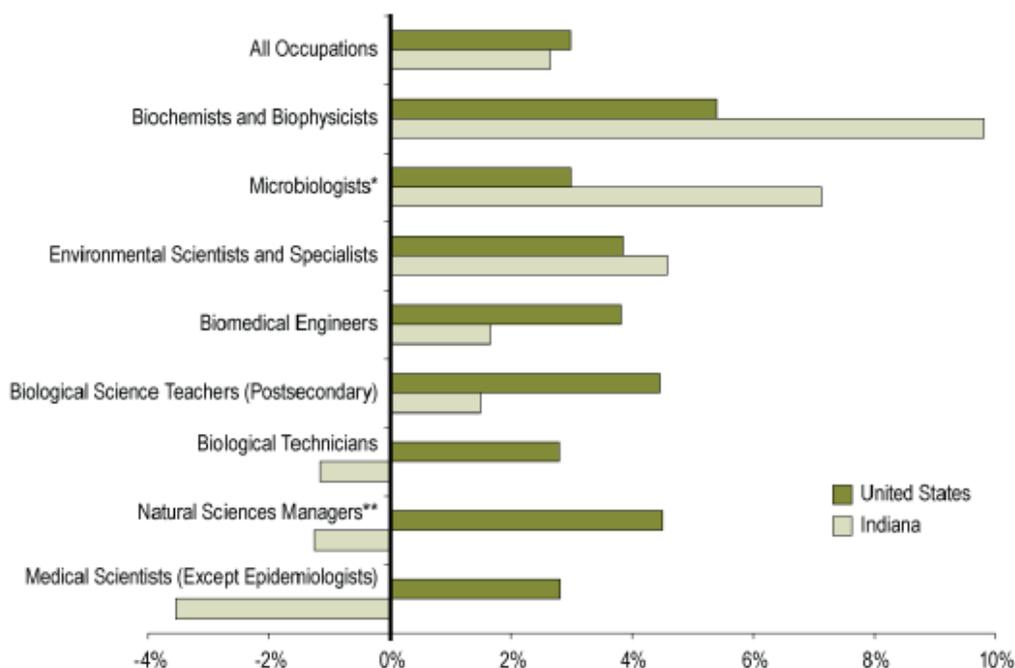
#### Environmental Scientists and Specialists, Including Health

Indiana's concentration of environmental scientists and specialists also lags behind that of the rest of the nation. In 2007, the state's 1,160 workers in this occupation represented a location quotient of 0.66. This mark is typical for this region of the country as no Midwestern states for which data are available (Iowa is not included) had a location quotient above 0.85 in 2007.

Environmental scientists and specialists in Indiana earned \$55,870 on average in 2007—\$8,000 less than the value for the United States as a whole. The gap in pay between Indiana and the United States has been declining in recent years as the environmental scientists and specialists occupation is one of only three life science occupations in which Indiana's current-dollar growth in average wage between 2001 and 2007 outpaces the nation (refer again to Figure 11).

Industries with the highest levels of employment for environmental scientists and specialists at the national level are state, federal and local government; management, scientific and technical consulting services; and architectural, engineering and related services.

**Figure 11: Average Annual Change in Wages (Current Dollars) by Occupation, 2001-2007**



\*2001-2006 data, \*\* 2002-2007 data  
Source: IBRC, using Bureau of Labor Statistics data

**Table 5: Summary of Indiana Life Science Occupations, 2007**

	Employment	Avg. Annual Employment Change, 2001-2007		Avg. Wage	
	Indiana	Indiana	United States	Indiana	United States
All Occupations	2,928,780	0.4%	0.8%	\$36,410	\$40,690
Medical Scientists, Except Epidemiologists	2,740 <sup>§</sup>	47.3% <sup>§</sup>	10.6%	\$52,710	\$74,160
Biological Technicians	1,200	9.5%	7.7%	\$34,960	\$40,240
Environmental Scientists and Specialists, Including Health	1,160	4.2%	5.5%	\$55,870	\$63,870
Natural Sciences Managers	1,130	0.0% <sup>***</sup>	-1.3%	\$58,590	\$113,170
Microbiologists	780 <sup>*</sup>	11.5% <sup>**</sup>	-1.0%	\$67,790 <sup>*</sup>	\$66,430
Biological Science Teachers, Postsecondary	740	-3.3%	5.2%	\$71,200	\$84,130
Biochemists and Biophysicists	660 <sup>§</sup>	27.1% <sup>§</sup>	3.2%	\$90,230	\$85,290
Biomedical Engineers	340 <sup>*</sup>	6.1% <sup>**</sup>	13.2%	\$62,740	\$79,610
Life Scientists, All Other	200	n/a	n/a	\$56,250	\$66,930

<sup>\*</sup>2006 data, <sup>\*\*</sup> 2001-2006 data, <sup>\*\*\*</sup> 2002-2007 data

<sup>§</sup> The Occupational Employment Statistics survey reports large margins of error in 2007 for these occupations. As a result, the reader is strongly cautioned that actual industry and employment trends may conflict with published government—Bureau of Labor Statistics—data sources. Industry experts may provide a more accurate and complete analysis of regional or state industry structure.

Source: IBRC, using Bureau of Labor Statistics

#### ***Appendix 4: Surveys of Employers or Students and Analyses of Job Postings***

A job search using Indeed.com in October 2012 provided a listing of 45 environmental science related jobs within 150 miles of Evansville Indiana. These advertised positions require a Bachelor of Science degree in environmental science and/or a related field, and require various years of experience. These employment opportunities are primarily with environmental consulting companies and local, state, and federal agencies. The following are selected job announcements for environmental scientists in Indiana, Illinois, and Kentucky:

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#### **Environmental Scientist – Stantec in Indianapolis**

Minimum Requirements:

- Bachelor's degree in Geology, Engineering, or Environmental Science. Four (4) to six (6) years of consulting industry experience.
- Familiarity with CERCLA and RCRA a plus
- 40 HR OSHA training
- Strong commitment to health and safety; excellent technical writing skills; organizational and communications skills.

**Job Description:** Stantec's Environmental Services group is dedicated to helping our clients reduce their environmental liabilities by developing comprehensive remediation programs. We provide integrated, multidisciplinary services to identify and assess liabilities and risks, and to develop solutions to site management, remediation, and mitigation. This is where great ideas and rewarding careers are built. Our team members

work on a variety of projects, including environmental monitoring, in-situ/ex-situ remedial design and implementation, human health and ecological risk assessments, air quality permitting and reporting, pipeline compliance, stormwater permitting and planning, and audit support services. Our structure cultivates career growth and provides opportunities as unique as you are.

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**Environmental Scientist or Engineer - Sullivan International Group, Inc.**

Minimum Requirements:

- B.S. in Environmental Science or other related discipline;
- Entry level to three (3) years experience with similar work, including sampling and data management;
- Certification of or ability to pass 40-hour HAZWOPER training (or refresher courses), minimum;
- Proven organizational, written and verbal communication skills;
- Demonstrate technical writing skills on technical documents (environmental reports);

Job Description: Sullivan International Group, Inc. is a nationally-recognized consulting firm that provides environmental engineering, construction management, and science and technology products and services. We are currently looking for an Environmental Scientist or Engineer. The position will report from our Indianapolis office and will require frequent travel, mainly in the Midwest.

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**Project Environmental Scientist – URS in Indianapolis, Indiana**

Minimum Requirements:

- Minimum Bachelor’s degree in Geology, Biology, Ecology, Geography, or related discipline
- Minimum 10 years of environmental consulting and/or related consulting experience
- Must be familiar with state and Federal environmental regulations
- Strong client communication skills, and prior project experience

Job Description: The URS Indianapolis, IN office is seeking talented Environmental professionals to help grow its environmental consulting practice involving the permitting, evaluation, investigation, and/or remediation of environmental conditions on properties located in Indiana and surrounding states. The successful candidate will support existing clients, develop proposals, pursue independent marketing efforts, and lead diverse technical teams in the delivery of client projects. The position requires completing projects on time and accurately. The team member will promote and demonstrate a positive, team-oriented attitude.

---

## **GIS Specialist – URS Corporation in Louisville, Kentucky**

### Minimum Requirements:

- Master's degree in Urban Planning with GIS or Spatial Analysis specialty
- Mapping and Geographic Information Systems
- Hazard Mitigation Planning
- Estimating Economic Impact of Natural Hazards
- Siting Studies
- Computer Programming and Database Applications

Job Description: Collect, analyze, and interpret geographic information provided by geodetic surveys, aerial photographs, and satellite data in order to provide planning related to the Federal Emergency Management Agency (FEMA) hazard mitigation planning, FEMA Flood Insurance Rate Maps (FIRMs) development (MAP Modernization guidance and RISK MAP guidance), development of billing systems for stormwater utilities, GIS analysis for green infrastructure and wet weather programs, Municipal Separate Storm Sewer (MS4) programs, siting studies, estimating economic impact of natural hazards; development of databases, emergency management emergency operations plans, emergency action plans for dams, and sanitary sewer mapping. Research, study, and prepare maps and other spatial data in digital or graphic form for legal, social, political, educational, and design purposes.

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## **Environmental Analyst - SAIC at Naval Support Activity Crane**

Minimum Requirements: Bachelor's Degree in Environmental Engineering, Environmental Science, Environmental Management, or other technical field, and at least 4 years of related experience.

The candidate must: have the knowledge and experience to be able to work on problems of diverse scope and exercise independent judgment within generally defined practices and policies in selecting methods and techniques for obtaining solutions; making decisions that may have a direct effect on project schedules; interact daily with customers and peer staff members; and able to handle unusual and seldom occurring job events with minimal assistance. Position will also require support with internal SAIC local operations, facilities and other projects with environmental compliance needs/actions. Candidate may also be required to attend conferences, training or other task-related opportunities to network with potential customers (DoD and non-DoD) and present SAIC capabilities. Overall Environmental Compliance and environmental project management experience will enable the successful candidate to accurately assess and manage diverse environmental projects.

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## **Soil Conservation Technician - Pinckneyville, Illinois Field Office**

### Minimum Requirements:

- Bachelor's Degree in Environmental Science, Geology, Soil Science, or a related field.

- Applicant must have at least one year of specialized experience equivalent to the GS-04 level in the Federal Government.
- Must be a United States Citizen to qualify for this position.
- Must serve a one-year probationary period

This position will serve Natural Resources Conservation Service District Conservationist, Soil and Water Conservation District, other local groups, and landowners in the planning and application of total resource management system plans; providing conservation planning assistance from initial evaluation to completion using the nine step planning process. The incumbent investigates, surveys, and gathers information for complex conservation practices and provides layout assistance and construction inspections on complex practices within the serviced area. Prepares design material lists, cost estimates, and engineering plans for the construction of complex conservation practices and approves engineering jobs which are within job approval authority. Provides training to NRCS and SWCD on surveying, staking, information gathering, design, engineering plan preparation, and construction inspection.

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**Summit Energy Services, Inc., Sustainability Analyst, Louisville, Kentucky**

**Essential Skills and Qualifications:**

- Bachelors Degree in Environmental Sciences, Energy, Engineering, or a related technical field with 3 - 6 years of related professional experience and an interest in pursuing a career in sustainability
- Some project management experience
- High commitment to company vision, values and excellent client service
- Proven track record in developing, managing, and executing client solutions
- Progressive history of building successful relationships
- Ability to communicate, both written and verbally, complex analysis and ideas in a concise manner
- Analytical self-starter with strong attention to detail
- Strong organizational and problem-solving skills with the ability to work on multiple complex projects in diverse areas
- Proficient computer experience in Microsoft Office Products, particularly Excel, Word, and PowerPoint.

**Position Summary**

The Sustainability Analyst will develop and deliver services and solutions that create client value, financial and environmental impact reductions, and track performance against client goals and strategies.

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## *Appendix 5: Letters of Support*

The following are support letters that have been received from local, state, and federal government agencies and businesses. These support letters attest to the need for an Environmental Science degree program at USI, and the potential for internships and collaborative research among professionals in the community and students and faculty members at USI.



### **Rigid Packaging/Primary Metals**

Warrick Operations  
State Route 66  
PO Box 10  
Newburgh, IN 47629-0010 USA

Nov. 2, 2012

Dr. William Elliott  
Department of Geology and Physics  
University of Southern Indiana  
8600 University Blvd.  
Evansville, IN 47712

Dear Dr. Elliott,

I would like to express my support for the creation of a bachelor's of science degree program in environmental science at the University of Southern Indiana (USI).

As you know, sustainability is an integral part of our culture and a core strategy at Alcoa. This is reflected in the investments that we make through the Alcoa Foundation. The Foundation works to meet both community and business needs, and its two core focus areas are the environment and education. In fact, our educational focus area, among other things, seeks to increase the number of students who receive training to pursue a career in EH&S – environment, health and safety.

So, it's apparent that environmental science is an important priority for Alcoa.

We believe this program will be beneficial to our region, providing USI graduates with the training and knowledge to become successful. The degree program could also enhance the ongoing collaborative efforts that we have with USI's faculty and its students.

We are supportive of this program – and we look forward to the possibilities that it will offer your students and our region.

Sincerely,

A handwritten signature in black ink, appearing to read "Jim Beck", with a long horizontal flourish extending to the right.

Jim Beck  
Communications & Public Affairs Manager  
Alcoa Warrick Operations  
812-853-4557 or [jim.beck@alcoa.com](mailto:jim.beck@alcoa.com)



## INDIANA GEOLOGICAL SURVEY

611 N. Walnut Grove Ave., Bloomington, IN 47405-2208 · (812) 855-7636  
<http://igs.indiana.edu> · [IGSinfo@indiana.edu](mailto:IGSinfo@indiana.edu)

March 6, 2013

Dr. William S. Elliott, Jr., Chair  
Department of Geology and Physics  
Pott College of Science and Engineering  
8600 University Blvd.  
Evansville, IN 47712

Dear Dr. Elliott,

I am writing to express my support for the proposed new Environmental Science degree program at the University of Southern Indiana. Your proposal to the Indiana Commission for Higher Education makes a strong case for the establishment of this program at USI, and I take this opportunity to express my perspective from someone who has administered research and service in the public sector, i.e., government, for the past 19 years, and as the director of the Indiana Geological Survey (IGS) for the past 15 years.

The mission of the IGS is to provide geologic information and counsel that contribute to the wise stewardship of the energy, mineral, and water resources of the state and the enhancement of the environment. In this capacity, the staff of the IGS advise, among its diverse clientele, numerous counterparts in other state and federal agencies. For example and in Indiana in particular, we have almost daily contact with Earth and Environmental Scientists in state agencies ranging from the Indiana Department of Homeland Security, Indiana Department of Environmental Management, Indiana Department of Natural Resources, to the Indiana Department of Transportation. In these instances, we depend on a level of education and professionalism among those personnel that permit us to work expeditiously with them for the benefit of the citizens. The proposed program at USI will go a long way in providing a steady and competent supply of Environmental Scientists to those agencies, as well as our own, especially as the current workforce ages and faces retirement.

The statistics you provide in your proposal amply demonstrate the need for Environmental Scientists in the public sector. The proposed Environmental Science degree program at USI will provide students with a broad background in the physical sciences necessary to serve the public and ensure the quality of life we as a society depend upon. The emphasis of the program on water resources will be especially timely, as the vagaries of water supply and quality continue to challenge us with population growth, industrial development, and looming climate change.

The University of Southern Indiana, through its new Environmental Science program, is well poised to make important contributions to the citizens of Indiana and the central Midwest.

With sincere best wishes for the success of your new program,

A handwritten signature in black ink that reads "John C. Steinmetz".

John C. Steinmetz, Ph.D.  
Director and State Geologist



INDIANA UNIVERSITY



United States  
Department of  
Agriculture

Forest  
Service

Humboldt-Toiyabe  
National Forest

Mountain City Ranger District  
Elko Office  
2035 Last Chance Road  
Elko, NV 89801-4808

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February 26, 2013

Dr. William Elliott  
Department of Geology and Physics  
University of Southern Indiana  
8600 University Blvd.  
Evansville, IN 47712

Dear Dr. Elliott,

I am writing this letter to express our support for the establishment of a new B.S. degree program in environmental science at the University of Southern Indiana (USI). We believe that this program will be beneficial, providing USI graduates with the training and knowledge appropriate to be successful in our workplace.

Furthermore, we are excited by the possibility of internships and other collaborative efforts with faculty members and students from the USI environmental science program. We feel that these collaborative efforts will be beneficial to our company.

Again, we are supportive of a new environmental science degree program at USI. If you have any additional questions, please feel free to contact me at [mrsilva@fs.fed.us](mailto:mrsilva@fs.fed.us) or (775)778-6129.

Sincerely,

Manuel R. Silva  
NE Zone Geologist, CMA I

## ***Appendix 6: Faculty and Staff, Detail***

The following full-time faculty will be directly involved with the Environmental Science program:

- Oana Armeanu, Ph.D. – Assistant Professor of Political Science. Dr. Armeanu teaches international and comparative politics. Prior to coming to the States, she worked as a journalist for "22" magazine in Romania and for Radio Free Europe.
- James Bandoli, Ph.D. – Professor of Biology. Dr. Bandoli's research interests include parental investment in spottail darters, a local stream fish that practices resource-defense polygyny.
- Peter Cashel-Cordo, Ph.D. – Professor of Economics. Dr. Cashel-Cordo's expertise and interests are in the areas of international public economics, economic development and international economics. He once served as an environmental enforcement agent with the City of Houston.
- Cindy DeLoney, Ph.D. – Associate Professor of Biology. Dr. DeLoney is a microbiologist with research interests in symbiotic relationships between squid and bacteria.
- Joseph DiPietro, Ph.D. – Professor of Geology. Dr. DiPietro has expertise in tectonics and landscape evolution. He is interested in research involving neotectonic hazards and the interaction of landscape and climate.
- Paul K. Doss, Ph.D. – Professor of Geology. Dr. Doss is a hydrogeologist and environmental geologist who works extensively with the U.S. Geological Survey, National Park Service, and U.S. Forest Service.
- Jim Durbin, Ph.D. – Associate Professor of Geology. Dr. Durbin has expertise in geomorphology, climatology, stratigraphy, and hydrogeology. He is particularly interested in aspects of climate change over the last 120,000 years.
- William Elliott, Ph.D. – Associate Professor of Geology. Dr. Elliott is an environmental scientist interested in research involving sedimentology, low temperature geochemistry, and stratigraphy. He is particularly interested in dam removal along rivers and streams in the Pacific Northwest.
- Brandon Field, Ph.D. – Assistant Professor of Engineering. Dr. Field has expertise in thermal fluid sciences, and an interest in sustainable and efficient energy production.
- Edith L. Hardcastle, Ph.D. – Associate Professor of Biology. Dr. Hardcastle teaches botany and plant taxonomy with strong interests in environmental science.
- Jason Hill, Ph.D. – Assistant Professor of Engineering. Dr. Hill has teaching and research expertise in the areas of water resources and environmental engineering. His interests include rainfall-runoff modeling, wetland hydrology, and environmental restoration.
- Nils I. Johansen, Ph.D., P.E. – Professor of Geological Engineering, retired, University of Alaska Fairbanks. Dr. Johansen's expertise is in Arctic resource development and the environmental impacts of mining operations. He recently completed a study on surface reclamation of coal mined land and its impact on housing development in Warrick County, Indiana.
- Mark Kraehling, Ph.D. – Associate Professor of Chemistry. Dr. Kraehling's research group uses chromatographic and spectroscopic instrumental techniques to solve analytical and environmental problems. He currently has students using gas

chromatography –mass spectrometry to characterize and quantify nonpolar organic molecules extracted from natural water systems.

- Anton Maria, Ph.D. – Associate Professor of Geology. Dr. Maria is interested in the dynamics of the oceans and environmental issues surrounding natural disasters.
- Henri R. Maurice, Ph.D. – Associate Professor of Biology. Dr. Maurice is a plant developmental biologist with an interest in the effects of the environment on plant hormones and developmental processes.
- Eric McCloud, Ph.D. – Associate Professor of Biology. Dr. McCloud is an ecologist and entomologist who has extensive research experience in the biology of global change.
- Landon Moore, Ph.D. – Assistant Professor of Biology. Dr. Moore is a geneticist whose research interests involve understanding how genomes are maintained during development and following genotoxic stresses.
- Mary Lyn Stoll, Ph.D. – Associate Professor of Philosophy. Dr. Stoll specializes in applied ethics, especially the intersection between environmental ethics and business ethics. She has published articles on the injustices involved with Persistent Organic Pollutants (POPs), on Marine Ethics, and a variety of other applied ethics topics.
- Rex M. Strange, Ph.D. – Associate Professor of Biology. Dr. Strange studies the molecular evolution of fishes.
- R. Brent Summers Ph.D. – Associate Professor of Biology. Dr. Summers is an environmental biologist with a continuing project to investigate the down-stream effect on macroinvertebrates below a new dam re-operation. He has also conducted a bioassessment of the Blue River in several local counties.
- Mary Tucker, Ph.D. – Instructor in Chemistry. Dr. Tucker's graduate research was in environmental analytical chemistry specifically with extraction and analysis of mercury compounds as well as other inorganic ions. She has taught the Environmental Chemistry laboratories for the past 5 years at USI.
- Kenneth Walsh, Ph.D. – Assistant Professor of Chemistry. Dr. Walsh teaches organic chemistry and has research interests in carbohydrate chemistry and organic synthesis methodology.
- Stephen Zehr, Ph.D. – Professor of Sociology. Dr. Zehr has teaching and research expertise in the areas of sociology of science and sociology of the environment. His research addresses the representation of scientific expertise on environmental controversies in policy and media contexts.

In addition, the following support personnel will be involved with the program:

- Chris Hogue, Laboratory Supervisor
- Vince Frazier, Electronic Equipment Specialist
- Gloria Butz, Laboratory Supervisor in Biology

Finally, the Environmental Science degree program will be overseen by Dr. William Elliott, Chair of Geology and Physics in the Pott College of Science, Engineering, and Education. After the initial development of this program, a coordinator will be identified to take on advising, marketing, and scheduling duties of the Environmental Science program.

### ***Appendix 7: Facilities***

There will be no major impacts on facilities caused by the proposed Environmental Science degree program at USI.

### ***Appendix 8: Other Capital Costs***

There will be no capital costs associated with the proposed Environmental Science degree program at USI.

### ***Appendix 9: Articulation of Associate/Baccalaureate Programs***

Currently, students that are admitted to USI with an Associate's degree receive credit for the completion of our University Core Curriculum. In addition, USI will accept up to 60 credits of transfer hours toward the completion of the Environmental Science degree program. Furthermore, USI has established course transfer agreements with Vincennes University and Ivy Tech Community College that provide a smooth transition for students into the Environmental Science degree program at USI.

Students enrolled in an accredited degree program and interested in a baccalaureate degree from USI are encouraged to obtain specific transfer credit information from their college transfer office, or USI, as early as possible. These agreements also apply to students from Kentucky and Illinois. Some program restrictions do apply; specific details can be discussed with the USI Credentials Analyst. For questions regarding the transferability of credits, contact Mary Branson, Credentials Analyst, [atmbranson@usi.edu](mailto:atmbranson@usi.edu), 812/465-7171 or 800/467-1965, or refer to [www.transferin.net](http://www.transferin.net).

### ***Appendix 10: Credit Hours Required/Time To Completion***

The environmental science curriculum includes coursework from biology, chemistry, geography, geology, and social science. Supporting coursework also includes mathematics and physics. The curriculum for the new Environmental Science degree is outlined in the following tables. In addition, examples of a 4-year plan and 3-year plan for the completion of the Environmental Science degree at USI are also provided.

#### **Environmental Science Core Coursework**

<b>Environmental Science Core (Required)</b>	<b>Hours</b>	<b>Designation</b>
Earth System Science <b>or</b> Geology, the Environ, & Society	3	GEOG 112
Ecology	3	BIOL 215
Concepts in Environmental Science	3	GEOL 311
Advanced Environmental Geology	4	GEOL 481
<b>Total Environmental Science Courses</b>	<b>13</b>	

#### **Environmental Science Required Coursework**

<b>Required Courses</b>	<b>Hours</b>	<b>Designation</b>
Intro Physical Geology <b>or</b> Geology of National Parks	4	GEOL 161
Oceans: Past, Present, & Future	3	GEOL 234
Climatology	3	GEOG 215
Quantitative Analysis	4	CHEM 321
Geomorphology	4	GEOL 407
Hydrogeology	4	GEOL 441
Biology & Env. Sc. of Global Change	3	BIOL 452
<i>Choose at least 9 credit hours</i>		
Environmental & Resource Economics	3	ECON 338
Environmental Politics and Policy	3	POLS 464
Environmental Ethics	3	PHIL 366
Sociology of the Environment	3	SOC 415
<i>Choose at least 9 credit hours</i>	9	
Introduction to Entomology	4	BIOL 221
Aquatic Biology	4	BIOL 305
Ichthyology	4	BIOL 306
Invertebrate Zoology	4	BIOL 321
Plant Physiology	4	BIOL 336
Plant Systematics	4	BIOL 361
Advanced Ecology	4	BIOL 459
Organic/Biochemistry Principles <b>or</b> Organic Chemistry II*	4	CHEM 241
Environmental Chemistry*	4	CHEM 354
Environmental Chemistry*	3	CHEM 341
Geology of Soils	4	GEOL 411
Global Quaternary Env. & Geologic Change	3	GEOL 455
Introduction to GIS	3	GEOL 465
Remote Sensing and Image Analysis	3	GEOL 475
Independent Research	1-3	GEOL 499, CHEM 499 or BIOL 492
Energy Systems & Sustainable Design	4	ENGR 265x
Environmental Engineering*	4	ENGR 428
Water Resources*	4	ENGR 429
<b>Required Coursework</b>	<b>43</b>	

\*Denotes additional prerequisites to enroll in these courses.

### Supporting Science Courses and Prerequisites

<b>Supporting Science Courses or Prerequisites</b>	<b>Hours</b>	<b>Designation</b>
Principles of Biology	4	BIOL 141
Botany	3	BIOL 151
Zoology	3	BIOL 152
Gen Chemistry I	4	CHEM 261
Gen Chemistry II	4	CHEM 262
Calculus I	4	MATH 230
Gen Physics I	4	PHYS 175
<b>Natural &amp; Physical Science Supporting courses</b>	<b>26</b>	

### Supporting Social Science Courses

<b>Supporting Social Science Courses</b>	<b>Hours</b>	<b>Designation</b>
<i>Choose 1 from the following</i>		
Seminar: Science in Society	3	SOC 370
Seminar: Global Climate Change	3	SOC 370
Philosophy of Science	3	PHIL 435
<b>Social Science Supporting Courses</b>	<b>3</b>	

The following is a distribution of required credit hours within each program specialty area. All environmental science majors will automatically satisfy 14 to 16 hours of the University Core (Science, Math, and Synthesis) in this program.

#### **Environmental Science Degree**

Environmental Science Core Courses – 56 credit hours  
 Supporting Math and Science Courses – 26 credit hours  
 Supporting Social Science Courses – 3 credit hours  
 Additional University Core Curriculum (UCC) – 35 credit hours

**TOTAL:** 120 credit hours

The following table describes the semester by semester sequence of a 4-year plan for the proposed Environmental Science degree program at USI. The course number, title and credit hours assigned to each course are listed.

**Environmental Science Curriculum Sequence – 4 Year Plan**

<b>Freshman Fall</b>			<b>Freshman Spring</b>		
Course	hours	notes	Course	hours	notes
Geog 112 or Geol 131	3	C	Geol 161 or Geol 151	4	C, UCC-C3
Math 230	4	C, UCC-A2	ES Social Science Sup.	3	C
Biol 141	4	C, UCC-C3	Biol 151 or Biol 152	3	C, UCC-C3
UCC-A Eng 101	3	UCC-A1	UCC A Eng 201	3	UCC-A1
UCC Ped 186	1	UCC-B3	UCC Ped activity	1	UCC-B3
<b>total</b>	<b>15</b>		<b>total</b>	<b>14</b>	<b>29</b>
<b>Sophomore Fall</b>			<b>Sophomore Spring</b>		
Course	hours	notes	Course	hours	notes
Biol 151 or Biol 152	3	C	Biol 215	3	C
Chem 261	4	C, UCC-C3	Chem 262	4	C
Cmst 101/107	3	UCC-A1	UCC-C1	3	UCC-C1
UCC-C5	3	UCC-C5	UCC-C4	3	UCC-C4
Econ 208	3	UCC-C2			
<b>Total</b>	<b>16</b>		<b>Total</b>	<b>13</b>	<b>29</b>
<b>Junior Fall</b>			<b>Junior Spring</b>		
Course	hours	notes	Course	hours	notes
UCC-B2	3	UCC-B2	UCC-C4	3	UCC-C4
UCC-C2	3	UCC-C2	Geog 215	3	C
Phys 175	4	C	Geol 311	3	C
Geol 441	4	C	Chem 321	4	C
			ES Social Science	3	C
<b>Total</b>	<b>14</b>		<b>Total</b>	<b>16</b>	<b>30</b>
<b>Senior Fall</b>			<b>Senior Spring</b>		
Course	hours	notes	Course	hours	notes
UCC-B1	3	UCC-B1	Geol 481	4	C, UCC-D1
Geol 234	3	C	ES Social Science	3	C
Geol 407	4	C	ES Science elective	3	C
ES Social Science	3	C	ES Science elective	3	C
ES Science elective	3	C	Biol 452	3	C
<b>Total</b>	<b>16</b>		<b>Total</b>	<b>16</b>	<b>32</b>
C=environmental science core course					
UCC=university core curriculum					
					<b>Total Hours      120</b>

The following table describes the semester by semester sequence of a 3-year plan for the proposed Environmental Science degree program at USI. The course number, title and credit hours assigned to each course are listed.

**Environmental Science Curriculum Sequence – 3 Year Plan**

<b>Freshman Fall</b>			<b>Freshman Spring</b>			<b>Sophomore Summer</b>			
Course	hours	notes	Course	hours	notes	Course	hours	notes	
Geog 112 or Geol 131	3	C	Geol 161 or Geol 151	4	C, UCC-C3	Biol 151 or Biol 152	3	C	
Math 230	4	C, UCC-A2	UCC-C1	3	UCC-C1	Cmst 101/107	3	UCC-A1	
Biol 141	4	C, UCC-C3	Biol 151 or Biol 152	3	C, UCC-C3	UCC-B1	3	UCC-B1	
UCC-A Eng 101	3	UCC-A1	UCC A Eng 201	3	UCC-A1	UCC-C5	3	UCC-C5	
UCC-C2	3	UCC-C2	UCC Ped 186	1	UCC-B3	UCC Ped activity	1	UCC-B3	
<b>total</b>	<b>17</b>		<b>total</b>	<b>14</b>		<b>total</b>	<b>13</b>	<b>44</b>	
<b>Sophomore Fall</b>			<b>Junior Spring</b>			<b>Junior Summer</b>			
Course	hours	notes	Course	hours	notes	Course	hours	notes	
Phys 175	4	C	Biol 215	3	C	Chem 321	4	C	
Chem 261	4	C, UCC-C3	Chem 262	4	C	UCC-B2	3	UCC-B2	
Geol 234	3	C	Geog 215	3	C	UCC-C4	3	UCC-C4	
Geol 441	4	C	Geol 311	3	C	UCC-C4	3	UCC-C4	
			Econ 208	3	UCC-C2				
<b>Total</b>	<b>15</b>		<b>Total</b>	<b>16</b>		<b>Total</b>	<b>13</b>	<b>44</b>	
<b>Senior Fall</b>			<b>Senior Spring</b>						
Course	hours	notes	Course	hours	notes				
Geol 407	4	C	Geol 481	4	C, UCC-D1				
ES Science elective	3	C	Biol 452	3	C				
ES Science elective	3	C	ES Social Science	3	C				
ES Social Science	3	C	ES Social Science	3	C				
ES Social Science Sup.	3	C	ES Science elective	3	C				
<b>Total</b>	<b>16</b>		<b>Total</b>	<b>16</b>		<b>32</b>			
C=environmental science core course							Total Hours		<b>120</b>
UCC=university core curriculum									