01/31/11 → UWUCC

LSC Use Only No:	LSC Action-Date:	UWUCC USE Only No.	UWUCC Action-Date:	Senate Action Date:
		10-58a.	AP-4/5/11	App-4/19/11

Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee

Contact Person	Email Address
Michael A. Poage	mpoage@iup.edu
Proposing Department/Unit	Phone
Geosciences - Natural Sciences and Mathematics	724-357-5627

Check all appropriate lines and complete information as requested. Use a separate cover sheet for each course proposal and for each 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*

2. Additional Course Designations: check if appropriate

_____ This course is also proposed as a Liberal Studies Course.

_____ This course is also proposed as an Honors College Course.

_____ Other: (e.g., Women's Studies, Pan-African)

3. Program Proposals

_____Catalog Description Change ____Program Revision

_____New Degree Program _____Program Title Change _____Other

_____New Minor Program ___X__New Track

Current program name	*Proposed program name, if changing*
B.S.-Geology/Energy Resources Track	

4. Approvals		**Date**
Department Curriculum Committee Chair(s)		11/3/10
Department Chair(s)		11/3/10
College Curriculum Committee Chair	Anne Kondo	12/3/10
College Dean		12/3/10
Director of Liberal Studies *		4/12/11
Director of Honors College *		
Provost *		4/7/11
Additional signatures as appropriate:		
(include title)		
UWUCC Co-Chairs	Gail Sechrist	4/7/11

* where applicable

RECEIVED JAN 31 2011 ASSOCIATE PROVOST OFFICE

Received JAN 31 2011 Liberal Studies

Part II. Description of Curriculum Change

1. Catalog Description and List of Courses and Credits

Note: This revised catalog description will apply to the Geoscience Department's B.S. in Geology/Geology Track, B.S. in Geology/Environmental Track, B.S. in Geology/Energy Resources Track, B.S. in Education-Earth and Space Science, and Minor in Geology. **A copy of the old catalog description is provided as an Appendix at the end of this proposal.**

Reflecting minor editorial changes and the addition of the new Energy Resources Track, the catalog description will be revised to read as follows:

Geology is the broad science that encompasses all aspects of the Earth system. In addition to the solid Earth, this system includes the oceans and atmosphere, climate change and most aspects of our immediate environment. Professional geologists are thus engaged in a wide range of activities, depending on their interests. Scientific questions addressed by geologists include: the evolution of life; the origin of volcanic activity; the assessment of volcanic and earthquake hazards; the evolution of our planetary neighbors; climate change; mineral and energy resources; and the human impact on our environment.

The Geoscience Department offers a B.S. degree in Geology that is divided into three tracks: Geology, Environmental, and Energy Resources. All tracks give students the necessary foundation to pursue a wide variety of career goals. In addition, we offer a B.S. degree in Earth and Space Science Education for those students who are interested in teaching. The degrees and courses in our program emphasize hands-on learning, including outdoor instruction, student-oriented research, and professional experiential learning opportunities. In addition to on-campus instruction and class-related field trips, the department also offers several regional geology Field Workshops, which take place in Newfoundland, the northern Rockies region, Florida and the Bahamas, and the American southwest.

The B.S. in Geology/Geology Track is designed for students who are interested in pursuing many of the various sub-disciplines in Geology, including Oceanography/Marine Geology, Climate Change, Volcanology, Paleontology, and Geophysics. There is also considerable overlap between geology and astronomy, as geologists study the evolution of other planetary bodies, such as the Moon, Mars and Venus; our curriculum reflects this link and provides the groundwork for planetary studies. The Geology Track thus provides students with the foundation needed to pursue a wide variety of careers, including research and graduate studies, or working as professional geologists for energy resource companies, environmental consulting firms, or federal and state regulatory agencies.

The B.S. in Geology/Environmental Track is designed for students who wish to pursue careers in the environmental field. In addition to air and water quality issues, pollution often impacts the subsurface in ways that are difficult to detect and remediate. Geologists therefore play a key role in dealing with complex environmental issues; the Environmental Track prepares students to solve a variety of environmental problems. Graduates from this track will be prepared for direct entry into jobs with federal or state agencies and private environmental consulting firms, as well as graduate studies.

The B.S. in Geology/Energy Resources Track is designed for students who wish to pursue careers in the energy sector. As the world's energy demands continue to grow, nations face the challenge of maintaining reliable energy supplies. Conventional oil, coal, and natural gas continue as mainstays of the energy industry, but renewable and/or carbon-neutral energy sources are gaining attention in response to growing concerns about climate change and finite reserves of fossil fuels. Western Pennsylvania is a

historic coal and natural gas producing region with the potential for significant growth in the natural gas industry due to development of the Marcellus Shale. The Energy Resources Track will prepare students for direct entry into the energy industry with a focus on the discovery and development of energy resources and geophysical exploration techniques.

The B.S. in Education-Earth and Space Science prepares students to become certified middle and high school teachers in Pennsylvania and other states. Earth and Space Science teachers in grades 7 to 12 teach subjects that require a broad and solid foundation in science. Coursework includes study of geology, meteorology, oceanography, and astronomy. A basic understanding of the cognate sciences, biology, chemistry, and physics, and mathematics is also an essential part of the major. Courses in the foundations of education and pedagogy complement the subject matter studies. Students create and present lessons, first in their courses and then in school classrooms, culminating in the student teaching experience in the final semester.

The Minor in Geology is designed for students who want a background in Geology in conjunction with their main area of study. This minor may be particularly appropriate for students pursuing degrees in business or one of the social or physical sciences.

List of courses and credits for the proposed Energy Resources Track:

Bachelor of Science - Geology/Energy Resources Track

Liberal Studies Requirements: **50**
Liberal Studies: As outlined in Liberal Studies section with the following specifications:
Mathematics: MATH 121
Natural Science: PHYS 111-121 and CHEM 111 (or CHEM 113)
Social Science: ECON 121
Liberal Studies Electives: 4cr., MATH 122, no courses with GEOS prefix

Major:

Required Courses:			**59**
GEOS 201	Foundations of Geology	4cr	
GEOS 202	Quantitative Methods in the Geosciences	2cr	
GEOS 203	Surficial Processes	4cr	
GEOS 323	Geophysics	4cr	
GEOS 324	Geology of Oil and Gas	4cr	
GEOS 352	Sedimentation and Stratigraphy	4cr	
One of the following:	GEOS 303, 401-402, 403-404, 405-406, 407-408 (1)	4cr	
GEOS 470	Research Methods in the Geosciences	2cr	
GEOS 480	Geoscience Seminar	2cr	
PHYS 112-122	Physics I Lecture and Lab ***or***		
CHEM 112	General Chemistry II (or CHEM 114)	4cr	

Controlled Electives: 25cr
Select 25cr from the following list: (2)
One 100- or 200-level GEOS course
Any 300-level or 400-level GEOS course
Foreign Language Intermediate-Level
CHEM 112 (if not taken above), 231, 232, 322, 323, 341
ECON 122, 331, 361
GEOG 415, 419
MATH 216 or 217, 241
PHYS 112-122 (if not taken above), 342
COSC 110, 210, 250, 310, 362

Free Electives: **11**

Total Degree Requirements: **120**

(1) Up to 4cr of a summer field camp, internship, or independent study, all of which must be approved by the department, may substitute for GEOS 303 Field Geology or a Geoscience Field Workshop.
(2) Only one Geoscience Field Workshop (including prerequisite 1cr Seminar) may be applied toward controlled electives. Up to 12cr from non-GEOS courses may be applied toward controlled electives. 6cr of foreign language may be applied toward controlled electives provided Intermediate-Level is successfully attained.

2. Track Description and Rationale

Description: The B.S. in Geology/Energy Resources Track is designed for students who wish to pursue careers in the energy sector. As the world's energy demands continue to grow, nations face the challenge of maintaining reliable energy supplies. Conventional oil, coal, and natural gas continue as mainstays of the energy industry, but renewable and/or carbon-neutral energy sources are gaining attention in response to growing concerns about climate change and finite reserves of fossil fuels. Western Pennsylvania is a historic coal and natural gas producing region with the potential for significant growth in the natural gas industry due to development of the Marcellus Shale. The Energy Resources Track will prepare students for direct entry into the energy industry with a focus on the discovery and development of energy resources and geophysical exploration techniques.

Liberal Studies Courses. The Energy Resources Track requires fifty credits of Liberal Studies coursework including the following specifications and rationales:

MATH 121 (specified under Mathematics) and **MATH 122** (specified as a Liberal Studies Elective): Two semesters of calculus is ideal for working in the geophysics sector of the energy industry. In addition, for many companies, the Master's degree is the operative industry degree; two semesters of calculus is ideal for admission into Geology graduate programs.

CHEM 111 (or CHEM 113) *and* PHYS 111-121: The study of the formation, exploration and development of energy resources requires knowledge of both physics and chemistry.

ECON 121 (specified under Social Science): Recognizing that the energy industry is heavily influence by the global economy and market forces, the Energy Resources Track specifies ECON 121 as Liberal Studies Social Science Requirement.

Major Courses. The Energy Track requires 59 credits of Major courses as follows.

GEOS 201, 202, 203: These three courses form the introductory sequence for all majors in the Geoscience Department, providing a foundational geological and quantitative background for upper-level major's classes.

GEOS 323 Geophysics: Geophysical techniques are widely used in energy exploration as viable resources, due to depletion, are deeper underground (underwater) and more geographically remote. GEOS 323 will focus on the theory and application of frequently used geophysical techniques (not limited to energy exploration) including seismic and gravity surveys, as well as paleomagnetics.

GEOS 324 Geology of Oil and Gas: GEOS 324 will focus on the geological formation, exploration and development of oil and natural gas, as well as the environmental risks involved in extraction. This course emphasizes the geochemistry of resource formation as well as the geophysical methods employed in exploration and development.

GEOS 352 Sedimentation and Stratigraphy: The vast majority of the world's energy resources are contained within layers of sedimentary rock. Exploration for resources such as coal, oil, gas and uranium requires a detailed understanding of the processes of sedimentary rock formation and the techniques used to map and model underground deposits using well logs and cores. GEOS 352 gives students in-depth and hands-on experience with sedimentary rock identification in core, chips, and geophysical logs.

GEOS 303, 401-402, 403-404, 405-406, or 407-408: A field component is essential to a modern degree program; these courses represent our current field-based offerings. GEOS 303 Field Geology is a locally oriented field courses; all others are off-campus field workshops and preliminary seminar courses. Majors in the Geology and Environmental Tracks are similarly required to take one of these options.

GEOS 470, GEOS 480: These two courses form the basis of students' research experience and are required by all students currently in the Geology and Environmental Tracks. GEOS 470 Research Methods in the Geosciences provides a fundamental understanding of the scientific method, hypothesis testing, data gathering, and statistical analysis in light a research project of their choosing. GEOS 480 Geoscience Seminar provides students with the opportunity to formally present their research results and discuss projects by other students, faculty or outside speakers.

CHEM 112 (or CHEM 114) ***or*** **PHYS 112-122:** The Energy Resources Track requires two semesters of either Physics or Chemistry; one semester of the other is also required with the second semester available in the list of controlled electives.

The Energy Resources Track will require 25 credits of Controlled Electives, of which 12 credits can be from non-GEOS courses. Non-GEOS Controlled Elective options were selected either as typical ancillary science courses taken by Geoscience students, or for their specific value to the economic component of the Energy Resources Track.

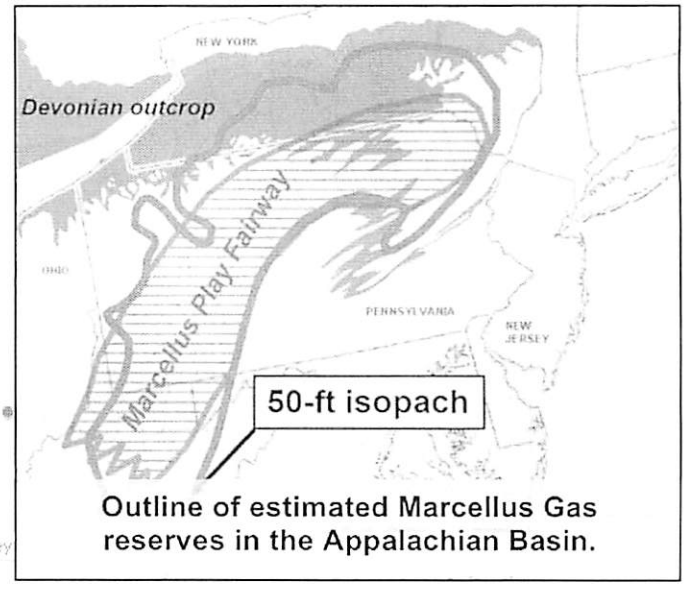
Rationale and Justification: The Energy Resources Track is being developed in response to 1) the recommendation from the 2010 Department Five-Year Review to develop such a track, 2) recent regional developments in the natural gas sector, and 3) emerging national trends in geoscientist employment and demographics.

The Geoscience Department underwent its regularly scheduled five-year review during the 2009-2010 academic year. A recommendation common to both the self-study and the external evaluation was the development of an Energy Resources Track. Our current Geology Track provides students with the foundation needed to pursue a wide variety of career goals, including research (and postgraduate studies), teaching, or careers as professional geologists working with private businesses, environmental firms, or as a consultant for federal and state agencies. Our Environmental Track is designed for students who wish to pursue careers in the expanding environmental field. In no track do we provide training specifically for students seeking employment in the energy sector, which currently accounts for ~45% of the geoscience workforce. Development of an Energy Resources Track thus represents an opportunity to capture as-of-yet unrealized growth potential for the department.

IUP is also situated near the geographic center of the emerging Marcellus Gas Play, which many energy specialists suggest will supply energy for the remainder of this century. The Marcellus Shale is currently thought to be the world's largest unconventional natural gas reservoir. Gas trapped inside this minimally permeable unit can only be extracted by careful horizontal drilling, which requires intensive geologic study and planning as well as careful environmental protection and mitigation of potential hazards involved with hydro-fracture techniques to extract the gas. Development of this vast but difficult resource will require numerous trained geologists. Western Pennsylvania is home to at least a dozen companies who will be exploiting this new reserve, including Range Resources, EXCO, Equitable Resources, Cabot Oil and Gas, Sylvan Energy, Atlas Energy Resources and Texas Keystone Energy. With our traditional academic specialties (e.g, stratigraphy, sedimentology, paleontology, oceanography, stellar astronomy, structural geology, geochemistry, and environmental geology) coupled with new courses in Geophysics and Energy Geology, IUP can provide an important training ground for the many future geologists who

will be needed to develop Pennsylvania's underground resources of unconventional natural gas and wealth of potential sites for future carbon capture and storage technology. Note that at this time, none of the PA-SSHE schools offers an Energy Resources or comparable track.

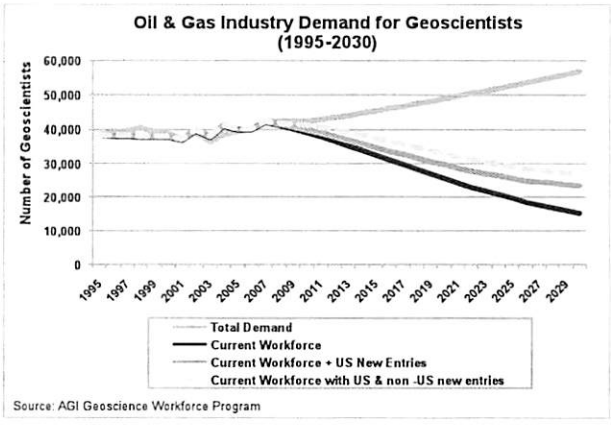
Location of the 14 PA-SSHE campuses.



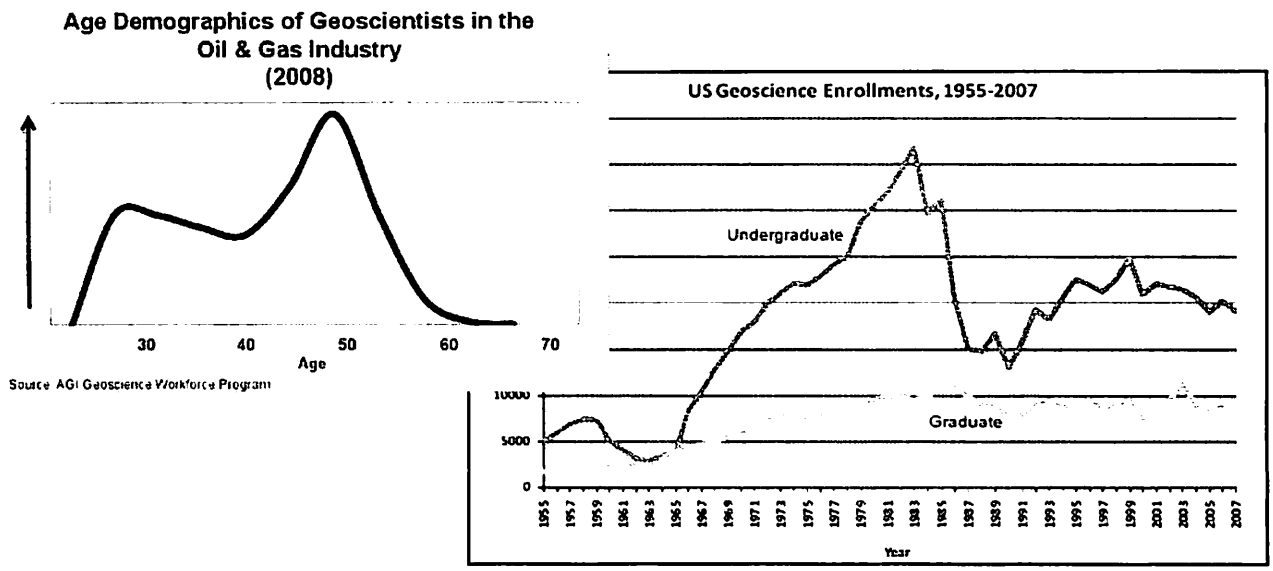
Outline of estimated Marcellus Gas reserves in the Appalachian Basin.

In addition to the regional development of the Marcellus Shale, there are national trends in the energy sector suggesting a looming shortfall of properly trained geoscientists (see figure below). A 2009 "Status of the Geoscience Workforce" conducted by the American Geologic Institute conclude, "The supply of geoscientists is not expected to meet the demand for geoscientists over the next 20 years. Even with an optimistic 3 percent increase in graduate geoscience students, by 2030 the unmet demand for geoscientists in the petroleum industry will be approximately 30,000." Of particular note (and most pertinent to our geographic location) is that this shortfall in geoscientists is predicted to occur over the next twenty years in the oil and gas industry. Since the oil and gas industry makes up nearly half of the total employment opportunity in the geosciences, this trend implies a growing future demand for our proposed academic program. This demand will be spurred locally by the growing employment and entrepreneurial opportunities created by the Marcellus shale-gas industry.

This shortfall may already be happening in western Pennsylvania. IUP has had several oil and gas companies (EXCO, Equimark Energy Resources, Exxon-Mobil Exploration and Production) ask to visit the IUP campus in order to recruit students for job openings. In addition, several petroleum geologists and energy executives who have visited IUP over the past three years to give seminar talks have all emphasized the growing need for geologists to work locally on the Marcellus Shale gas play that is booming right now in the Appalachian Basin.



At the same time as the need for professional oil and gas geologists is growing, the age distribution of those actually working in this industry is skewed toward older workers. These are geologists who graduated from college during the 1980's, which was the period of the last major oil and gas development boom in the United States. These geologists are now beginning to retire, resulting in an increasing demand for highly-trained younger workers to replace them. When he visited IUP in 2007 to accept his honorary doctorate, Tim Cejka '73, the president of Exxon-Mobil Exploration Company, told us that his company's main emphasis even back when energy prices were much lower was to replace their geological workforce with new graduates, because they could foresee a shortage of petroleum geologists developing over the next few decades.



Source: AGI Geoscience Workforce Program, data derived from U.S .Bureau of Economic Analysis, US Bureau of Labor Statistics, and AGI's Directory of Geoscience Departments

Between the emerging development of the Marcellus Shale, and the future shortfall and aging demographic of the geoscience workforce in the oil and gas industry, the Geoscience Department sees a growth opportunity in providing undergraduate training in energy resources which will complement our existing Geology and Environmental tracks.

Part III. Implementation

1. How will the proposed new tracks affect students already in the existing program?
Development and implementation of the Energy Resources Track will not affect students in the current programs.

2. Are faculty resources adequate? If you are not requesting or have not been authorized to hire additional faculty, demonstrate how this program will fit into the schedule(s) of current faculty.
Faculty resources will be adequate at the time of implementation. The Geoscience Department has been allocated an additional tenure-track faculty line to support the development of this track. The search for this faculty member is currently underway and we anticipate the new faculty member starting in Fall 2011. The new faculty member will teach GEOS 324 Geology of Oil and Gas every other year in addition to other upper-level classes within his/her field of expertise as well as non-major lecture and lab sections.

3. Are other resources adequate?

Yes; there are no required facilities or resources not already available. We anticipate allocation of the standard office, laboratory space, and start-up funds for the new faculty member hired in support of this new track.

4. Do you expect an increase or decrease in the number of students as a result of these revisions? If so, how will the department adjust?
We anticipate an increase in the number of students majoring in the Geosciences, although the magnitude of that increase is impossible to predict. At present, we have the ability to increase the number of majors in the department by 50% or more without impacting our ability to deliver required courses and maintain a significant contribution to the liberal studies program.

5. Intended implementation date?
Fall 2011.

Part IV. Periodic Assessment
The Department of Geoscience has in place an assessment plan approved by the IUP curriculum process during our last major curriculum revision (2007-2009). This approved assessment plan is summarized below.

1. Describe the evaluation plan. Include evaluation criteria. Specify how student input will be incorporated into the evaluation process.
During retreats and planning sessions conducted as part of our five-year reviews in 2004-2005 and 2009-2010, the Geoscience Department came to the following consensus on the goals for students in our three major programs (Geology, Environmental Geology & Earth & Space Science Education). These goals are:

1. Effective oral and written communication skills:
    a. giving a research talk (for geology/environmental majors)
    b. teaching a lesson plan (for education majors)
2. Quantitative skills appropriate for earth science problems
3. Professional skills need for field, lab and computer tasks:
    a. identify common rocks and minerals
    b. keep a detailed and accurate field notebook
    c. use a Brunton Compass
4. Knowledge of the critical content areas:
    a. plate tectonic theory
    b. organic evolution
    c. environmental issues

Our current methods of student learning outcomes assessment have been streamlined and simplified to focus primarily on the measurement of skills and content knowledge at the freshman-level, and then compare those to measurements of the same skills and knowledge at the junior and senior levels. This allows us to look at the overall gains in outcome success over the course of our major programs, while allowing our students to take many different paths through our flexible curriculum.

1. As seniors, geology, environmental and energy track students are required to take GEOS 480 Geoscience Seminar and present talks at Geoscience Day. These students will be rated on the writing of their abstract, their oral presentation, the quantitative methods used in their research and their demonstration of adequate content knowledge. A rubric has been designed to focus on the desired student

learning outcomes and facilitate long-term data acquisition. Education students who are not required to take GEOS 480 Geoscience Seminar will initially be evaluated for the same set of desired skills based on their student teaching experiences as evaluated by themselves, their faculty supervisors and their cooperating teachers. The department will work to establish an evening equivalent to Geoscience Day for education students, where they can present a lesson that they taught to actual students in their classrooms for faculty rubric evaluation.

2. Quantitative skills appropriate for earth science problems will be assessed for freshmen in their required GEOS 202 Quantitative Methods in the Geosciences course and then again for juniors and seniors in GEOS 470 Research Methods in the Geosciences, as well as GEOS 480 Geoscience Seminar. Learning outcomes will be assessed through problem-solving modules and applied research techniques.

3. Professional skills will be directly measured and evaluated in courses as follows:
   Rock & Mineral ID: GEOS 201 Foundations of Geology (freshmen), GEOS 470 Research Methods in the Geosciences (juniors)
   Field Notebooks: GEOS 203 Surficial Processes (freshmen) & GEOS 303 or 401-408 (Field Geology or Field Workshops; juniors and seniors)
   Brunton compass use: GEOS 201 Foundations of Geology (freshmen), GEOS 470 Research Methods in the Geosciences (juniors)
   Software Skills: GEOS 202 Quantitative Methods in the Geosciences (freshmen), GEOS 470 Research Methods in the Geosciences (juniors)

4. Knowledge of the critical content areas will be directly assessed in required courses as follows:
   Plate tectonic theory: GEOS 203 Surficial Processes (freshmen) & GEOS 303 or 401-408 (Field Geology or Field Workshops; juniors and seniors)
   Organic evolution: GEOS 201 Foundations of Geology (freshmen); GEOS 353 Paleontology (juniors and seniors)
   Environmental issues: GEOS 203 Surficial Processes (freshmen); GEOS 370 Oceanography, GEOS 371 Meteorology (juniors and seniors)

2. Specify the frequency of the evaluations.
Assessment data will be collected annually by individual faculty members and reported through the use of Qualtrix faculty surveys and TracDat database archiving. Additional entrance and exit surveys of students along with content inventory analysis will be used to supplement course-level assessment as needed. Collectively, department faculty will evaluate and discuss program revisions during annual daylong meetings and modify criteria and assessment strategies as needed. A full program assessment will be performed during every 5-year departmental review; our next review is currently scheduled for 2015.

3. Identify the evaluating entity.
We have instituted a simple set of tests for each relevant course that will tell us if our students are actually learning and using the skills they had been taught. We have designed rubrics to facilitate this process and have begun implementing annual program assessments as per our 2005 five-year Academic Program Review. In addition, we are creating a senior 'exit interview' in an online questionnaire format to find out if students' own learning goals were met by program. We will also continue administering our alumni questionnaire (give a year or two after graduation to each cohort of students) by putting it in an online format as well.

Part V. Course Proposals
The Energy Resources Track will require the addition of two new courses, GEOS 323 Geophysics and GEOS 324 Geology of Oil and Gas. Proposals for these two new courses are attached.

Part VI. Letters of Support or Acknowledgment
The Geoscience Department has contacted the following departments and programs requesting letters of support or acknowledgment for the new Energy Resources Track. Letters to departments and received responses are attached.

Department of Mathematics: no response received at time of submission
Department of Chemistry: no response received at time of submission
Department of Physics: received letter of support
Department of Economics: received letter of support
Department of Geography and Regional Planning: no response received at time of submission
Department of Computer Science: no response received at time of submission; Dr. Shubra has indicated that the matter has been forwarded to the chair of the Department Curriculum Committee.
Department of French and German: no response received at time of submission
Department of Spanish: unofficial response received indicating lack of support
Critical Languages Program: no response received at time of submission

Appendix: Old Catalog Description
Geology is a far-ranging science and encompasses various aspects of the Earth system. In addition to the solid Earth, this system includes the oceans and atmosphere, climate change, and most aspects of our immediate environment. Professional geologists are thus engaged in a wide range of activities, depending on their interests. Scientific questions addressed by geologists include the evolution of life, the origin of volcanic activity, the assessment of volcanic and earthquake hazards, the evolution of our planetary neighbors, climate change, and perhaps most importantly, the human impact on our environment.

The department offers a B.S. degree with a major in Geology that is divided into two tracks: Geology and Environmental. Either track gives students the necessary foundation to pursue a wide variety of career goals. In addition, education degrees are offered for students who are interested in teaching. The degrees including outdoor instruction and student-oriented research and professional experiential learning opportunities. In addition to on-campus instruction and class-related field trips, the department also offers several regional geology Field Workshops, which take place in Newfoundland, the Northern Rockies region, Florida and the Bahamas, and the American Southwest.

The B.S. degree with a major in Geology/Geology Track is designed for students who are interested in pursuing any of the various subdisciplines in geology, including oceanography/marine geology, climate change, volcanology, paleontology, meteorology, and geophysics. There also is considerable overlap between geology and astronomy, as geologists study the evolution of other planetary bodies, such as the Moon, Mars, and Venus; the curriculum reflects this link and provides the groundwork for planetary studies. The Geology Track thus provides students with the foundation needed to pursue a wide variety of career goals, including research (and postgraduate studies), teaching, or careers as professional geologists working with private businesses, environmental firms, or as consultants for federal and state agencies.

The B.S. degree with a major in Geology/Environmental Track is designed for students who wish to pursue careers in the rapidly expanding environmental field. While our planet has evolved over a 4.5 billion-year history, our presence has had a significant impact upon our surroundings, in spite of our brief

time of residence. Geologists play a key role in dealing with environmental issues, and the Environmental Track prepares students to solve environmental problems. Graduates from this track will be prepared for direct entry into jobs with federal or state agencies and private environmental consulting firms, as well as postgraduate studies.

The B.S. in Education degree with a major in Earth and Space Science prepares students to become certified teachers in Pennsylvania and other states. Earth and Space Science teachers in middle and high school grades teach subjects that require a broad and solid foundation in science. Coursework includes study of geology, meteorology, oceanography, and astronomy. A basic understanding of the cognate sciences, biology, chemistry, physics, and mathematics is also an essential part of the major. Courses in pedagogy, including the teaching of English language learners and students with special needs, complement the subject matter studies. Students create and present lessons, first in Geoscience courses and then in school classrooms, culminating in the student teaching experience in the last semester.

The Minor in Geology is designed for students who desire a background in Geology, in conjunction with degrees in business or one of the social or physical sciences.

January 22, 2011

To: Dr. Michael Poage

From: John Woolcock, Chair, IUP Chemistry Department

Subject: GEOS Energy Resources Track

The following recommendation was made by the Chemistry Department Curriculum Committee: "The Department of Chemistry supports the inclusion of CHEM 111/112 or CHEM113/114 as part of the liberal studies requirements for the Proposed new Energy Resources Track in the Geoscience Department B.S. Geology degree program, along with CHEM 112, 231, 232, 322, 323, and 341 as Controlled Electives. The proposed chemistry requirements and controlled electives closely match the curriculum requirements for the current Geology and Environmental Tracks. We request, however, that this support is made with the understanding that priority for enrollment in CHEM 113/114 will be given to our chemistry and biochemistry majors. We also note that the MATH requirements for CHEM 323 and 341 do not coincide with the requirements of the Track."

I support the creation of this track and the use of a wide variety of controlled electives is an important strength of the track. However, in the list of CHEM controlled electives and the recommendation above there are two issues that will need to be addressed when the track is approved and implemented. I don't believe either of these should prevent this track from being approved by the UWUCC.

The first is the list of CHEM controlled electives on p. 4. The program as proposed would allow students the option of taking only CHEM 111 or CHEM 113. However, students who take this track need to be advised they must take CHEM 112 or CHEM 114 if they plan to take other CHEM courses. This is because CHEM 112 and CHEM 114 are prerequisites for CHEM 231-232 and CHEM 323. They also will need to take both semesters of physics as controlled electives if they plan to take CHEM 341 or CHEM 322.

The second is faculty resources. At a minimum, students in this track will be required to take CHEM 111 or CHEM 113. These courses are currently running at full capacity. So, adding the projected 10-15 more GEOS students to CHEM 111 or CHEM 113 will require an additional sections in these courses. The same situation is true in CHEM 231 and CHEM 323, which are on the list of controlled electives. If the enrollments in CHEM courses remain at their current levels in Fall 2011, additional temporary faculty FTE will be needed to offer enough lecture and lab sections of these courses.

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210 South Tenth Street
Indiana, Pennsylvania 15705-1048

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www.iup.edu/compsci

The Department Curriculum Committee of the Department of Computer Science has considered the proposed changes to the Geosciences curriculum and supports them. We recognize that each department is in the best position to evaluate its curriculum needs and should therefore be accorded the prerogative to initiate such changes. However, we do wish to emphasize to Geosciences that in today's information technology-based world that it would be extremely beneficial for their majors to understand the process of software construction. Computer-based tools used in Geosciences include analysis, visualization, simulation, and instruments with embedded processors.

Respectfully,

Terrence P. Fries
Chair, Department Curriculum Committee

Reply | Reply To All | Forward | Delete | This is Spam

Subject: Requesting a letter of support for new Geoscience track
From: Michael A Poage
Date: 10/18/10 01:48 PM
To: Francisco.alarcon@iup.edu

Mathematics

Attached Files
• Energy Track Proposal.doc (4892 KB)

* <!-- /* Font Definitions */ @font-face {font-family:Cambria; panose-1:2 4 5 3 5 4 6 3 2 4; mso-font-charset:0; mso-generic-font-family:auto; mso-font-pitch:variable; mso-font-signature:3 0 0 0 1 0;} /* Style Definitions */ p.MsoNormal, li.MsoNormal, div.MsoNormal {mso-style-parent:""; margin:0in; margin-bottom:.0001pt; mso-pagination:widow-orphan; font-size:12.0pt; mso-bidi-font-size:10.0pt; font-family:"Times New Roman"; mso-fareast-font-family:"Times New Roman"; mso-bidi-font-family:"Times New Roman";} @page Section1 {size:8.5in 11.0in; margin:1.0in 1.25in 1.0in 1.25in; mso-header-margin:.5in; mso-footer-margin:.5in; mso-paper-source:0;} div.Section1 {page:Section1;} -->

Dear Dr. Alarcon,

The Geoscience Department is proposing a new Energy Resources Track (see attached proposal) within our B.S. Geology degree program. The proposed track specifies MATH 121 and MATH 122 as part of its Liberal Studies requirements, and lists MATH 216 or 217 and MATH 241 as controlled electives. These mathematics requirements and controlled electives are identical to those of our current Geology and Environmental tracks.

We are requesting a letter of support from the Department of Mathematics with regard to the inclusion of these MATH courses in our new Energy Resources Track. Geoscience is a fundamentally quantitative field of study and our students' education is greatly enhanced by including mathematics coursework in our curriculum. To help gauge the potential impact on your department, we anticipate that the addition of this new track will result in a modest increase in Geoscience majors of at most 10-15 students per year.

Thank you for consideration of this request. Should you have any questions or concerns, please do not hesitate to contact me at mpoage@iup.edu or 7-5627.

Sincerely,

Michael Poage

Take Address

No response received as of 11/3/10.

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Subject: Requesting letter of support for new Geoscience Track
From: Michael A Poage
Date: 10/18/10 01:52 PM
To: john.woolcock@iup.edu

Chemistry

Attached Files
- Energy Track Proposal.doc (4892 KB)

* <!-- /* Font Definitions */ @font-face {font-family:Cambria; panose-1:2 4 5 3 5 4 6 3 2 4; mso-font-charset:0; mso-generic-font-family:auto; mso-font-pitch:variable; mso-font-signature:3 0 0 0 1 0;} /* Style Definitions */ p.MsoNormal, li.MsoNormal, div.MsoNormal {mso-style-parent:""; margin:0in; margin-bottom:.0001pt; mso-pagination:widow-orphan; font-size:12.0pt; mso-bidi-font-size:10.0pt; font-family:"Times New Roman"; mso-fareast-font-family:"Times New Roman"; mso-bidi-font-family:"Times New Roman";} @page Section1 {size:8.5in 11.0in; margin:1.0in 1.25in 1.0in 1.25in; mso-header-margin:.5in; mso-footer-margin:.5in; mso-paper-source:0;} div.Section1 {page:Section1;} -->

Dear Dr. Woolcock,

The Geoscience Department is proposing a new Energy Resources Track (see attached proposal) within our B.S. Geology degree program. The proposed track will require one or two semesters of Chemistry coursework (either CHEM 111-112 or CHEM 113-114; students may choose two semesters of Chemistry and one semester of Physics or vice-versa) as part of its Liberal Studies Requirements or Major Required Courses. In addition, the new track lists CHEM 112, 231, 232, 322, 323, and 341 as Controlled Electives. These chemistry requirements and controlled electives are nearly identical to those of our current Geology and Environmental tracks.

We are requesting a letter of support from the Department of Chemistry with regard to the inclusion of these CHEM courses in our new Energy Resources Track. The modern field of geoscience requires a fundamental understanding of chemical processes, and our students' education is greatly enhanced by including chemistry coursework in our curriculum. To help gauge the potential impact on your department, we anticipate that the addition of this new track will result in a modest increase in Geoscience majors of at most 10-15 students per year.

Thank you for consideration of this request. Should you have any questions or concerns, please do not hesitate to contact me at mpoage@iup.edu or 7-5627.

Sincerely,

Michael Poage

No response received as of 11/3/10.

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Subject: **Re: Requesting letter of support for new Geoscience track and course**
From: Devki N Talwar
Date: 10/20/10 09:38 AM
To: Michael A Poage
Cc: talwar@iup.edu, kmarkel@iup.edu

Physics

Hello Michael,
The Physics Department will support the Geoscience Department's BS Geology/Energy Resources Track - requiring your students taking PHYS 111/121 and PHYS 112/122 courses as part of their Liberal Studies Rwequirements or Major Required Courses.

Thanks

Devki Talwar

On Mon, 18 Oct 2010 13:57:08 -0400
"Michael A Poage" <mpoage@iup.edu> wrote:

> *Dear Dr. Talwar, The Geoscience Department is proposing a new Energy Resources Track (see attached proposal) within our B.S. Geology degree program. The proposed track will require one or two semesters of Physics coursework (PHYS 111-121; 112-122; students may choose two semesters of Physics and one semester of Chemistry or vice-versa) as part of its Liberal Studies Requirements or Major Required Courses. In addition, the new track lists PHYS 112-122 and 342 as Controlled Electives. These physics requirements and controlled electives are nearly identical to those of our current Geology and Environmental tracks. We are requesting a letter of support from the Department of Physics with regard to the inclusion of these PHYS courses in our new Energy Resources Track. The modern field of geoscience requires a fundamental quantitative understanding of physical processes, and our students' education is greatly enhanced by including physics coursework in our curriculum. To help gauge the potential impact on your department, we anticipate that the addition of this new track will result in a modest increase in Geoscience majors of at most 10-15 students per year.*
>
> *As part of the proposed Energy Resources Track, we are also proposing a new course GEOS 323 Geophysics (see attached proposal). This course will require PHYS 111 as a prerequisite, however this should not generate additional demand for PHYS 111 as all geoscience students who will be taking GEOS 323 will have to take PHYS 111 for their major anyway. In any case, we wish to duly inform you of this new course and to suggest that it may be appropriate for Physics students in your B.S. in Applied Physics-Geology Track. Thank you for consideration of this request. Should you have any questions or concerns, please do not hesitate to contact me at mpoage@iup.edu or 7-5627. Sincerely, Michael Poage*
> *Chair, Geoscience Department Curriculum Committee*

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Subject: B.S.-Geology/Energy Proposal
From: Debbie Bacco
Date: 10/26/10 03:39 PM
To: mpoage@iup.edu
Cc: Nicholas Karatjas, Debbie Bacco

Economics

The following is from Dr. Nicholas Karatjas:

Dr. Poage -

The Department of Economics has reviewed the B.S.-Geology/Energy proposal and supports it. The Department of Economics will be able to accommodate the projected increase in enrollment.

Dr. Nicholas Karatjas, Chairperson
Department of Economics
karatjas@iup.edu

Debbie D. Bacco
Department Secretary
Department of Economics
213 McElhaney Hall, IUP
Indiana, PA 15705-1087
(724) 357-2640

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Subject: **Requesting letter of support for Geoscience program revisions and new track**
From: Michael A Poage
Date: 10/18/10 02:10 PM
To: john.benhart@iup.edu

Geography and Regional Planning

Attached Files
- Geology Track Proposal.doc (124 KB)
- Environmental Track Proposal.doc (124 KB)
- Energy Track Proposal.doc (4892 KB)

Dear Dr. Benhart,

The Geoscience Department is preparing some minor revisions to our Geology and Environmental Tracks, which will affect the Department of Geography and Regional Planning (see attached proposals). One proposed modification to these tracks is a change in the Controlled Elective options, replacing GEOG 316 Introduction to GIS with GEOG 419 GIS for Environmental Applications. We feel that GEOG 419 is more appropriate for Geoscience majors as it focuses on environmental applications and does not have a specified prerequisite.

In addition, we are also proposing a new Energy Resources Track (see attached proposal) within our B.S. Geology degree program. As part of the Controlled Elective options for this new track, we would like to include GEOG 415 Remote Sensing and GEOG 419 GIS for Environmental Applications. GEOG 415 is currently listed as a Controlled Elective for our Geology and Environmental Tracks. To help gauge the potential impact on your department, we anticipate that the addition of this new track will result in a modest increase in Geoscience majors of at most 10-15 students per year.

We are requesting a letter of support from the Department of Geography and Regional Planning with regard to the above-mentioned change in our Geology and Environmental Tracks, and with regard to the inclusion of GEOG 415 and 419 as Controlled Electives in our new Energy Resources Track. Thank you for consideration of this request. Should you have any questions or concerns, please do not hesitate to contact me at mpoage@iup.edu or 7-5627.

Sincerely,

Michael Poage
Chair, Geoscience Department Curriculum Committee

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No response received as of 11/3/10

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Subject: **Re: Requesting letter of support for Geoscience program revisions and new track**

From: Charles Shubra

Date: 10/19/10 01:49 PM

To: Michael A Poage

Cc: Terry Fries

Computer Science

Hi Michael,
I have referred this matter to Dr. Terry Fries the chairperson for the departmental curriculum committee. The committee will draft a letter and share it with the faculty. I hope that you will have the requested response within two weeks.

From: "Michael A Poage" <mpoage@iup.edu>
Sent: Monday 18 October 2010 2:16 PM
To: <charles.shubra@iup.edu>
Subject: Requesting letter of support for Geoscience program revisions and new track

Dear Dr. Shubra,

The Geoscience Department is preparing revisions to our Geology and Environmental Tracks, which will affect the Department of Computer Science (see attached proposals). At present, students in both of these tracks are required to satisfy the College of Natural Sciences and Mathematics Foreign Language Requirement. As you are probably aware, taking COSC 110 and 210 is, for geoscience students, an acceptable alternative to the typical Intermediate-Level Foreign Language.

In 2008-2009, the Biochemistry Program was successful in its proposal to eliminate the NSM College Foreign Language Requirement from its curriculum. The Geoscience Department, recognizing the broader value of studying a foreign language but also recognizing the minimal predictable value that it has for those entering the geoscience workforce or graduate school in geology, is currently proposing to move foreign language study to the Controlled Elective component of our Geology and Environmental Tracks. As a part of this change, we are also proposing to move COSC 110 and 210 from a footnote-specified alternative to the Foreign Language Requirement to the Controlled Elective section of these tracks. In terms of the effect on your department, students in our Geology and Environmental Tracks will no longer be required to take a foreign language or COSC 110 and 210 as the alternative. However, they may still do so should they choose to use their Controlled Elective Credits in this way. Thus it is possible with these changes that you will see a change in the number of Geoscience students from these two tracks taking COSC 110 and 210.

In addition, we are also proposing a new Energy Resources Track (see attached proposal) within our B.S. Geology degree program. As part of the Controlled Elective options for this new track and to be consistent with Controlled Elective options for our current Geology and Environmental Tracks, we would like to include COSC 110, 210, 250,

No official response received as of 11/3/10.

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Subject: **Requesting letter of acknowledgment for Geoscience curriculum changes**
From: Michael A Poage
Date: 10/18/10 02:35 PM
To: charles.mccreary@iup.edu

French and German

Attached Files
- Geology Track Proposal.doc (124 KB)
- Environmental Track Proposal.doc (124 KB)
- Energy Track Proposal.doc (4892 KB)

Dear Dr. McCreary,

The Geoscience Department is preparing revisions to our Geology and Environmental Tracks, which may affect the Department of French and German (see attached proposals).

At present, students in both of these tracks are required to satisfy the College of Natural Sciences and Mathematics Intermediate-Level Foreign Language Requirement with the alternative of taking COSC 110 and 210 instead. In 2008-9, the Biochemistry Program was successful in its proposal to eliminate the NSM College Foreign Language Requirement from its curriculum. The Geoscience Department, recognizing the broader value of studying a foreign language but also recognizing that there are other areas of study with equal or greater predictable value to those entering the geoscience workforce or graduate school in geology, is currently proposing to move foreign language study to the Controlled Elective component of our Geology and Environmental Tracks. In terms of the potential effect on your department, students in these tracks will no longer be specifically required to successfully complete foreign language study at the intermediate level (or the COSC 110/210 alternative), however, they may still do so should they choose to use their Controlled Elective credits in this way.

In addition, we are also proposing a new Energy Resources Track (see attached proposal). As part of the Controlled Electives component for this new track, and to be consistent with Controlled Elective options for our Geology and Environmental Tracks, we would like to include a Foreign Language Intermediate-Level option. In this scenario, the Energy Resources Track students could choose to study French or German to satisfy this option. To help gauge the potential impact on your department, we anticipate that the addition of this new track will result in a modest increase in Geoscience majors of at most 10-15 students per year.

We are requesting a letter of acknowledgement from the Department of French and German with regard to the above-mentioned changes in our Geology and Environmental Tracks, and with regard to the inclusion of the Foreign Language Intermediate-Level option in the Controlled Electives component of our new Energy Resources Track. Thank you for consideration of this request. Should you have any questions or concerns, please do not hesitate to contact me at mpoage@iup.edu or 7-5627.

Sincerely,

Michael Poage
Chair, Geoscience Department Curriculum Committee

Take Address

No response received as of 11/3/10.

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Subject: Re: Requesting letter of acknowledgment for Geoscience curriculum changes
From: Sean McDaniel
Date: 10/24/10 03:07 PM
To: Michael A Poage

Spanish

Michael,

I am sorry I haven't responded sooner. We've had quite a hectic 10 or so days.

I assure you that here soon you will receive a letter of acknowledgement of your proposed changes, although, as you can probably imagine, I don't think I'll be able to say that I support them.

Sean

Unofficial response indicating lack of support. We anticipate receipt of an official response.

Sean McDaniel
Professor of Spanish and Chair
Department of Spanish
Indiana University of Pennsylvania
Indiana, PA 15705
Office/Fax 724-357-7532/724-357-1268

On Oct 18, 2010, at 2:42 PM, Michael A Poage wrote:

> Dear Dr. McDaniel,
>
> The Geoscience Department is preparing revisions to our Geology and Environmental Tracks, which may affect the Department of Spanish (see attached proposals).
>
> At present, students in both of these tracks are required to satisfy the College of Natural Sciences and Mathematics Intermediate-Level Foreign Language Requirement with the alternative of taking COSC 110 and 210 instead. In 2008-9, the Biochemistry Program was successful in its proposal to eliminate the NSM College Foreign Language Requirement from its curriculum. The Geoscience Department, recognizing the broader value of studying a foreign language but also recognizing that there are other areas of study with equal or greater predictable value to those entering the geoscience workforce or graduate school in geology, is currently proposing to move foreign language study to the Controlled Elective component of our Geology and Environmental Tracks. In terms of the potential effect on your department, students in these tracks will no longer be specifically required to successfully complete foreign language study at the intermediate level (or the COSC 110/210 alternative), however, they may still do so should they choose to use their Controlled Elective credits in this way.
>
> In addition, we are also proposing a new Energy Resources Track (see attached proposal). As part of the Controlled Electives component for this new track, and to be consistent with Controlled Elective options for our current Geology and Environmental Tracks, we would like to include a Foreign Language Intermediate-Level option. In this scenario, the Energy Resources Track students could choose to study Spanish to satisfy this option. To help gauge the potential impact on your department, we anticipate that the addition of this new track will result in a modest increase in Geoscience majors of at most 10-15 students per year.
>
> We are requesting a letter of acknowledgement from the Department of Spanish with regard to the above-mentioned changes in our Geology and Environmental Tracks, and with regard to the inclusion of the Foreign Language Intermediate-Level option in the Controlled Electives component of our new Energy Resources Track. Thank you for consideration of this request. Should you have any questions or concerns, please do not hesitate to contact me at mpoage@iup.edu or 7-5627.
>
> Sincerely,
>