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CURRICULUM PROPOSAL COVER SHEET
University-Wide Undergraduate Curriculum Committee

I. CONTACT

Contact Person Keith Putirka Phone x5627
Department Geoscience

II. PROPOSAL TYPE (Check All Appropriate Lines)

- COURSE _____ Suggested 20 character title
- New Course* _____ Course Number and Full Title
- Course Revision _____ Course Number and Full Title
- Liberal Studies Approval for new or existing course _____ Course Number and Full Title
- Course Deletion _____ Course Number and Full Title
- Number and/or Title Change _____ Old Number and/or Full Old Title
_____ New Number and/or Full New Title
- Course or Catalog Description Change _____ Course Number and Full Title
- PROGRAM: Major _____ Minor _____ Track
- New Program* _____ Program Name
- Program Revision* BS of Education—Earth & Space Science Program Name
- Program Deletion* _____ Program Name
- Title Change _____ Old Program Name
_____ New Program Name

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III. Approvals (signatures and date)

Darlene Richards
Department Curriculum Committee

revised 2/2002
Darlene Richard 2/2002
Department Chair

[Signature]
College Curriculum Committee

[Signature]
College Dean

Director of Liberal Studies (where applicable) *Provost (where applicable)

Geoscience Department: Program Revision

Part II. Description of Curriculum Change

1. Catalog Description No change to the catalog description

2. Summary of Changes

2 (a) New Program:

Bachelor of Science in Education—Earth and Space Science (*)

Liberal Studies: As outlined in Liberal Studies section with the following specifications:	55-56
Mathematics: MATH 121 or 123	
Natural Science: CHEM 111-112 or CHEM 113-114	
Social Science: PSYC 101	
Liberal Studies Electives: MATH 217, PHYS 111, BIOL 114(1)	
College:	3 2
Professional Education Sequence: (1)	
COMM 301 Digital Instructional Technology	3sh
EDUC 242 Pre-student Teaching Clinical Experience I	1sh
EDUC 342 Pre-student Teaching Clinical Experience II	1sh
EDUC 451 Teaching Science in the Secondary School	3sh
EDUC 441 Student Teaching	12sh
EDUC 442 School Law	1sh
EDSP 102 Educational Psychology	3sh
EDSP 477 Assessment of Student Learning: Design and Interpretation of Educational Measures	3sh
FDED 102 American Education in Theory and Practice	3sh
EDEX 301 Education of Students with Disabilities in Inclusive Secondary Settings	2sh
Major:	3 6
Required Courses	
GEOS 121 Physical Geology	3sh
GEOS 122 Physical Geology Laboratory	1sh
GEOS 131 Historical Geology	3sh
GEOS 131 Historical Geology Laboratory	1sh
GEOS 220 Mineralogy	3sh
GEOS 330 Paleontology	3sh
GEOS 341 Solar System	3sh
GEOS 342 Stellar Astronomy	3sh
GEOS 350 Operation of the Planetarium	1sh
GEOS 361 Physical Oceanography	3sh
GEOS 362 Plate Tectonics	3sh
GEOS 371 Meteorology	3sh
GEOS 380 Research Techniques in Geoscience	2sh
GEOS 480 Geoscience Seminar	1sh
Controlled Electives:	3sh
One GEOS course 300 or above (2)	

Other Requirements	5
PHYS 121 Physics I Lab	1sh
PHYS 112 Physics II Lecture	3sh
PHYS 122 Physics II Lab	1sh
Free Electives:	<u> </u> 0
Total Degree Requirements:	128-129

(*) See requirements leading to teacher certification in the catalog section on academic Policies, "Admission to Teacher Education".

(1) Earth and Space Education students may simultaneously complete the requirements for General Science Education Certification by taking BIOL 111-112. Students may therefore substitute BIOL111-112 for BIOL 114.

(2) Excludes GEOS 336, 337, 338, 441

2 (b). Comparisons of current and proposed programs

**Bachelor of Science in
Education—Earth and Space
Science (*) - Existing Program**

Liberal Studies: As outlined in Liberal Studies section with the following specifications: 55-56
Mathematics: MATH121
Natural Science: CHEM111-112

Social Science: PSYC101
Liberal Studies Electives:
BEDU/COSC/IFMG101, PHYS111, no courses with
GEOS prefix

College: 3 0
Professional Education Sequence: (1)

COMM301 Technology for Learning and Instruction 3sh
EDUC242 Pre-student Teaching Clinical Experience 1sh
I
EDUC342 Pre-student Teaching Clinical 1sh
Experience II
EDUC451 Teaching Science in the Secondary 3sh
School
EDUC441 Student Teaching 12sh
EDUC442 School Law 1sh
EDSP202 Educational Psychology 3sh
EDSP377 Educational Tests and. Measurements 3sh

FDED202 American Education in Theory and 3sh
Practice

Major: 3 9
Required Courses
BIOL103 General Biology I 4sh
GEOS121 Physical Geology 3sh
GEOS122 Physical Geology Laboratory 1sh
GEOS131 Historical Geology 3sh
GEOS132 Historical Geology Laboratory 1sh

GEOS341 Solar System 3sh
GEOS342 Stellar Astronomy 3sh
GEOS350 Operation of the Planetarium 1sh
GEOS361 Physical Oceanography

GEOS371 Meteorology I 3sh
PHYS112 Physics II Lecture 3sh
PHYS121 Physics I Lab 1sh
PHYS122 Physics II Lab 1sh

**Bachelor of Science in
Education—Earth and Space
Science (*) - Proposed Program**

Liberal Studies: As outlined in Liberal Studies section with the following specifications: 55-56
Mathematics: MATH121 or 123
Natural Science: CHEM111-112 or CHEM113-114

Social Science: PSYC101
Liberal Studies Electives: MATH 217,
PHYS111, BIOL 114 (1)

College: 3 2
Professional Education Sequence: (1)

COMM301 Digital Instructional Technology 3sh
EDUC242 Pre-student Teaching Clinical Experience 1sh
I
EDUC342 Pre-student Teaching Clinical 1sh
Experience II
EDUC451 Teaching Science in the Secondary 3sh
School
EDUC441 Student Teaching 12sh
EDUC442 School Law 1sh
EDSP102 Educational Psychology 3sh
EDSP477 Assessment of Student Learning: Design 3sh
and Interpretation of Educational Measures
FDED102 American Education in Theory and 3sh
Practice
EDEX301 Education of Students with Disabilities 2sh
in Inclusive Secondary Settings

Major: 3 6
Required Courses
see: Liberal Studies Electives: BIOL 114
GEOS121 Physical Geology 3sh
GEOS122 Physical Geology Laboratory 1sh
GEOS131 Historical Geology 3sh
GEOS132 Historical Geology Laboratory 1sh
GEOS321 Mineralogy 3sh
GEOS330 Paleontology 3sh
GEOS341 Solar System 3sh
GEOS342 Stellar Astronomy 3sh
GEOS350 Operation of the Planetarium 1sh
GEOS361 Physical Oceanography 3sh
GEOS362 Plate Tectonics 3sh
GEOS371 Meteorology I 3sh
see: Other Requirements
see: Other Requirements
see: Other Requirements
GEOS380 Research Techniques in Geoscience 2sh

		GEOS480 Geoscience Seminar	1sh
Controlled Electives:	9sh	Controlled Electives:	3sh
Geology electives (not GEOS101, 103, 105, 111, 113, 141)		One GEOS courses 300 or above (2)	
Other Requirements:	0	Other Requirements:	5
		PHYS121 Physics I Lab	1sh
		PHYS 112 Physics II Lecture	3sh
		PHYS 122 Physics II Lab	1sh
Free Electives:	<u>0</u>	Free Electives:	<u>0</u>
Total Degree Requirements:	124-	Total Degree Requirements:	128-
	125		129

(*) See requirements leading to teacher certification in the catalog section on academic Policies, "Admission to Teacher Education"
 (1) Special Education Competency Requirements: Revision pending will eliminate exam option and will require EDEX301 (2sh)

* See requirements leading to teacher certification in the catalog section on academic Policies, "Admission to Teacher Education".
 (1) Earth and Space Education students may simultaneously complete the requirements for General Science Education Certification by taking BIOL 111-112. Students may therefore substitute BIOL111-112 for BIOL 114.
 (2) Excludes GEOS 336, 337, 338, 441

2 (b). Highlights of program changes

Current Program
 Liberal Studies 55-56 sh

Proposed Program
 Liberal Studies 55 sh
 The liberal studies requirements in the new program are fixed at 55 since we have specified MATH 121 in the "Learning Skills" section, and MATH217 in the "Liberal Studies Electives" section.

Mathematics: MATH121

Mathematics: MATH 121 or 123
 • Students will now have the option of taking MATH 123.

Natural Science: CHEM111-112 or CHEM113-114

Natural Science: CHEM 111-112 or CHEM 113-114
 • Students will now be able to select the CHEM 113-114 sequence.

BIOL 1103 General Biology

• BIOL 114 (Environmental Biology) replaces BIOL 103. Topical coverage of BIOL 114 places more emphasis on environmental issues, which is more relevant to our majors, and fulfills accreditation mandates to cover environmental issues.

BEDU/COSC/IFMG101

• COMM 103 and COSC 101 both duplicate the many computer-based assignments within the GEOS department. We wish to delete some of this overlap by removing COSC 101 from the program. MATH 217 is added to the Liberal Studies list. NSTA standards currently mandate

some background in statistics for teachers of science, and with the addition of MATH 217 we fulfill chapter 354 mathematics requirements.

EDEX 301 is added to the program

- Required for accreditation.

GEOS 321 Mineralogy is added to program .

This addition is crucial for several reasons, most important of which is that GEOS 321 addresses NSTA accreditation requirements for coursework pertaining to Earth resources.

GEOS 330 Paleontology is added to program.

This addition is essential as paleontology addresses several fundamental accreditation issues, including a link between the biological and geological sciences, and crucial background regarding issues of evolution.

GEOS 362 Plate Tectonics is added to program. Plate tectonics is a fundamental element of NSTA teaching standards, and hence the addition of GEOS 362 is essential.

GEOS 380 and 480 Research techniques and Geoscience Seminar are added to program. These course additions address state and national mandates that require teachers to become involved in research. In GEOS 380/480 students perform a research project, and gain experience that is essential if we realistically expect teachers to remain professionally active.

Other Requirements

Controlled Electives, 9sh

Geology electives (not GEOS101, 103, 105, 111, 113, 141)

Total Degree Requirements: 124-125sh

Other Requirements

Controlled Electives, 3sh

- One GEOS course 300 or above (excluding Regional Field courses). Interested students now have the option of enrolling in advanced courses.

- Controlled electives are reduced to 6sh to keep graduation requirements within limits currently observed by other science education programs at IUP (Biology, Physics).

Total Degree Requirements: 128-129sh

- While total degree requirements are increased, the proposed increase is essential for strengthening the program. The new total is furthermore on a par with existing program totals in other programs including Biology (127), Chemistry (126-129) and Physics (126-127). (Note that Biology and Physics do not include EDEX301 (2sh) in their program, even though this course is required; their effective totals are thus 128 and 128-129 respectively). Moreover, our proposed program total is far less than for

Music Education, which currently stands in at 140-142 sh. Finally, it is crucial to understand that even with these increased program totals we only marginally satisfy Chapter 354 accreditation requirements. Without this increase we risk the loss of state accreditation.

3a. Rationale for Changes Part 1 - General Comments and Concerns, and Addition of Upper Division GEOS coursework.

It has been several years since the Geoscience department has revisited the issue of the Earth and Space Science Education curriculum. Since that time the education climate and job market have changed dramatically. As outlined below, there are three principle reasons for which an overhaul of the Earth and Space Science Education degree is required. In brief, 1a) our current program does not meet various national mandates or minimum standards. 1b) Our existing program is out of compliance with upcoming state mandates and if our proposed changes program are not implemented we risk losing state accreditation. 2) Our students' geoscience preparation is becoming inadequate for competition in the modern job market. 3) Students are left with few professional options following graduation.

Point number 1) is of particular relevance as Chapter 354 of PA state code now requires teacher preparation programs to be of comparable rigor to their non-teaching counterparts; our revised program addresses these recent state mandates. Our rationale, which follows, treats our GEOS course additions in the context of state and national mandates and academic standards.

Addition of GEOS 380 (Research Methods in the Geosciences) and 480 (Geoscience Seminar)
Regarding teacher preparation: Science is fundamentally an investigative occupation. It is therefore absolutely essential that teachers of science obtain hands-on experience in the practice of science. Indeed, without such experience, it would seem impossible for teachers to convey to students the genuine excitement of discovery and the basic problem-solving character of the Earth and Space Sciences. This aspect of teacher training may well extend beyond the classroom, and society's need for an educated population. In spite of the growing need for scientists in all fields, enrollments in the College of Natural Science and Mathematics are low. Unsurprisingly, non-U.S. citizens frequently fill science-related positions here in the U.S. Low enrollments in the sciences - particularly in the face of a growing job market - almost assuredly reflect a lack of excitement generated by teachers whose science training is limited, and whose only contact with research is through textbooks, rather than first-hand experience.

Our department believes that research is a key experience in science education—critical not only from a pedagogical standpoint, but because it is conducive to life-long learning, which is now a goal expected of science teachers. Our foremost goal within the Geoscience Dept. is thus to involve Earth and Space Education students in research projects, as we do with all our other majors. We are not alone in this belief. Such organizations as the National Science Foundation, the American Association for the Advancement of Science and the National Science Teachers Association (NSTA) fully recognize that science teachers need research experience. For example,

1) The National Science Foundation (NSF): The NSF standards regarding teacher training state that *"Science learning experiences for teachers must involve teachers actively in investigating phenomena that can be studied scientifically, interpreting results, and making sense of findings consistent with currently accepted scientific understanding"* (Shaping the Future, NSF Publication 96-139). They go on to state that (a) *"hands-on scientific experiences such as lab projects and field studies (and) all situations in which students collect data and draw their own conclusions are crucial at all levels of scientific education"*. And finally, *"Prospective teachers must have the opportunity to become active participants in...research"* (bold type added; Shaping the Future, NSF Publication 96-139).

2) The National Academy of Sciences (NAS): The NAS state that teacher-training programs must "*introduce teachers to scientific literature...that expand their science knowledge and their ability to access further knowledge*" (<http://stills.nap.edu/html/nsef/>).

3) The National Council for Accreditation of Teacher Education (NCATE): NCATE standards require that teacher training programs "*provide pre-service teachers with:*
* *An understanding of the inter-relationships between mathematics and science*
* *Data analysis skills, including graphing and data display,*
and that teachers should be able to
* *Apply basic mathematics and computer skills to the scientific investigation of phenomena and analysis of data*" (from the National Science Teachers Association Handbook - from which NCATE standards are derived)

4) The National Science Teachers Association (NSTA) standards require that a teacher:
* "Works with other science professionals to develop opportunities for continuous learning as members of a professional education community".
* Shows a record of scholarly growth and development".
* "Teachers who have never conducted investigations and research are unlikely to model investigative behaviors for their students".

"Shaping the Future" has become the basis for most of the science educational reform supported by the NSF. Our department is committed to meeting the objectives outlined in this document, and the program revisions proposed here will greatly enhance our effectiveness in doing so. The vehicle for obtaining this goal already exists in our department: all Geology and Environmental Geoscience majors enroll in Research Methods in the Geosciences (GEOS 380) and Geoscience Seminar (GEOS 480), a course sequence where students select a research project and see it to completion. The results of such projects are presented at Geoscience Day, an annual intra-departmental colloquium, and many students go on to present their results at professional meetings. By adding GEOS 380/480 our new program not only satisfies national education mandates (as noted above), but moves us toward fulfillment of the spirit of Chapter 354 of the PA code—Earth and Space Science Education majors will now be required to complete the same research component required of all other Geoscience majors. We would not be the first geoscience department to require a research component for prospective teachers—at the California State University, Northridge, for example, prospective teachers have long been required to complete a 'senior thesis'. Most importantly, by adding GEOS380/480, education majors will have a far better understanding of what it means to 'do science', our program will fulfill NSF and state mandates, and we will be in compliance with NCATE and Harrisburg standards.

Addition of Other Upper Division Coursework (Mineralogy, Paleontology, Plate Tectonics, MATH 217)
In addition to hands-on research experience, it is imperative that prospective teachers achieve a degree of competence in the sciences that is comparable to their non-teaching professional counterparts. Our existing program falls short of standards set by NCATE for the minimum number semester hours in the geosciences, and does not fulfill the spirit of NSF requirements for a satisfactory teacher training program. Most importantly, our current program is out of compliance with chapter 354 of the PA code. Section 354.24 states "*For initial preparation programs culminating in a bachelor's degree or higher, academic content area courses for the preparation of professional educators shall include all required core courses and required elective courses in the bachelor of arts or bachelor of science major academic area the candidates intend to teach or in the noninstructional certificate category the candidates plan to serve.*". From an academic standpoint, it is not clear to us that a one-to-one correspondence of coursework is necessary (e.g., our Geology majors do not need Meteorology - but our Education majors do). We interpret the intent of chapter 354, though, to mean that teacher training programs should be no less rigorous in regard to science content than their non-education counterparts. Our proposed changes accomplish this latter goal.

To illustrate how our current education program may be lacking in rigor we compare certain other programs across the country to our present Earth and Space Education degree. At the University of California, Santa Barbara, education majors take 44 units of upper division coursework in geology, and

at the California State University, Northridge, 40 upper division units of geology are required. In contrast, IUP Geoscience students currently enroll in only 22 units of upper division geology coursework—approximately half that required by California standards. It should also be noted that many other state universities (Wisconsin, Minnesota, New York, and many public CA institutions), do not offer four-year education degrees. These institutions instead require students to complete a BA or BS degree in a given field of science in order to receive a single subject credential—education coursework in such programs is a part of *post-baccalaureate* education.

To fulfill the intent and spirit of Chapter 354 reform measures we have added several post 100-level courses. With the addition of MATH 217, GEOS 220, 330, 362, 380, and 480 our students will complete 34 sh of post-100 level mathematics and science coursework (compared to the 22 sh in the current program). This increase means that our new Earth and Space Education degree approaches the minimum post-100 level mathematics and science requirements of our Geology (36 sh) and Environmental Geoscience (34) degree programs. With these proposed changes we fulfill NSF, NCATE standards, as well as the spirit of chapter 354 reform guidelines.

Addition of Mineralogy (GEOS 220, formerly 321) and Paleontology (GEOS 330)

The addition of Mineralogy and Paleontology are essential in order for us to fulfill current accreditation standards. First and foremost, however, it is absolutely crucial that these courses are added to the program for purely academic reasons. Mineralogy is a foundational course—it is impossible to understand the Earth sciences without knowing something about the materials of which Earth is made. Paleontology is similarly fundamental—more than any other science, paleontology addresses the question "why are we here?". And more than any other discipline, paleontology provides that essential link between the biological and geological sciences. The lack of such fundamental coursework almost assuredly has motivated some of the recent reform initiatives in teacher education.

With the addition of Mineralogy and Paleontology our program will also more closely meet NSTA content standards. These content standards (from "NSTA Standards for Teacher Preparation" section IV "Standards for High School Science Teacher Preparation") state that students must

1) *"Preparation for teaching secondary earth/space sciences should minimally include thematic concepts and applications in astronomy, geology, meteorology, oceanography and natural resources".*

2) *"The development of a clear, consistent integrating framework for science across disciplines is a stated national goal of science education. As an example... consider how the theme of evolution and equilibrium unifies the concepts of equilibrium in chemistry, homeostasis in biology, geochemical processes in earth science, and thermodynamics in physics".*

Our department presently covers the topics of Meteorology, Oceanography, and Astronomy quite well, with substantial emphasis on contemporary, historical and environmental issues. Natural resources, however, are largely the purview of Mineralogy and/or Petrology. Moreover, the linkages of geochemistry with "concepts of equilibrium in chemistry" and "thermodynamics in physics" are covered to a greater extent in Mineralogy and Petrology than in most other Geoscience courses. And paleontology provides the clearest link of biology and the earth sciences. With the addition of Mineralogy and Paleontology we thus complete the topical linkages required by NSTA. In addition, BIOL 114 replaces BIOL 103; this substitution preserves the accreditation requirements for Biology, but adds an environmental dimension with stronger link to existing coverage of environmental issues in Physical and Historical Geology, Mineralogy and Paleontology. Please also note that students may now take courses offered at the Marine Science Consortium for fulfillment of their controlled electives. Appropriate choices in this program would allow students to take additional coursework in oceanography and the marine sciences, which are not offered here at IUP.

The addition of Paleontology fulfills several other crucial aspects regarding education standards and accreditation requirements. On the one hand, practically every GEOS course touches on either physics and or chemistry; in many respects mandate 2) is fulfilled in regard to the physical sciences. As noted above, the addition of Paleontology consummates the 'interconnectedness' requirement by establishing

for students a more secure coupling between biology and the Geosciences. Additionally, students will be able to more fully develop issues regarding the evolution of life on our planet, and will be better positioned to defend evolution against advocates of creationism. Moreover, courses such as GEOS 220 and 330 provide crucial resources for student success in GEOS 380 and 480; together, these courses help to fulfill mandate 4) as discussed in the prior section.

The Changing Job Market

An additional motivation for these additions stems from the recognition that 1) many students who enter secondary education become dissatisfied and leave their profession within a few years. 2) Many graduates seek employment outside PA. 3) There exists a national mandate that teachers of science remain professionally active following graduation. With the very low level of upper division coursework required of our current education program our graduates do not have the preparation needed to compete for geoscience jobs outside of the teaching profession. (Indeed, with the shortfall of upper division coursework in the existing program compared to that required in other states, our Geology and Environmental Geoscience majors would probably compete more successfully for teaching jobs than our education majors!). With our proposed changes, education students will complete a program that is comparable in scientific rigor to our BS—Geology program. Students who become disenchanted with teaching will thus have a realistic option of pursuing an alternative career path, and students seeking teaching positions outside PA will be competitive as standards for teacher preparation are raised. Finally, with addition of Mineralogy and Paleontology, students will complete essential foundational coursework in the geosciences, and will thus have a credible chance of remaining professionally active.

3b. Rationale for Changes Part 2 - Need for an Increase in Total Semester Hours

Chapter 354 of the Pennsylvania state code will require teacher preparation programs in the sciences to be equivalent in rigor to their non-education counterparts. In the absence of our proposed revisions our program meets neither the intent nor spirit of the recently passed Chapter 354 reform initiative. Without these revisions we risk the loss of state accreditation for our Earth and Space Science Education program. Our revised program fulfills the Chapter 354 mandate under the current semester hour restrictions, which include the number of units required for an education credential, and the number of units required by liberal studies. Please be aware that the additional GEOS coursework was not haphazardly chosen. It is this department's firm belief that in the absence of edicts from NSF, NCATE or Harrisburg, the additions such as Mineralogy, Paleontology, Plate Tectonics and Geoscience Seminar would still be essential—Chapter 354 merely adds urgency to the adoption of these changes. Indeed, our department is pleased that we have successfully adopted the rigor required by Chapter 354 without cutting into liberal studies requirements or course requirements from the college of education. The Geoscience department views the liberal studies component of the degree program as a university strength, and feels that the college of education coursework is crucial for satisfactory teacher preparation.

Regarding Chapter 354 requirements of rigor: Our proposed current program is comparable to our non-education programs in regard to the total number of mathematics and science semester hours, and the total post-100 level math and science course-load. We concede that we do not achieve a one-to-one correspondence in coursework between Earth and Space Education and our other degree programs. It is impossible to do so and still retain (a) the current complement of liberal studies courses (b) all of the coursework required by the college of education and (c) a 4 year program. We are uncertain that on-to-one correspondence is necessary from an academic standpoint. For example, our Environmental Geoscience and Geology majors do not need courses such as Oceanography and Meteorology, while prospective science teachers will be expected to teach such material in the secondary schools. We believe, however, that our revised program fulfills the spirit and intent of the chapter 354 reform initiative—our Earth and Space education program is by quantitative measures, no less rigorous or demanding than our non-education degree programs. Furthermore, with the addition of GEOS 380 and 480, there is no longer a division within our department in regard to the performance expectations between our education and non-education majors; all students within the Geoscience department are now required to complete and present a research project.

Regarding the 4-year graduation requirement: With the application of COMM301 as a liberal studies elective, and the deletion of PHYS 112 and 122, we have not only been able to upgrade the Geoscience content of the program, but have made room for the addition of EDEX301, which the department firmly believes is an important and essential requirement for prospective teachers. In our revised program the total number of semester hours required for graduation is fixed at 131. A four year full-time program represents 16 sh/semester with a program total of 128 sh. Our 131 sh program total is 3 sh above the 128 maximum, and would thus require the addition of only one summer course. Most of our students already enroll in MATH, CHEM and PHYS courses during the summer so our proposed program should be completed by most of our students within four years, satisfying the chapter 354 edict. And if the overlapping coursework of COM 301 were deleted, our program would be fixed at 128 sh.

As noted above, the GEOS coursework that has been added to the program is crucial to an understanding of the Geosciences. Mineralogy and Paleontology are foundational courses, and should have been included in the original program. Moreover, the committee must understand that while the study of such topics as Mineralogy or Paleontology may advance, at no point do they become obsolete—they *cannot be consolidated, and cannot be cut from any reasonable geoscience education program*. Similarly, courses in chemistry, math and physics are essential, and can neither be deleted nor consolidated. It is our belief that the current proposed program provides the best possible compromise between the various (and unfortunately) competing academic disciplines. Indeed, it is impossible to satisfy both NCATE and Harrisburg accreditation standards and simultaneously maintain a 124 sh limit for the degree program. In summary, failure to adopt the proposed changes will mean that we risk the loss of accreditation at either one level or another, which cannot be in either the students', of the Universities' best interests.

Part III. Implementation

1. Q: How will the proposed revision affect students already in the existing program?

A: Students currently enrolled in the program will be unaffected—their requirements will not be changed from the requirements in effect when they declared a geology major. All current students will nevertheless be encouraged to follow the new program as closely as possible.

2. Q: How will the proposed revision affect faculty teaching loads?

A: Faculty teaching load will not be affected.

Q: Have additional faculty been authorized? A: No additional faculty have been authorized.

Q: If you are adding requirements, how will adequate seats be provided?

A: Seats are available for all upper division courses that have been added to the program.

3. Are other resources adequate? A: Yes.

4. Q: Do you expect an increase or decrease in the number of students as a result of these revisions?

A: No change in enrollment is anticipated.

Part IV. Course Proposals

Not applicable

Part V. Letters of Support

Not applicable