LSC Use Only No:	LSC Action-Date:	UWUCC USE Only No. 08-7K. 07-43K	UWUCC Action-Date: App-1/29/09	Senate Action Date: App-2/24/09

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)

_X_ New Course _____ Course Prefix Change _____ Course Deletion

_____ Course Revision _____ Course Number and/or Title Change _____ Catalog Description Change

	GEOS 202 Quantitative Methods in the Geosciences
***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 _____ New Track

***Current* program name**	***Proposed* program name, if changing**

4. Approvals		**Date**
Department Curriculum Committee Chair(s)		2/4/08
Department Chair(s)		2/4/08
College Curriculum Committee Chair		2-11-08
College Dean		2-11-08
Director of Liberal Studies *		
Director of Honors College *		
Provost *		
Additional signatures as appropriate: (include title)	Joseph Domaracki TECC	1-26-09
	Mary Ann Rafoth Dean COE-ET	1.26.09
UWUCC Co-Chairs		
	Gail S Sechrist	1-29-09

* where applicable

Received SEP 25 2008 Liberal Studies

Received FEB 14 2008 Liberal Studies

Part II. Description of Curricular Change

1. SYLLABUS OF RECORD

I. Catalog Description 2 class hours
GEOS 202 Quantitative Methods in the Geosciences 0 lab hours
2 credit hours
(2c-0l-2cr)

Prerequisite: Geoscience or Earth and Space Science majors and minors only, or permission of instructor; must be taken after or concurrently with GEOS 201.
A quantitative introduction to the geological sciences including the study of the Earth's interior, plate tectonics, minerals and crystallography, igneous, sedimentary and metamorphic rocks and their cycling, geologic time, crustal deformation and earthquakes. This course will introduce students to foundational mathematical skills and techniques used in the geosciences.

II. Course Objectives
At the end of this course students will be able to:
1) Demonstrate competence in an essential set of mathematical skills for the geosciences.
2) Analyze plate motions using trigonometric analysis.
3) Calculate the absolute age of rock formations based on the numerical age equation and an understanding of radioactivity.
4) Derive the chemical formulas for minerals in the common chemical classes of minerals.
5) Calculate major oxide percentages of minerals and allocate the major-oxide of a rock into appropriate mineral components.
6) Use graphical representations of magma crystallization and rock melting (phase diagrams) to trace the crystallization/ melting histories of magmas/rocks.
7) Evaluate the relative hazards posed by volcanic eruptions of different size using geometric techniques.
8) Demonstrate an understanding of the mathematical principles of thermobarometry and be able to calculate the pressures and temperatures at which metamorphic rock equilibrate.
9) Identify geologic structures using data assembled from field measurements and/or geologic maps.
10) Interpret data from geologic map and create balance cross sections through geologic regions.
11) Construct geologic maps by synthesizing field measurements and rock distributions.

Student outcomes assessment matrix:

Conceptual Framework (Danielson Domain)	Content Standard (NSTA Science Teacher Preparation)	Course Objective	Assessment (*denotes assessment for reporting)
1	1a, 1e	1	*Problem sets 1 and 2, Exam 1
1	1a, 1e	2	Problem set 3, Exam 1
1	1a, 1e	3	Problem sets 4 & 5, Exam 1
1	1a, 1b	4	Problem set 6, Exam 2
1	1a, 1e	5	Problem set 6, *Exam 2
1	1a, 1e	6	*Problem set 7,

			Exam 2
1	1e, 4a	7	Problem set 8, Exam 2
1	1a, 1e	8	Problem set 9 & 10, Exam 2
1	1a	9	Problem set 11, Final Exam
1	1a, 3a	10	Problem sets 12-14, Final Exam
1	1a	11	Problem sets 12-14, Final Exam

III. Course Outline

Lecture

Week 1 (2 academic hours): Essential Mathematics in the Geosciences
Week 2 (2 academic hours): Essential Mathematics in the Geosciences
Week 3 (2 academic hours): Plate Motion Vector Analysis
Week 4/5 (3 academic hours): Radiometric Age Dating
Exam 1 (1 academic hour)
Week 6 (2 academic hour): Mineral Chemistry
Week 7 (2 academic hours): Phase Diagrams and Magma Crystallization
Week 8 (2 academic hours): Volcanic Hazards
Week 9-10 (3 academic hours): Metamorphic Reactions and Thermobarometry
Exam 2 (1 academic hour)
Week 11 (2 academic hours): Geometry of Geologic Structures
Week 12-14 (6 academic hours): Interpretation of Geologic Maps
Final exam scheduled by registrar

IV. Evaluation Methods

Each component of the course will contribute to final grade according to:

Exam 1	25%
Exam 2	25%
Final Exam	30%
Weekly Problem Sets	20%
Total	100%

V. Example Grading Scale

The final grade for this course will be determined using the following schedule:
A=90-100%; B=80-89%, C=70-79%, D=60-69%, F=<60%

VI. Attendance Policy

The attendance policy will conform to IUP's undergraduate course attendance policy.

VII. Required textbooks, supplemental books and readings

This course is designed so that it may be taken concurrently with GEOS 201 Foundations of Geology and will draw on material covered in the same textbook. Due to the quantitative nature of this course, problem sets and in-class exercises will be developed by the instructor.

Tarbuck, E.J. and Lutgens, F.K. *Earth: An Introduction to Physical Geology, 8th Edition.* Upper Saddle River, N.J.: Pearson Prentice Hall, 2005.

Tarbuck, E.J. and Lutgens, F.K. *Earth: An Introduction to Physical Geology, Student Lecture Notebook, 8th Edition.* Upper Saddle River, N.J.: Pearson Prentice Hall, 2005.

Busch, R.M. *Laboratory Manual in Physical Geology, 7th Edition.* Upper Saddle River, N.J.: Pearson Prentice Hall, 2006.

VIII. Special resource requirements

There are no special resource requirements for this course.

IX. Bibliography

In addition to the required textbooks and supplemental readings from science journals, the following will be used to develop the course curriculum:

Press, F. and Siever, R. (2001) *Understanding Earth, 3rd ed.*: W.H. Freeman and Co., New York, 573p.

Hamblin, W.K. and Christiansen, E.H. (2001) *Earth's Dynamic Systems, 9th ed.*: Pearson Prentice Hall, Upper Saddle River, N.J., 735p.

Wicander, R. and Monroe, J.S. (2002) *Essentials of Geology, 3rd ed.*: Brooks Cole Publishing, Pacific Grove, CA, 523p.

Chernicoff, S., Fox, H.A. and Tanner, L.H. (2004) *Earth: Geologic Principles and History*: Houghton Mifflin Company, New York, 570p.

McGeary, D., Plummer, C.C. and Carlson, D.H. (2004) *Physical Geology: Earth Revealed*: McGraw Hill, Boston, 574p.

Skinner, B.J., Porter, S.C. and Park, J. (2004) *Dynamic Earth: An Introduction to Physical Geology*: John Wiley and Sons, New York, 584p.

Marshak, S. (2005) *Earth: Portrait of a Planet, 2nd ed.*: Norton Publishing, London, 748p.

Smith, G.A. and Pun, A. (2006) *How Does Earth Work? Physical Geology and the Process of Science:* Pearson Prentice Hall, Upper Saddle River, N.J., 641p.

Course Analysis Questionnaire

Section A: Details of the Course

A1. How does this course fit into the programs of the department? For which students is the course designed? Explain why his course cannot be incorporated into an existing course.

This course is designed so that it may be taken concurrently with or after the newly developed GEOS 201 Foundations of Geology (replaces GEOS 121/122 Physical Geology and Lab). This course will specifically introduce students to the quantitative side of the geosciences by reinforcing basic mathematical skills and using them in an applied manner to address geological problems. This course is part of a newly designed set of three introductory courses (GEOS 201, 202, 203). Enrollment is limited to declared majors and minors only.

A2. Does this course require changes in the content of existing courses or requirements for a program?

This course does not require changing the existing content of any other courses or requirements for any program. GEOS 121/122 will be deleted and replaced by this course.

A3. Has this course been offered at IUP on a trial basis?

This course has never been offered in the Geoscience Department.

A4. Is this course to be a dual-level course?
This course is not a dual-level course.

A5. If this course may be taken for variable credit, what criteria will be used to relate the credits to the learning experience of each student?
This course cannot be taken for variable credit.

A6. Do other higher education institutions currently offer this course? If so, please list examples.
Virtually all higher education institutions with programs in geology or earth sciences offer a course with a similar curriculum. This course adds an applied quantitative component, thus requiring a second lab period each week.

A7. Is the content, or are the skills, of the proposed course recommended or required by a professional society, accrediting authority, law or other external agency?
No professional society, accrediting authority, law or other external agency recommends or requires any specific content or skills for this course.

Section B: Interdisciplinary Implications

B1. Will this course be taught by instructors from more than one department?
This course will be taught by one instructor from the Geoscience Department.

B2. What is the relationship between the content of this course and the content of courses offered by other departments?
There is no overlap between the content of this course and that of other courses offered by other departments.

B3. Will this course be cross-listed with other departments?
This course will not be cross-listed with any other department.

B4. Will seats in this course be made available to students in the School of Continuing Education?
Seats in this course will not be available to students in Continuing Education.

Section C: Implementation

C1. Are faculty resources adequate?
Faculty resources are currently adequate to teach this course. This course will be counted as one preparation and two hours of equated workload.

C2. What other resources will be needed to teach this course and how adequate are the current resources?
a. Classroom space is currently adequate to teach this course.
b. There is no special equipment required to teach either the lecture of laboratory portions of this course.
c. There may be small amounts of consumable supplies required for the laboratory portion of the class. These are either already available in the Geoscience Department or are sufficiently inexpensive that they can be covered by the department budget.
d. Library materials are currently adequate for this course.
e. There will be no additional travel expenses.

C3. Are any of the resources for this course funded by a grant?
No resources for this course are currently funded by a grant.

C4. How frequently do you expect this course to be offered?
The department expects that this course will be offered every semester (see attached program revision). There are no seasonal restrictions.

C5. How many sections of this course do you anticipate offering in any single semester?
We anticipate offering a single section of this course in a given semester.

C6. How many students do you plan to accommodate in a section of this course?
We plan to accommodate no more than twenty-four students in a section of this course. This is the maximum number of students that can be accommodated in the Geoscience Department's teaching laboratory rooms.

C7. Does any professional society recommend enrollment limits or parameters for a course of this nature?
No professional society recommends enrollment limits or parameters for this course.

C8. Not applicable.

Section D: Miscellaneous
None.

Part III. Letters of Support or Acknowledgement
See "Letters of Support or Acknowledgement" section in the main body of the Program Revisions Proposal.