Curriculum Proposal Cover Sheet – form is available on-line as an interactive PDF

LSC Use Only Proposal No: LSC Action-Date: App-4/19/12	*UWUCC Use Only* Proposal No: 11-156 UWUCC Action-Date: AP-4/24/12 Senate Action Date: App-5/01/12

Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee

Contact Person(s) **Jonathan C. Lewis**	Email Address **jclewis@iup.edu**
Proposing Department/Unit **Geoscience**	Phone **7- 5624**

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

1. Course Proposals (check all that apply)

____ New Course ____ Course Prefix Change ____ Course Deletion

_X_ Course Revision ____ Course Number and/or Title Change ____ Catalog Description Change

Current course prefix, number and full title: ***GEOS 201 Foundations of Geology***

Proposed course prefix, number and full title, if changing:

2. Liberal Studies Course Designations, as appropriate

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

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

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

____ Global Citizenship ____ Information Literacy ____ Oral Communication

____ Quantitative Reasoning ____ Scientific Literacy ____ Technological Literacy

3. Other Designations, as appropriate

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

4. Program Proposals

____ Catalog Description Change ____ Program Revision ____ Program Title Change ____ New Track

____ New Degree Program ____ New Minor Program ____ Liberal Studies Requirement Changes ____ Other

Current program name:

Proposed program name, if changing:

5. Approvals	Signature	Date
Department Curriculum Committee Chair(s)	[signature]	4/2/12
Department Chairperson(s)	[signature]	4/2/12
College Curriculum Committee Chair	Anne Kondo	4/13/12
College Dean	Dean [signature]	4/13/12
Director of Liberal Studies (as needed)	[signature]	4/24/12
Director of Honors College (as needed)		
Provost (as needed)		
Additional signature (with title) as appropriate	Edel Reilly TECC Chair / E Nardi Dean CoE	9/24/12
UWUCC Co-Chairs	Gail S Sechrist	4/24/12

Received APR 13 2012 Liberal Studies

<u>Part II. Description of Curricular Change</u>

1. SYLLABUS OF RECORD

I. Catalog Description

GEOS 201 Foundations of Geology (3c-3l-4cr)

Prerequisite: GEOS majors and minors, and Science or Science Education majors/minors, ANTH, GEOG and RGPL majors, or instructor permission

An 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. Laboratory exercises will emphasize hands-on learning of basic geology skills including mineral and rock identification, understanding the geometry of subsurface geologic structures, and topographic and geologic map reading.

II. Course Objectives (Note: these objectives have not changed but they have been mapped to specific Expected Undergraduate Student Learning Outcomes.)

At the end of this course students will be able to:

<u>Objective 1:</u>

Recognize the Earth as a complex system of interacting components including the hydrosphere, atmosphere, biosphere and the lithosphere.

<u>Expected Student Learning Outcomes 1 and 2</u>

Informed and Empowered Learners

<u>Rationale:</u>

Assignments will focus on the linkages between Earth systems. Students will examine data and predict hydrosphere-lithosphere interactions, for example the role of fluids in earthquakes and the role of the lithsophere in tsunamis.

<u>Objective 2:</u>

Explain the major features of the continents and ocean floor.

<u>Expected Student Learning Outcomes 1 and 2</u>

Informed and Empowered Learners

<u>Rationale:</u>

Assignments will focus on the physical properties of the continents and seafloor. Students will integrate seafloor bathymetry, magnetic and age data to assess tectonic processes. They will also integrate onland lithologic data to synthesize geologic histories of continental areas.

<u>Objective 3:</u>

Synthesize data from a variety of sources into an understanding of different plate tectonic settings.

<u>Expected Student Learning Outcomes 1 and 2</u>

Informed and Empowered Learners

<u>Rationale:</u>

Assignments will focus on the fundamental characteristics of Earth's lithosphere. Students will assess the distribution of earthquakes, volcanoes, rock ages, elevations and heat flow to discriminate between different tectonic settings.

Objective 4:

Summarize the principles of relative and absolute geologic time and evaluate the history of rock outcrops.

Expected Student Learning Outcomes 1 and 2

Informed and Empowered Learners

Rationale:

Assignments will focus on the fundamentals of stratigraphy and radioactive half life. Students will generate geologic histories of rock bodies by integrating a range of data types, including lithology, rock geometry, contact relations and radionuclide ratios.

Objective 5:

Compare and contrast the common minerals in the Earth on the basis of chemical composition, physical properties, and bonding structure.

Expected Student Learning Outcomes 1

Informed Learners

Rationale:

Assignments will focus on how underlying atomic structure controls the fundamental properties of minerals. Students will compare and contrast physical properties to differentiate between minerals.

Objective 6:

Demonstrate a fundamental understanding of the rock cycle and the geologic processes responsible for creating the common igneous, sedimentary and metamorphic rocks of the world.

Expected Student Learning Outcomes 1 and 2

Informed and Empowered Learners

Rationale:

Assignments will focus on placing rocks in their geologic contexts. Students will match igneous, metamorphic and sedimentary processes, in the abstract, with their actual rock products. They will conceptualize their assessments in the context of deep (geologic) time and describe the processes that are the basis for the rock cycle.

Objective 7:

Demonstrate a fundamental understanding of rock deformation, geologic structures, earthquakes and seismology, and crustal movements.

Expected Student Learning Outcomes 1 and 2

Informed and Empowered Learners

Rationale:

Assignments will focus on applying geometric, kinematic and dynamic principals to characterize ancient and active rock deformation. Students will project data from 2D maps to vertical 2D profile interpretations of Earth's crust.

Objective 8:

Synthesize information about rock deformation, geologic structures, earthquakes and seismology, and crustal movements into a description of tectonic plate boundaries and the evolution of continents.

Expected Student Learning Outcomes 1 and 2

Informed and Empowered Learners

Rationale:

Assignments will focus on integration of observations from the rock record with observations of contemporary crustal processes. Students will explain the rock record in the context of active plate-boundary processes.

Objective 9:

Identify rocks and minerals in hand-specimen using their physical and chemical properties.

Expected Student Learning Outcomes 1

Informed Learners

Rationale:

Assignments will focus on the identification of geological materials. Students will distinguish between silicate and non-silicate minerals, and between the three main rock types. Amongst the rock types, students will evaluate subtle differences that reflect differences in the environments of formation.

Objective 10:

Use the petrographic microscope in identifying minerals and rocks.

Expected Student Learning Outcomes 1 and 2

Informed and Empowered Learners

Rationale:

Assignments will focus on the identification of minerals and rocks using the petrographic microscope. Students will distinguish specific minerals on the basis of suites of optical properties.

Objective 11:

Interpret topographic and geologic maps and synthesize a region's geologic history from these maps.

Expected Student Learning Outcomes 1 and 2

Informed and Empowered Learners

Rationale:

Assignments and course content will synthesize geologic data presented on maps to generate hypotheses about geologic history. Students will use data presented on Earth's surface to interpret the distribution and geometry of subsurface geologic units.

Student outcomes assessment matrix:

Conceptual Framework (Danielson Domain)	Content Standard (NSTA Science Teacher Preparation)	Course Objective	Assessment (*denotes assessment for reporting)
1	1b	1	Final Exam
1	1a	2	*Plate Tectonics Lab, Final Exam
1	1a, 3a	3	Plate Tectonics Lab, Exam 1
1, 3	1a, 1b, 2b, 3a	4	*Geologic Time Lab, Exam 1

1	1a	5	Mineral Labs, Exam 1
1	1a, 1b	6	Rock Labs, Exam 2
1	1a	7	Earthquake Lab, Geologic Structure Lab, Final Exam
1, 3	1a, 3a	8	Final Exam
1	1a	9	Mineral and Rock Labs
1	1a	10	Mineral and Rock Labs
1	1a, 3a	11	*Topographic and Geologic Maps Lab

III. Course Outline

Lecture

Part A: Introduction to Geology **3 hours**

1. The Science of Geology and the Nature of Scientific Inquiry
2. The Earth as a System: Hydrosphere, Atmosphere, Biosphere and Solid Earth
3. Early Evolution of the Earth and Earth's Internal Structure
4. Major Features of the Continents and Ocean Floor
5. Geologic Time and the Rock Cycle

Part B: Plate Tectonics **3 hours**

1. Alfred Wegener and Continental Drift
2. Earth Magnetism and the Birth of Plate Tectonics
3. Plate Boundaries: Divergent, Convergent and Transform
4. Measuring Plate Motion
5. The Driving Forces Behind Plate Tectonics

Part C: Geologic Time **3 hours**

1. Principles of Relative Age Dating, Correlation of Rock Layers
2. Types of Fossils, Conditions Favoring Preservation, Fossils and Stratigraphic Correlation
3. Radiometric Age Time and Absolute Time
4. The Geologic Time Scale and Earth History

Part D: Matter and Minerals **5 hours**

1. Structure of Atoms, Elemental Bonding
2. Structure and Physical Properties of Minerals
3. The Silicate Tetrahedron and Silicate Minerals
4. Non-Silicate Minerals: Carbonates, Sulfates, Halides, Sulfides, Oxides, Hydroxides

Exam 1 **1 hour**

Part E: Rocks **14 hours**

1. Igneous Rock Types Igneous Textures, Origin of Magma, Crystallization of Magmas, Naming Igneous Rocks
2. Volcanoes, Nature of Volcanic Eruptions, Volcanic Rocks, Intrusive Igneous Bodies, Plate Tectonics and Igneous Activity, Volcanic Hazards
3. Chemical vs. Mechanical Weathering, Rates of Weathering, Detrital vs. Chemical Sedimentary Rocks, Sedimentary Facies and Environments
4. Agents of Metamorphism, Metamorphic Textures, Metamorphic Rocks, Metamorphic Zones and Environments, Plate Tectonics and Metamorphism

Exam 2 **1 hour**

Part F: Crustal Deformation, Earthquakes and Tectonic Settings **12 hours**

1. Rock Deformation, Geologic Structures, Graphical Representation of Geologic Structures, Geologic Maps
2. Earthquakes, Seismology, Earthquake Hazards, The Earth's Interior
3. Origin and Evolution of the Ocean Floor, Passive and Active Continental Margins, Origin and Destruction of Oceanic Lithosphere, The Supercontinent Cycle
4. Evolution of the Continents, Mountain Building and Continental Collisions, Vertical Crustal Movements

Final exam during final exam period **2 hours**

Laboratory Exercises (3 hours each)

Week 1: Introduction to Earth Systems
Week 2: Plate Tectonics
Week 3: Geologic Time
Week 4: Physical Properties of Minerals
Week 5: Mineral Identification
Week 6: Optical Mineralogy
Week 7: Igneous Rock Identification and Petrography
Week 8: Sedimentary Rock and Fossil Identification and Petrography
Week 9: Metamorphic Rock Identification and Petrography
Week 10: Interpretation of Fossil and Rock Distributions
Week 11: Geologic Structures
Week 12: Earthquake Mechanics
Week 13: Topographic and Geologic Maps
Week 14: Synthesis Exercises

IV. Evaluation Methods

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

Exam 1	20%
Exam 2	20%
Final Exam	20%
Laboratory Exercises	40%
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

Textbooks

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

Reynolds, S.J., Johnson, J.K., Kelly, M.M., Morin, P.J. and Carter, C.M. (2009) *Exploring*

Geology, 2nd Edition., McGraw Hill Higher Education. (example textbook)

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

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. (example lab manual)

<u>Supplemental Books and Readings</u>

Halbwachs, M., Sabroux, J.-C., Grangeon, J., Kayser, G., Tochon-Danguy, J.-C., Felix, A., B'eard, J.-C., Villevieille, A., Vitter, G., Richon, P., Wüest, A., and Hell, J., 2004, Degassing the "Killer Lakes"; Nyos and Monoun, Cameroon: Eos Trans. AGU, v. 85, no. 30. (example supplemental reading, science news piece in *Eos*)

Schneiderman, J.S. The Earth Around Us: Maintaining a Livable Planet: W.H. Freeman and Co., 2000, 455p.Howarth, R. W., Ingraffea, A., and Engelder, T., 2011, Natural gas: Should fracking stop?: Nature, v. 477, no. 7364, p. 271-275. (example supplemental reading, commentary in *Nature*)

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:

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

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

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

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

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

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

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.

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

2. SUMMARY OF PROPOSED REVISIONS

1. Objectives – the course objectives were revised from the original syllabus of record and aligned with the Expected Undergraduate Student Learning Outcomes (EUSLO) and Common Learning Objectives found in the criteria for a laboratory Natural Science course.

3. JUSTIFICATION/RATIONALE FOR THE REVISION

The course is a currently approved Liberal Studies Laboratory Natural Science course and is being revised to meet the new curriculum criteria for this category.

Example Assignment & Grading Rubric

During lectures in this course students are periodically assessed by means of so-called minute papers. The approach entails asking a fundamental question that is based on material covered up to that point and providing several minutes for the students to compose their hand-written responses. The responses are evaluated and several that have earned different scores are reviewed (without identification of the authors) at the start of the following class. By starting with the highest scoring examples and working down the students see that there are multiple ways to earn full credit, and they see specific examples missing concepts, content and/or vocabulary. These assignments require the students to write cogently about scientific content and modeling this level of engagement generally proves fruitful. Two specific examples are provided here.

Example 1

Minute Paper Quiz 1 & Rubric

In a few complete sentences explain how elastic strain happens during the earthquake cycle.

Rubric

10 pts	9 pts	8 – 7 pts	6 – 5 pts	4 – 0 pts
uses strain terms for distortion and stress terms for loading, includes tectonic or directed stress, includes correct timing of elastic strain recovery	appropriate description of stress or strain but not both, general description of the earthquake cycle, correct timing of elastic strain recovery	incomplete description of fault and blocks, incomplete description of what elastic strain is but timing is basically correct	correct use of terms but no clear relation of timing of elastic strain recovery, no attempt to describe system	poor description of system, terms misused

Example responses:

10 points
"Elastic strain occurs when on either side of a fault each plate has force acting upon it in an opposite (e.g., horizontal) direction. Eventually, the forces build up enough that they overcome the friction between the 2 plates, allowing them to slide past one another and the distortion accumulated since the last earthquake to recover."

9 points
"Over time directed stress increases along a fault. This stress becomes so large that the fault actually slips (earthquake). After the earthquake, most stress is relieved, the rocks around the fault go back to their original shapes and then the cycle starts again. It is much like stretching a rubber band and letting it go, it returns to its normal state."

Example 2

Minute Paper Quiz 2 & Rubric

Explain in a few short sentences how valley glaciers recede without flowing upstream.

Rubric

10 pts	9 pts	8 – 7 pts	6 – 5 pts	4 – 0 pts
describes the mechanisms of ice loss, ice budget ideas portrayed correctly, notes gravity drives flow	notes that gravity drives flow, incomplete description of ice loss mechanisms, ice budget ideas portrayed correctly	ice loss mechanisms incomplete or ice budget ideas not fully incorporated	includes only one of the key elements, gravity, ice budget, or ice loss mechanisms	poor description of system, terms misused

10 points

"Valley glaciers move downslope no matter what because they are being acted upon by gravity. Specifically three things can happen to valley glaciers that move them downslope when receding, they are: sublimation, (vaporization), melting and calving. If no new snow is added to the accumulation zone, the valley glacier will recede while moving downhill."

9 points

"Valley glaciers always flow down the slope, even though they may be described as receding. This is because the glaciers termination point is just moving up hill. Basically, the glacier is still moving down hill, it just isn't making it as far as it used to. The whole process is usually caused by there being less snow accumulated at the beginning of the glacier."

8 points

"Valley glaciers can recede without flowing upstream by the ablation zone moving up the glacier. The ablation zone is mainly the area/zone where calving, melting and sublimation take place. In other words the ablation zone is where the glacier begins to melt, receding due to the melting of the glacier."

Liberal Studies Course Approval General Information

1. This course will be taught in one section by one instructor.

2. Readings taken from Vassar College Professor Jill S. Schneiderman's collection of essays entitled "The Earth Around Us: Maintaining a Livable Planet" [W.H. Freeman and Company: New York, 2000, 455p.; ISBN 0-7167-3397-8] will highlight the important contributions that this and other female scientists have made to conveying modern science to a broad audience (see "C" below). Other authors of essays in this collection include Marcia Bjornerud (Lawrence University), Allison McFarlane (George Mason University), Cathryn Manduca (Carleton College), Kirsten Menking (Vassar College), Naomi Oreskes (University of California at San Diego), and Jill Singer (Buffalo State University).

3. In addition to the textbook "Earth: An Introduction to Physical Geology" a number of non-textbook readings will incorporated into the course from the above-mentioned collection of essays, "The Earth Around Us: Maintaining a Livable Planet". Essays in this collection address the interactions of humans and planet Earth in a discussion of modern environmental issues. Essay titles include:

"Geology: The Bifocal Science" (Susan Werner Kieffer)
"Set Piece on Geologic Time from *Annals of a Former World*" (John McPhee)
"Living with Karst: Maintaining a Clean Water Supply in Olmsted County, Minnesota" (Cathryn Manduca)
"A Record of Climate Change from Owens Lake Sediments" (Kirsten M. Menking)

4. This is an introductory course for majors in Geoscience and is available to students in allied fields such as Biology and Archeology for liberal studies credit. This course will focus on the fundamental systems that constitute our planet with an emphasis on the lithosphere and its interactions with the hydrosphere and atmosphere. Particular attention will be paid to plate tectonics and the internal processes that shape our planet and that are reflected in the rock record.

OLD SYLLABUS OF RECORD

I. Catalog Description
GEOS 201 Foundations of Geology

3 class hours
3 lab hours
4 credit hours
(3c-3l-4cr)

Prerequisite: Geoscience majors and minors, and Science or Science Education majors/minors, Anthropology, Geography and Regional Planning majors, or permission of instructor

An 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. Laboratory exercises will emphasize hands-on learning of basic geology skills including mineral and rock identification, understanding the geometry of subsurface geologic structures, and topographic and geologic map reading.

II. Course Objectives
At the end of this course students will be able to:
1) Recognize the Earth as a complex system of interacting components including the hydrosphere, atmosphere, biosphere and the lithosphere.
2) Explain the major features of the continents and ocean floor.
3) Synthesize data from a variety of sources into an understanding of different plate tectonic settings
4) Summarize the principles of relative and absolute geologic time and evaluate the history of rock outcrops
5) Compare and contrast the common minerals in the Earth on the basis of chemical composition, physical properties, and bonding structure.
6) Demonstrate a fundamental understanding of the rock cycle and the geologic processes responsible for creating the common igneous, sedimentary and metamorphic rocks of the world
7) Demonstrate a fundamental understanding of rock deformation, geologic structures, earthquakes and seismology, and crustal movements
8) Synthesize information about rock deformation, geologic structures, earthquakes and seismology, and crustal movements into a description of tectonic plate boundaries and the evolution of continents.
9) Identify rocks and minerals in hand-specimen using their physical and chemical properties
10) Use the petrographic microscope in identifying minerals and rocks.
11) Interpret topographic and geologic maps and synthesize a region's geologic history from these maps.

Student outcomes assessment matrix:

Conceptual Framework (Danielson Domain)	Content Standard (NSTA Science Teacher Preparation)	Course Objective	Assessment (*denotes assessment for reporting)
1	1b	1	Final Exam
1	1a	2	*Plate Tectonics

			Lab, Final Exam
1	1a, 3a	3	Plate Tectonics Lab, Exam 1
1, 3	1a, 1b, 2b, 3a	4	*Geologic Time Lab, Exam 1
1	1a	5	Mineral Labs, Exam 1
1	1a, 1b	6	Rock Labs, Exam 2
1	1a	7	Earthquake Lab, Geologic Structure Lab, Final Exam
1, 3	1a, 3a	8	Final Exam
1	1a	9	Mineral and Rock Labs
1	1a	10	Mineral and Rock Labs
1	1a, 3a	11	*Topographic and Geologic Maps Lab

III. Course Outline

Lecture

Part A (3 academic hours): Introduction to Geology

1. The Science of Geology and the Nature of Scientific Inquiry
2. The Earth as a System: Hydrosphere, Atmosphere, Biosphere and Solid Earth
3. Early Evolution of the Earth and Earth's Internal Structure
4. Major Features of the Continents and Ocean Floor
5. Geologic Time and the Rock Cycle

Part B (3 academic hours): PlateTectonics

1. Alfred Wegener and Continental Drift
2. Earth Magnetism and the Birth of Plate Tectonics
3. Plate Boundaries: Divergent, Convergent and Transform
4. Measuring Plate Motion
5. The Driving Forces Behind Plate Tectonics

Part C (3 academic hours): Geologic Time

1. Principles of Relative Age Dating, Correlation of Rock Layers
2. Types of Fossils, Conditions Favoring Preservation, Fossils and Stratigraphic Correlation
3. Radiometric Age Time and Absolute Time
4. The Geologic Time Scale and Earth History

Part D (5 academic hours): Matter and Minerals

1. Structure of Atoms, Elemental Bonding
2. Structure and Physical Properties of Minerals
3. The Silicate Tetrahedron and Silicate Minerals
4. Non-Silicate Minerals: Carbonates, Sulfates, Halides, Sulfides, Oxides, Hydroxides

Exam 1 (1 academic hour)

Part E (14 academic hours): Rocks

1. Igneous Rock Types Igneous Textures, Origin of Magma, Crystallization of

Magmas, Naming Igneous Rocks
2. Volcanoes, Nature of Volcanic Eruptions, Volcanic Rocks, Intrusive Igneous Bodies, Plate Tectonics and Igneous Activity, Volcanic Hazards
3. Chemical vs. Mechanical Weathering, Rates of Weathering, Detrital vs. Chemical Sedimentary Rocks, Sedimentary Facies and Environments
4. Agents of Metamorphism, Metamorphic Textures, Metamorphic Rocks, Metamorphic Zones and Environments, Plate Tectonics and Metamorphism

Exam 2 (1 academic hour)

Part F (12 academic hours): Crustal Deformation, Earthquakes and Tectonic Settings

1. Rock Deformation, Geologic Structures, Graphical Representation of Geologic Structures, Geologic Maps
2. Earthquakes, Seismology, Earthquake Hazards, The Earth's Interior
3. Origin and Evolution of the Ocean Floor, Passive and Active Continental Margins, Origin and Destruction of Oceanic Lithosphere, The Supercontinent Cycle
4. Evolution of the Continents, Mountain Building and Continental Collisions, Vertical Crustal Movements

Final exam during final exam period.

<u>Laboratory Exercises (3 academic hours each)</u>

Week 1:	Introduction to Earth Systems
Week 2:	Plate Tectonics
Week 3:	Geologic Time
Week 4:	Physical Properties of Minerals
Week 5:	Mineral Identification
Week 6:	Optical Mineralogy
Week 7:	Igneous Rock Identification and Petrography
Week 8:	Sedimentary Rock and Fossil Identification and Petrography
Week 9:	Metamorphic Rock Identification and Petrography
Week 10:	Interpretation of Fossil and Rock Distributions
Week 11:	Geologic Structures
Week 12:	Earthquake Mechanics
Week 13:	Topographic and Geologic Maps
Week 14:	Synthesis Exercises

IV. Evaluation Methods

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

Exam 1	20%
Exam 2	20%
Final Exam	20%
Laboratory Exercises	<u>40%</u>
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

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.

Subject: FW: GEOS 201
From: "Gail Sechrist" <gailsech@iup.edu>
Date: Fri, 13 Jul 2012 11:42:16 -0400
To: "'Sharon Aikins'" <saikins@iup.edu>

This one obviously should not have been put on the Senate Agenda but it got on there in the confusion.
It was recently approved 1-2 years ago so it would have had TECC approval then.
Gail

-----Original Message-----
From: David H. Pistole [mailto:dpistole@iup.edu]
Sent: Wednesday, April 25, 2012 9:38 AM
To: Lewis, Jonathan C
Cc: Gail S. Sechrist
Subject: GEOS 201

John, The UWUCC provisionally approved GEOS 201 Foundations of Geology at our 24 April, 2012 meeting. The UWUCC realized at the meeting that since it involves education majors that it needs to go to TECC. TECC has to approve the course before the LSC or UWUCC can (thus, the provisional). We will send the proposal to TECC. This course can be considered to be in the "pipeline" so it will be fine to complete the review process in the fall. Please let Gail or myself know if you have any questions. David

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