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Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee

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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

__X__Course Revision __X__Course Number and/or Title Change __X__Catalog Description Change

GEOS 412 Stratigraphy	GEOS 352 Sedimentation and Stratigraphy
***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)		
UWUCC Co-Chairs	Gail S Sechrist	10/14/08

* 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

GEOS 352 Sedimentation and Stratigraphy 3c-3l-4cr

Prerequisite: Grade of C or better in GEOS 202 and GEOS 203

An introduction to the concepts and methods applied in defining and establishing the spatial and temporal relationships of stratigraphic units – the material packages of sediment/rock and the intervals of time that are derived from them. Includes field trips that may occur on weekends.

II. Course Objectives

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

1) Prepare detailed and accurate descriptions of sedimentary rocks and sequences from hand specimens, drill core, and field exposures.

2) Integrate lithology, fossils, and sedimentary structures to delineate sedimentary facies and reconstruct paleoenvironments.

3) Assemble a suite of facies into a coherent model and decipher the roles of tectonic, climatic, and paleogeographic factors in controlling the facies architecture.

4) Summarize the types of stratigraphic units recognized in current national and international codes of stratigraphic nomenclature and an appreciation for their importance in unraveling a region's tectonic history.

6) Effectively apply the concepts and methods of stratigraphy in practical applications such as geologic mapping, petroleum exploration, coal mining, hydrogeology, and industrial mineral recovery.

III. Course Outline

Lecture

Part A (14 academic hours): History of stratigraphic nomenclature and current stratigraphic codes

1. Early history of stratigraphy and initial standardization of stratigraphic units
2. The emergence of modern stratigraphic concepts, early and middle 20th century
3. Advances (and missteps) in the latter half of the 20th century
4. Current North American Code of Stratigraphic Nomenclature: Material Units
5. Current North American Code of Stratigraphic Nomenclature: Geologic Time Units

Exam 1 (1 academic hour)

Part B (13 academic hours): Lithostratigraphy and Physical Correlation

1. Sedimentary facies, key bed stratigraphy, and lateral gradients
2. Sedimentary cycles and cyclostratigraphy
3. Unconformities and sequence stratigraphy

Exam 2 (1 academic hour)

Part C (13 academic hours): Chronostratigraphy: temporal correlation methods

1. Temporal Biostratigraphy: zonal boundaries as time lines
2. Chemostratigraphy and Geophysical chronocorrelation
3. Geochronology: Absolute age dating and tephrochronology
4. Boundary stratotypes (GSSP's) and geologic time scales

Final exam during final exam period.

Laboratory Exercises (3 academic hours each)

Week 1: Description of siliciclastic sedimentary rocks

Week 2: Description on non-clastic sedimentary rocks
Week 3: Description and facies interpretation of a primarily siliciclastic core
Week 4: Siliciclastic core description/interpretation (continued)
Week 5: Description and facies interpretation of a carbonate core
Week 6: Carbonate core description/interpretation (continued)
Week 7: Lower Paleozoic subsurface stratigraphy of New York state (wire-line logs)
Week 8: Upper Devonian subsurface correlation exercise, western Pennsylvania
Week 9: Case Study #1: Early Paleozoic paleogeography of western Colorado: search for the Transcontinental Arch
Week 10: Quantitative correlation methods (Graphic Correlation and CONOP)
Week 11: Field Trip #1 - Fluvio-deltaic facies of the Conemaugh and Allegheny Groups
Weekend Field Trip: FIELD TRIP #2 - Stratigraphy and structure in the Valley & Ridge, Blue Ridge, and Piedmont Provinces of Maryland and West Virginia
Week 12: Release time for weekend field trip to Maryland and West Virginia
Week 13: Field Trip #3 – The Sauk Sequence in central Pennsylvania
Week 14: Case Study #2 – The Lower Paleozoic of Texas and southern New Mexico

IV. Evaluation Methods

Lecture - 3 exams (100 points each)	300 pts.
Lab write-ups and field notebook	200 pts.
Participation in lecture, lab, and field trips.	50 pts
	Total= 550 points

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

Prothero, D., and Schwab, M. *Sedimentary Geology, 2nd Edition*. New York: W.H. Freeman & Co., 2004

VIII. Special resource requirements

There are no special resource requirements for this course.

IX. Bibliography

In addition to the required textbook and supplemental readings from current literature, the following will be used to develop the course curriculum:

Brezinski, D.K., 2004, Stratigraphy of the Frederick Valley and its relationship to karst development: Maryland Geological Survey Report of Investigations 75, 101p.

Emery, D. and Myers, K.J. (eds.), 1996, Sequence Stratigraphy: Blackwell Science Ltd., Oxford, 297p.

Kolata, D., Huff, W.D. and Bergstrom, S.M., 1996, Ordovician K-bentonites of eastern North America: Geological Society of America Special Paper 313, 278p.

Hedberg, H., 1976, International Stratigraphic Guide: A guide to stratigraphcial classification, terminology, and procedure: John Wiley, New York, 200p.

Gradstein, F.M., Ogg, J.G., and Smith, A.G., 2004, A Geologic Time Scale 2004: Cambridge University Press, New York, 610p..

Mann, K.O. and Lane, H.R. (eds.), Graphic Correlation: Society for Sedimentary Geology Special Publication 53, 263p.
North American Commission on Stratigraphic Nomenclature, 1983, North American Stratigraphic Code: American Association of Petroleum Geologists Bulletin, v. 67, p.841-875.
McGowran, B., 2005, Biostratigraphy: Cambridge University Press, New York, 480p.
Shaw, A.B., 1964, Time in stratigraphy, McGraw-Hill Book Company, New York, 365p..
Walsh, S.L., Gradstein, F.M, and Ogg, J.G., 2004, History, philosophy, and application of the Global Stratotype Section and Point (GSSP): Lethaia, v. 37, p.201-218.
Zalasiewicz, J., Smith, A., Brenchley, P. Evans, J., Knox, R., Riley, N., Gale, A., Gregory, F.J., Rushton, A., Gibbard, P., Hesselbo, S., Marshall, J., Oates, M., Rawson, P. and Trewin, N., 2004, Simplifying the stratigraphy of time: Geology, v. 32, p. 1-4.

2. SUMMARYOF PROPOSED REVISIONS

The original format for the class was two hours of lecture and three hours of laboratory work per week for three credits (2c-3l-3cr). The new course will have three hours of lecture and three hours of laboratory work per week for four student credit hours (3c-3l-4cr). The additional hour of lecture per week will provide the necessary time to build a foundation in the principles of Sedimentation as a prelude to discussion and analysis of the stratigraphic units created by sedimentation. It will also allow for expansion of the treatment of sequence stratigraphy, a field that has experienced dramatic growth and seen much broader application than in earlier years when this course was first designed.

3. JUSTIFICATION/RATIONALE

Revisions in the required coursework for the B.S. in Geology, along with recent changes in the schedule of upper level course offerings in geology (specifically the relegation of almost all upper level courses to alternate year offerings), require expansion of the content in each of the courses dedicated to sedimentary rocks and surficial processes. In the new curriculum, fewer courses in sedimentary geology are required, so each must cover a broader range of topics to ensure adequate coverage of critical components. In the former curriculum, the geology core included three 3-credit upper level courses in sedimentary geology, locked into sequence through pre-requisites that could be maintained when the courses were offered each year. The new curriculum and course schedule make that arrangement impossible. The 4-credit upgrade of GEOS 352 is necessary to incorporate a number of topics that were not previously part of GEOS 412 – Stratigraphy.

4. OLD SYLLABUS OF RECORD

There is no available syllabus of record for this course. The syllabus used the last time that the course was offered (Spring 2005) is attached below.

Part III. Letters of Support or Acknowledgment

No other department or program is affected by these revisions.

Stratigraphy (GEOS 412)

I. Catalog Description
GEOS 412 Stratigraphy

2 class hours
3 lab hours
3 credit hours
(2c-3l-3cr)

Prerequisite: GEOS 411 or instructor permission

Principles and processes involved in development and description of stratified rock sequences, principles and problems of correlation, and selected stratigraphic problems. Includes field trips that may occur on weekends.

II. Course Objectives
At the end of this course students will be able to:
1) Prepare detailed and accurate descriptions of sedimentary rocks from hand specimens, core, and field exposures.
2) Integrate lithology, fossils, and sedimentary structures to delineate sedimentary facies and reconstruct paleoenvironments.
3) Assemble a suite of facies into a coherent model and decipher the roles of tectonic, climatic, and paleogeographic factors in creating the facies architecture.
4) Demonstrate a familiarity with the types of stratigraphic units recognized in current national and international codes of stratigraphic nomenclature.
5) Effectively apply the concepts and methods of stratigraphy in practical applications such as geologic mapping, petroleum exploration, coal mining, hydrogeology, and industrial mineral recovery.

II. Course Outline:

A. Lecture portion:

Text: Prothero and Schwab, 2004, Sedimentary Geology, 2nd Edition, W.H. Freeman & Co., New York

Date		Lecture	Topic
Jan.	11	1	Stratigraphy defined and early practitioners
	13	2	Evolution of stratigraphic nomenclature: (late 1800's to 1976 International Stratigraphic Guide.
	18	3	1983 North American Stratigraphic Code - Material Units
	20	4	1983 North American Stratigraphic Code - Geologic Time Units
	25	5	Sedimentary Facies and Walther's Principle
	27	6	Physical chronocorrelation - Key bed stratigraphy
Feb.	1	7	Sedimentary cycles and event stratigraphy
	3	8	Unconformities: definition, varieties, importance, and time significance
	8	9	Inter-regional unconformities and Sloss sequences
	10	10	Temporal biostratigraphy: biozones and stages
	15	11	Spatial biostratigraphy: biofacies and provinces
	17	12	Case study #1 - The Stonehenge Limestone (Lower Ordovician) in the central Appalachians
	22	13	The Stonehenge story continued: internal (member) stratigraphy and regional (global?) significance
	24	14	Case study #2: Upper Cambrian of the central Appalachians

Mar	1	15	Case study #2 (cont.): tales from the shelfbreak
	3	16	Case Study #3: Lower Paleozoic of western Colorado
	15	17	Subsurface stratigraphy in the Upper Devonian of western Pennsylvania
	17	18	Upper Devonian of western PA (continued).
	22	19	Case Study #4 - The Humber Zone of western Newfoundland.
	24	20	The Humber Arm Allochthon: off-platform facies of the "Great American Bank"
	29	21	Case Study #5: Cambrian shelfbreak facies in the Conestoga Valley
	31	22	The biomere: a stage-level biostratigraphic unit in the Upper Cambrian
April	5	23	Post-mortem on weekend field trip
	7	24	The biomere concept (continued)
	12	25	Case Study #6: Lower Paleozoic of west Texas and southern New Mexico
	14	26	Geochronometry and Chronostratigraphy
	19		No Class (release time for weekend field trip)
	21	27	Geophysical correlation and sequence stratigraphy
	26	28	The Cambrian-Ordovician boundary stratotype: the challenge of international correlation and cooperation

GRADING: Three lecture exams will constitute 55% of your semester grade (13% for exam 1; 21% each for exams 2 and 3). All will be essay exams with questions based on material from lectures, assigned readings, an field trips. Lab exercises will constitute 20% of your semester grade and your individual semester project will account for another 15%. A class participation grade, based on my assessment of the extent and quality of you involvement in class/lab/field trip activities, will provide the remaining 10%.

B. Lab portion:

Date		Lab	Topic/Exercise
Jan.	11	1	Description of siliciclastic rocks
	18	2	Description of non-clastic sedimentary rocks
	25	3	Description and analysis of a largely siliciclastic core
Feb.	1	4	Siliciclastic core exercise continued
	8	5	Description and interpretation of carbonate core
	15		Carbonate core exercise (cont.)
	22	6	Paleozoic subsurface stratigraphy of southern New York
	1	7	Early Paleozoic paleogeography in the central Rocky Mountain region: a search for th Transcontinental Arch
	15	8	Subsurface geology exercise (Upper Devonian of western Pennsylvania)
	22	9	Ordovician-Silurian boundary stratigraphy in southern Ohio: the Centerville enigma
	29		Briefing session for weekend field trip
F 4/1-Sa 4/2			FIELD TRIP #1 - Stratigraphy and structure in the Valley & Ridge, Blue Ridge, and Piedmon Provinces of eastern Pennsylvania and central Maryland
	5	10	FIELD TRIP #2 – Fluvio-deltaic facies of the Conemaugh and Allegheny Groups
	12	11	The Graphic Correlation method
	19		No Lab (Release Time for weekend trip)
	26	12	FIELD TRIP #3 - Cambro-Ordovician facies in the Nittany Arch