LSC Use Only Proposal No: LSC Action-Date:	*UWUCC Use Only* Proposal No: 14-975 UWUCC Action-Date: App 10/28/14 Senate Action Date: App 12/2/14

Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee

Contact Person(s) **Karen Rose Cercone**	Email Address **kcercone@iup.edu**
Proposing Department/Unit **Geoscience**	Phone 724-357- **7650**

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 __X__ Catalog Description Change

Current course prefix, number and full title: **GEOS 355 Sedimentary Petrology**

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

2. Liberal Studies Course Designations, as appropriate

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

_____ Learning Skills _____ 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)	Kenneth S. Cole	4/17/2014
Department Chairperson(s)		4/24/14
College Curriculum Committee Chair		10/17/14
College Dean		10/20/14
Director of Liberal Studies (as needed)		
Director of Honors College (as needed)		
Provost (as needed)		
Additional signature (with title) as appropriate		
UWUCC Co-Chairs	Gail Sechrist	10/28/14

Part II. Description of Curricular Change

1. SYLLABUS OF RECORD

I. Catalog Description

GEOS 355 Sedimentary Petrology (3c-3l-4cr)
Prerequisite: Grade of C or better in GEOS 203 and 301
Study of sediments and sedimentary rocks with emphasis on reconstruction of their origin, specifically depositional and post-burial history, from properties observed in outcrops, hand-specimens and thin sections.

II. Course Objectives

1. Students will construct detailed and accurate descriptions of sedimentary rocks that capture all genetically relevant characteristics, and convey that information utilizing standardized terminology and classification schemes.

2. Students will integrate all textural and compositional data recorded in thorough descriptions of sedimentary rocks to reconstruct the depositional conditions under which they formed.

3. Students will describe how specific tectonic settings influence the types of sediments and sedimentary rocks produced therein, and apply these relationships to analyze ancient rocks and reconstruct a region's tectonic history.

4. Students will explain the importance of post-burial environments and processes in the conversion of sediment into rock and the partial to wholesale transformation of the textures and/or composition of the rock produced.

5. Students will apply their knowledge of sedimentary rock properties, and derived insight about depositional and post-burial history of a particular rock, in practical pursuits such as exploration and production of fossils fuels and industrial mineral extraction.

III. Course Outline

Lecture Schedule

A. Sedimentary Rocks: Components and Classification (6 hours)
The minerals and organic matter that make up sedimentary rocks; methods of classifying sediments and sedimentary rocks in order to interpret their environments of formation

B. Sedimentary Textures and Structures (6 hours)
Examination of micro and macro-scale features that document environment of formation. Porosity evolution in sedimentary rocks and role of formation fluids in lithification.

C. Exam 1 (1 hour)

D. Siliciclastic sedimentary rocks: coarse-grained (7 hours)
Analysis and interpretation of sandstone, conglomerate and breccia

E. Siliciclastic sedimentary rocks: fine-grained (4 hours)
Analysis and interpretation of siltstone, mudstone and shale

F. Exam 2 (1 hour)

G. Chemical sedimentary rocks: carbonates (8 hours)
Analysis and interpretation of limestone and dolomite

H. Chemical sedimentary rocks: directly-deposited (5 hours)
Analysis and interpretation of evaporates, chert, and ironstones

I. Organic sedimentary rocks (4 hours)
Analysis and interpretation of peat, coal and phosphate

J. Final exam during final exam period (2 hours)

Lab Schedule

Week 1	Classifying sandstone: ternary diagrams
Week 2	Classifying limestone: Folk and Dunham systems
Week 3	Sedimentary textures and structures in hand-sample
Week 4	FIELD TRIP: Sedimentary textures in the field
Week 5	Field suite 1 Siliciclastic alluvial fan facies
Week 6	Field suite 2: Siliciclastic beach and desert facies
Week 7	Field suite 3: Siliciclastic fluvial-deltaic facies
Week 8	Field Suite 4: Mixed siliclastic-carbonate turbidite facies
Week 9	Field Suite 5: Carbonate reef and lagoon facies
Week 10	Field Suite 6: Mixed siliclastic-carbonate tidal-flat facies
Week 11	Field Suite 7: Cherts and other deep-water facies
Week 12	Field Suite 8: Evaporites and sedimentary iron deposits
Week 13	No lab – work on projects and compensatory time for weekend field trip
Week 14	Project presentation: poster session for field outcrops

IV. Evaluation Methods

The final class grade will be determined from the following assessments:

Lecture Exam 1	13 %
Lecture Exam 2	21 %
Final Lecture Exam	21 %
Lab exercises	25%
Semester project	10 %
Participation score	10 %
Total	100 %

V. Example Grading Scale
The final grade will be assigned based on the semester average using the scale: 90-100%=A; 80-89%=B; 70-79%=C; 60-69%=D and below 60%=F.

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

VII. Required Textbook
Prothero, D.R. & Schwab, F., 2014, Sedimentary Geology (3rd Ed): W.H.Freeman and Co., 500 pp.

VIII. Special Resource Requirements
Students must have a hand lens, sleeping bag, field boots and waterproof field notebook. Approximately $30 will be required for meals and camping during the 3-day field trip.

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

Boggs, S., Jr. (2009) Petrology of Sedimentary Rocks (2nd ed.). Cambridge University Press.
Boggs, S., Jr. (2006). Principles of Sedimentology and Stratigraphy (4th ed.). Prentice Hall.
Bridge, J. & R. DeMicco (2008) Earth Surface Processes, Landforms and Sediment Deposits: Cambridge University Press.
Collinson, J., N. Mountney & D. Thompson (2006). Sedimentary Structures (3rd ed.). Terra Publishing.
Driese, S.G. and Nordt, L.C. (eds.), 2013, New frontiers in paleopedology and terrestrial paleoclimatology: SEPM Special Publication 104, 275 p.
Einsele, G. (2000). Sedimentary Basins, Evolution, Facies, and Sediment Budget (2nd ed.). Springer.
Folk, R. L. (1981). Petrology of Sedimentary Rocks (2nd Ed). Hemphill.
Hirsch, D. M. (2012). ModeMaker and ModeQuiz: Tools for Enhancing Student Learning Estimation Skills of Rock-Component Abundance. Journal of Geoscience Education, 60(3), 277-287.
Hoffman, P. F. (2012). The Tooth of Time: How do passive margins become active? Geoscience Canada, 39(2).
Martinsen, O., Pulham, A., Haughton, P., and Sullivan, M. (eds.), 2011, Outcrops revitalized: tools, techniques, and applications: Society for Sedimentary Geology, Concepts in Sedimentology and Paleontology 10, 267 p
Reading, H. G. (1996). Sedimentary Environments: Processes, Facies and Stratigraphy (3rd ed.). Blackwell Science.
Stow, D. A. V. (2005). Sedimentary Rocks in the Field: A Color Guide. Burlington, MA: Academic Press.
Tucker, M. E. (2001). Sedimentary Petrology: An Introduction to the Origin of Sedimentary Rocks. Wiley-Blackwell.
Tucker, M. W. (2011). Sedimentary Rocks in the Field: A Practical Guide (4th Ed). Wiley.

2. SUMMARY OF PROPOSED REVISIONS

We propose to convert Sedimentary Petrology from a format of 2c-3l-3cr (two lecture hours, three lab hours per week) to a more rigorous format of 3c-3l-4cr (three lecture hours, three lab hours per week). The additional lecture hour will be used to add more student-centered work, quantitative analysis and in-class problem solving exercises to lectures in order to achieve the student learning outcome goals for the two program tracks that will now use this course as a track component. This change will also make the course equivalent in rigor and breath to its program alternative, GEOS 352 Sedimentation & Stratigraphy.

3. JUSTIFICATION/RATIONALE FOR THE REVISION

Sedimentary Petrology has traditionally been taught using a format of two lecture hours and three laboratory hours. In 2008-2009, the Geoscience Department converted almost all of its core majors courses to a more rigorous format of three lecture hours and three lab hours. The justification for those changes was to add more student-centered work, quantitative analysis and in-class problem solving exercises to these classes so that students could improve their outcomes for the newly identified program learning goals (see Table 1).

Table 1: Geoscience Program Learning Goals

Goal 1	*Students will develop the tools needed to analyze and solve problems in earth science.*
Goal 2	*Students will master three foundational content areas in geoscience: plate tectonic theory, organic evolution and environmental change.*
Goal 3	*Students will develop professional skills needed for field and lab research: rock & mineral identification and interpretation; spatial data analysis and map interpretation; computer spreadsheet analysis, statistics or mathematical modeling.*
Goal 4	*Students will develop effective scientific communication skills in written and oral forms.*

At that time of the last curriculum re-design, Sedimentary Petrology was considered a controlled program elective rather than a core course, so it was kept in the original 2c-3l-3cr format and was did not significantly alter its curriculum. Its pre-requisite was changed at that time to just the freshman level introductory sequence, in keeping with the very flexible 'ala carte' nature of the geoscience major curriculum as it was then envisioned.

In the five years since that curriculum re-design was implemented, our assessment of student learning outcomes has shown that under the 'ala carte' model, not enough of our students are graduating with a strong grasp of sedimentary environments. They are not always able to deduce ancient environments from the petrology and petrography of sedimentary rock facies. This skill is particularly critical for Energy Resource graduates, where the ability to determine sedimentary facies from small rock samples (well chips and cores) is a key professional skill for those students joining the well-logging and oil & gas drilling industries. It is also an important professional skill for students going on to graduate research, especially those whose goals are to get a PhD and work in a teaching or research institution. Not only does a solid understanding of sedimentary facies help these students function as graduate teaching assistants, it also may be the last high-level exposure they get (depending on their graduate research area) before they are tasked with teaching sedimentary rock lectures and labs as newly-minted professors themselves.

In order to achieve better learning outcomes, the Geoscience Department has re-designed its curriculum to reduce some of its 'ala carte' nature while still allowing students to have as much flexibility in scheduling and transferability between program tracks as possible. Sedimentary Petrology will now function as a key track requirement in both the Geology BS and BS in Energy Resources, giving those students the exposure they need to sedimentary rock identification and analysis. It must provide an equivalent learning experience and achieve the same enhancement of program learning goals as its alternate option, the 3c-3l-4cr course GEOS 352 Sedimentation & Stratigraphy. That requires additional content material, analytical exercises and student-centered work to be included in the lecture portion of the class, to allow students to refine both their rock identification skills and their critical thinking, quantitative analysis and communication skills as well. This change will also make the course equivalent to analogous upper-level-majors classes at many peer institutions and will allow our students to better meet the expectations of professional employers.

Note on time to degree:
The addition of this extra credit hour will not impact any student's time to graduation or required total credits for their major. Under our proposed new curriculum (included elsewhere in this revision package), all upper level Geoscience courses will be incorporated as options rather than as required courses for our degree tracks. Each optional category requires two of the four courses to be taken, and in these categories, most of the courses already carry four credits. Because of this, we have adjusted the overall program requirements so that the total major credits have actually decreased from 59 to 58 and free electives have therefore increased from 15 to 16. These changes were made to reduce curriculum 'bottle-necks,' shorten time to degree, and allow more flexibility for transfer students and students switching between our degree tracks.

Note on faculty work-load requirements
The Geoscience Department is aware that that the changes requested here will require additional faculty work-load to cover the added class time. Financially, this change will be covered by the additional credit load payments by students for the class as well as by our on-going commitment to teach very large lecture sections of Liberal Studies classes such as GEOS 101, GEOS 103 and GEOS 105 in order to cover the curricular costs of our smaller majors' courses. Operationally, the department will absorb this increase in work-load hours mainly by decreasing the number of workload-intensive non-major lab sections (GEOS 102, GEOS 104 and GEOS 106) that we teach each term, a change which synchronizes well with the recent change in Liberal Studies science requirements from 8 to 7 with its concomitant decrease in demand for laboratory science sections. Under our proposed new curriculum, we will also be able to schedule upper-level majors classes more judiciously so as not to spread our student load over too many options in each semester. Currently required courses such as GEOS 324 Geology of Oil & Gas or GEOS 352 Stratigraphy must be taught once every two years to allow students to graduate on time. With the optional menu of courses that is built into our new program, we can offer those courses at longer intervals if needed to accommodate the increased workload of other courses. Although not optimal, we believe these changes are worth making in order to achieve our student learning outcome goals.

PREVIOUS SYLLABUS OF RECORD

There is no syllabus of record on file for this course at the Liberal Studies or Geoscience offices. The most recent syllabus of instruction is attached.

Sed Petrology

Instructor: Katie Farnsworth

Office: Walsh 113

Email: kfarns@iup.edu

Phone: 724-357-3406

Lectures: M & W 9:05 – 9:55
Walsh 104

Lab: M 1:25 – 4:15 pm
Walsh 108

Office Hours: T 8-11am, W 12:30 – 1:30pm and Friday 10-noon or any time by appt.

Text: The textbook this year for this class is not a published book, but rather a text written by John Southard of MIT. It will be available on our class Moodle site. I will also provide other readings throughout the semester to complement this.

This course aims to provide you with the tools necessary to:

- Understand the origin and behavior of sedimentary grains
- Understand the physics behind the transport and deposition of sediment
- Describe and classify the major types of sedimentary rocks
- Identify specific environments of deposition
- Appreciate the role of the sedimentary record in geologic history

Mandatory Weekend Fieldtrip: - one day only, not overnight

- Oct 9 we will spend the day in the field – more info to come

General Course Policies:

Collaboration: I think it is helpful for you to work together on assignments, however please submit your own work. Work together, discuss the problems and then answer them in your own words.

ADA Policy: Persons with disabilities requiring special accommodations to meet the expectations of this course are encouraged to bring this to my attention as soon as possible.

Grading: Final grades will be assigned based on your performance in the following areas:

Exams	Mid-term exam	20 %
	Final Exam	25 %
Assignments	Lab Reports	25 %
	Problem Sets	10 %
	Lit Reviews and Discussions	15 %
Attendance and Participation		5%

Exams: There are 2 exams in this class. The exams will cover both what we are doing in lecture and what we are covering in the lab portion of the class.

Exam #1 – Oct 18, Monday, during the Lab time slot

Exam #2 – Dec 15, 8am Final Exam time slot

Lab Reports: I expect an organized and legible lab report for most of the labs that we will complete during the semester. This may include only 1 lab period or projects that run for a few weeks. You will turn this in with a partner.

Problem Sets: Over the course of the semester, there will be at least 2 problem sets. You will have at least a week to work on these before they are due. Please do not put them off and come to me if you need help. I will tell you now, I will not be too helpful the morning they are due.

Primary Lit Reviews: We will read a few papers this semester from the primary literature and discuss them. Prior to the scheduled discussion day, you will have to turn in an assignment about that paper to prepare for our discussion.

This will include a 3-4 page, double-spaced, typed write up about the paper. It will contain a brief summary of the important points of the paper (brief!), your reaction to the paper and 5 questions you have from reading the paper (this can be questions about why they did something, or how it fits into the big picture). These are due in class the morning of the paper discussion during lab

Attendance and Participation: I expect you to be in class and actively participating in lecture, lab and discussion. If you have a legitimate reason for needing to miss class, please let me know ASAP. The weekend fieldtrip is mandatory – please let me know early in the semester if this date will be a problem.

Lab Exercise			Lecture Schedule	Readings from Southward
Lab 1: Observation Exercise and Sediment Descriptions	Monday	Aug 30	Class Intro and Observation and Sed Intro	Southward pgs 1-36
	Wednesday	Sept 1	Components of Sediment	
No Lab - Labor Day	Monday	Sept 6	No Classes – Labor Day	
	Wednesday	Sept 8	Sediment Transport	Southward pgs. 37-71 and 106-114
Lab 2: Stokes Law	Monday	Sept 13	Sediment Transport and Deposition	
	Wednesday	Sept 15	No Class –Grainize Problem Set	
Lab 3: Sediment Transport/Paleo Current	Monday	Sept 20	Sediment Transport and Deposition	
	Wednesday	Sept 22	Bedforms	Southward pgs. 72-106, 115-144
Lab 4: Stream Lab	Monday	Sept 27	Bedforms	
	Wednesday	Sept 29	Deformation and Biogenic Structures	
Lab 5: Bedforms	Monday	Oct 4	Coarse Grained Siliciclastic Rocks	Southward pgs. 145-169
	Wednesday	Oct 6	Fine-grained siliciclastic Rocks	
Lab 6: Paper discussion #1	Monday	Oct 11	Siliciclastic Rock Roundup	
	Wednesday	Oct 13	Evaporites	Southward pgs. 209-217
Exam #1	Monday	Oct 18	No Class – Exam during lab this day	Southward pgs. 170-201
	Wednesday	Oct 20	Carbonate Sediments	
Lab 7: Evaporite Experiment	Monday	Oct 25	Modern marine carbonate sediments form as oozes, reefs or on platforms	
	Wednesday	Oct 27	Limestones – Folk/Dunham microbial mats	
Lab 8: Carbonates	Monday	Nov 1	Sed Structures Specific to Carbonates	
	Wednesday	Nov 3	Cherts	Southward pgs. 202-209
Diagenesis Lecture	Monday	Nov 8	No Class – Carbonate Problem Set	Southward pgs. 218-238
	Wednesday	Nov 10	Facies	Southward pgs. 350 – 356
Lab 9: Sedimentary Structures	Monday	Nov 15	Clastic Dep Environments	Southward pgs. 356-382
	Wednesday	Nov 17	Clastic Dep Environments	
No Lab	Monday	Nov 22	No Classes Thanksgiving Break	
	Wednesday	Nov 24	No Classes Thanksgiving Break	
Lab 10: Paper Discussion	Monday	Nov 29	Carbonate Environments	
	Wednesday	Dec 1	Carbonate Environments	
Lab 11: Sedimentary Deposit Correlations	Monday	Dec 6	Sedimentary Basins	
	Wednesday	Dec 8	Sedimentary Basins	Southward pgs: 383-407
	Monday	Dec 13	Catch up Day	
FINAL EXAM 8am	Wednesday	Dec 15		