FORMAT 1

Submit original with signatures + 1 copy + electronic copy to Faculty Senate (Box 7500).

See http://www.uaf.edu/uafgov/faculty-senate/curriculum/course-degree-procedures-/ for a complete description of the rules governing curriculum & course changes.

RECEIVED
SEP 28 2011
Dean's Office
College of Natural Science & Mathematics

TRIAL COURSE OR NEW COURSE PROPOSAL

SUBMITTED BY:

Department	Petroleum Engineering	**College/School**	College of Natural Science & Mathematics
Prepared by	Catherine Hanks	**Phone**	474-5562 or 2668
Email Contact	chanks@gi.alaska.edu	**Faculty Contact**	chanks@gi.alaska.edu

1. ACTION DESIRED (CHECK ONE): Trial Course [ ] New Course [X]

2. COURSE IDENTIFICATION: Dept PETE Course # 646 No. of Credits 3

Justify upper/lower division status & number of credits: Course will require 300 level geoscience courses or graduate standing in petroleum engineering or permission of the instructor; course will be predominantly a lecture-based course with in-class exercises and homework. Graduate students will be expected to do a paper and presentation.

3. PROPOSED COURSE TITLE: Petroleum Geology

4. To be CROSS LISTED? *YES/NO* Yes If yes, Dept: GEOS Course # 446/646

(Requires approval of both departments and deans involved. Add lines at end of form for such signatures.)

5. To be STACKED? *YES/NO* Yes If yes, Dept. GEOS Course # 446

6. FREQUENCY OF OFFERING: Alternate Fall

Fall, Spring, Summer (Every, or Even-numbered Years, or Odd-numbered Years) — or As Demand Warrants

7. SEMESTER & YEAR OF FIRST OFFERING (AY2011-12 if approved by 3/1/2012; otherwise AY2012-13) AY 2012-2013

8. COURSE FORMAT:

NOTE: Course hours may not be compressed into fewer than three days per credit. Any course compressed into fewer than six weeks must be approved by the college or school's curriculum council. Furthermore, any core course compressed to less than six weeks must be approved by the core review committee.

COURSE FORMAT: (check all that apply) [ ] *1* [ ] *2* [ ] *3* [ ] *4* [ ] *5* [X] *6 weeks to full semester*

OTHER FORMAT (specify)

Mode of delivery (specify lecture, field trips, labs, etc) Lecture

9. CONTACT HOURS PER WEEK: [3] LECTURE hours/weeks [ ] LAB hours /week [ ] PRACTICUM hours /week

Note: # of credits are based on contact hours. 800 minutes of lecture=1 credit. 2400 minutes of lab in a science course=1 credit. 1600 minutes in non-science lab=1 credit. 2400-4800 minutes of practicum=1 credit. 2400-8000 minutes of internship=1 credit. This must match with the syllabus. See http://www.uaf.edu/uafgov/faculty-senate/curriculum/course-degree-procedures-/guidelines-for-computing-/ for more information on number of credits.

OTHER HOURS (specify type)

10. COMPLETE CATALOG DESCRIPTION including dept., number, title, credits, credit distribution, cross-listings and/or stacking (50 words or less if possible):

PETE F646 Petroleum Geology
3 Credits Offered Fall Even-numbered Years
Examines the origin of petroleum, the geologic controls on its distribution and accumulation and the basic tools used exploration and exploitation, including subsurface mapping, well logging and exploration geophysics. *Prerequisites: Graduate standing or permission of the*

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instructor. Cross-listed with GEOS F646. Stacked with GEOS F446. (3 + 0)

GEOS F646 **Petroleum Geology**
3 Credits Offered Fall Even-numbered Years
Examines the origin of petroleum, the geologic controls on its distribution and accumulation and the basic tools used exploration and exploitation, including subsurface mapping, well logging and exploration geophysics. *Prerequisites: Graduate standing or permission of the instructor*. Cross-listed with PETE F646. Stacked with GEOS F446. (3 + 0)

GEOS F446 **Petroleum Geology**
3 Credits Offered Fall Even-numbered Years
Examines the origin of petroleum, the geologic controls on its distribution and accumulation and the basic tools used exploration and exploitation, including subsurface mapping, well logging and exploration geophysics. *Prerequisites: GEOS F314 and F322 or equivalent*. Stacked with GEOS F646. (3 + 0)

11. COURSE CLASSIFICATIONS: Undergraduate courses only. Consult with CLA Curriculum Council to apply S or H classification appropriately; otherwise leave fields blank.

H = Humanities [ ] S = Social Sciences [ ]

Will this course be used to fulfill a requirement for the baccalaureate core? **If YES, attach form.** YES: [ ] NO: [X]

IF YES, check which core requirements it could be used to fulfill:

O = Oral Intensive, **Format 6** [ ] W = Writing Intensive, **Format 7** [ ] Natural Science, **Format 8** [ ]

12. COURSE REPEATABILITY:

Is this course repeatable for credit? YES [ ] NO [X]

Justification: Indicate why the course can be repeated (for example, the course follows a different theme each time).

How many times may the course be repeated for credit? [ ] **TIMES**

If the course can be repeated for credit, what is the maximum number of credit hours that may be earned for this course? [ ] **CREDITS**

If the course can be repeated with variable credit, what is the maximum number of credit hours that may be earned for this course? [ ] **CREDITS**

13. GRADING SYSTEM: Specify only one. Note: Later changing the grading system for a course constitutes a Major Course Change.

LETTER: [X] **PASS/FAIL:** [ ]

RESTRICTIONS ON ENROLLMENT (if any)

14. PREREQUISITES **GEOS and PETE 646: Graduate standing and permission of instruction; GEOS 446: GEOS 314 and 322 or equivalent**

These will be *required* before the student is allowed to enroll in the course.

15. SPECIAL RESTRICTIONS, CONDITIONS none

16. PROPOSED COURSE FEES $ 0

Has a memo been submitted through your dean to the Provost for fee approval? **Yes/No**

17. PREVIOUS HISTORY

Has the course been offered as special topics or trial course previously? **Yes/No** | Yes |

If yes, give semester, year, course #, etc.: | GEOS/PETE 494/694 Fall 2008, 209, 2010 |

18. ESTIMATED IMPACT

WHAT IMPACT, IF ANY, WILL THIS HAVE ON BUDGET, FACILITIES/SPACE, FACULTY, ETC.

No additional impact. Uses existing space and faculty

19. LIBRARY COLLECTIONS

Have you contacted the library collection development officer (kljensen@alaska.edu, 474-6695) with regard to the adequacy of library/media collections, equipment, and services available for the proposed course? If so, give date of contact and resolution. If not, explain why not.

No [X] Yes [ ]

No additional material needed other than what is already available. Supplemental readings will be acquired by ILL or via existing journal subscriptions.

20. IMPACTS ON PROGRAMS/DEPTS

What programs/departments will be affected by this proposed action?
Include information on the Programs/Departments contacted (e.g., email, memo)

This course will provide an additional elective for both the Petroleum Engineering and Geology departments.

21. POSITIVE AND NEGATIVE IMPACTS

*Please specify **positive and negative** impacts on other courses, programs and departments resulting from the proposed action.*

No negative impact on any other courses, programs or departments is anticipated. On the positive side, this course would provide an additional elective for both engineering and geology undergraduates. As a cross-listed course, this class would provide an opportunity for students from both departments to interact. The course would also strengthen ties between the geology and petroleum engineering programs.

JUSTIFICATION FOR ACTION REQUESTED

The purpose of the department and campus-wide curriculum committees is to scrutinize course change and new course applications to make sure that the quality of UAF education is not lowered as a result of the proposed change. Please address this in your response. This section needs to be self-explanatory. Use as much space as needed to fully justify the proposed course.

Although petroleum exploration and production is the economic backbone of the state, there is no course offered currently at UAF that addresses the origin of and geologic controls on the distribution of hydrocarbons. This course will provide those UAF undergraduates and graduate students most likely to pursue jobs in industry with valuable information and skills that they will need to work in the petroleum industry.

CEM signatures as per attached.

APPROVALS: Add additional signature lines as needed.

	Date
Signature, Chair, Program/Department of:	
	Date
Signature, Chair, College/School Curriculum Council for:	
	Date
Signature, Dean, College/School of:	
	Date

Signature of Provost (if applicable)

Offerings above the level of approved programs must be approved in advance by the Provost.

ALL SIGNATURES MUST BE OBTAINED PRIOR TO SUBMISSION TO THE GOVERNANCE OFFICE

	Date

Signature, Chair

Faculty Senate Review Committee: ___Curriculum Review ___GAAC

___Core Review ___SADAC

ADDITIONAL SIGNATURES: (As needed for cross-listing and/or stacking)

	Date
Sarah Jewell	9/28/11
Signature, Chair, Program/Department of: Geology + Geophysics	
	Date 10/4/11
Signature, Chair, College/School Curriculum Council for: CNSM	
	Date Oct 7, 2011
Signature, Dean, College/School of: CNSM	

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APPROVALS: Add additional signature lines as needed.

Signature, Chair, Program/Department of:	Date	9/20/11
Signature, Chair, College/School Curriculum Council for: Debasmita Mishra	Date	9/30/11
Signature, Dean, College/School of: Charles E Mayer (acting) CEM	Date	10/12/11
Signature of Provost (if applicable)	Date	10/15/11

Offerings above the level of approved programs must be approved in advance by the Provost.

ALL SIGNATURES MUST BE OBTAINED PRIOR TO SUBMISSION TO THE GOVERNANCE OFFICE

Signature, Chair	Date

Faculty Senate Review Committee: ___Curriculum Review ___GAAC

___Core Review ___SADAC

ADDITIONAL SIGNATURES: (As needed for cross-listing and/or stacking)

Signature, Chair, Program/Department of:	Date
Signature, Chair, College/School Curriculum Council for:	Date
Signature, Dean, College/School of:	Date

GEOS 446

Petroleum Geology

3 credits

Hydrocarbons fuel today's economy, but remain a relatively rare natural resource. The objective of this course is to review the geologic controls on the distribution and accumulation of hydrocarbons, how those hydrocarbons are found, and how they are subsequently extracted. Topics to be covered will include:

- the subsurface environment
- the origin and nature of hydrocarbons
- how and where hydrocarbons accumulate
- methods of hydrocarbon exploration and exploitation
- unconventional hydrocarbon resources
- basic reservoir engineering techniques

Examples from classic hydrocarbon-producing regions will be used to illustrate the principles and techniques discussed in class.

Prerequisites: Geos 314 and 322 or equivalent

Instructor: Cathy Hanks, NSB 346/Duckering 417, 474-5562 or 2668
chanks@gi.alaska.edu

Text: Selley, 1999, Elements of Petroleum Geology. Academic Press, 470 p.

Class format:

The class will consist of lectures and homework assignments.

Grading Policy

The course grade will be a letter grade (plus, minus) and will be based on:

- 2 mid-term exams (25% each)
- final exam (25% each)
- homeworks (25%)

Grades will be assigned as follows:

A+ = 97-100%
A = 93-96
A- = 90-92
B+ = 87 - 89

B = 83-86%
B- = 80-82
C+ = 77-79
C = 73 – 76%
C- = 70 - 72
D+ = 65-69
D = 55-64%
D- = 50 - 54
F = <55%

The instructor reserves the right to curve the grades where appropriate.

COURSE OUTLINE: (28 CLASS DAYS)

Week	*Topic*	*Homeworks*	*Readings*
1	**Intro—Why petroleum?**		
	What is Petroleum? • Organic vs. inorganic origin of petroleum • Chemical Properties • Physical Properties		**Selley Ch. 2**
2	**The subsurface environment** • Temperature within the earth • Pressure • Subsurface waters	**Hwk 1: Calculating geothermal gradients**	**Selley, Ch. 4**
	Methods of Exploration • Drilling a well • Well logging	**Hwk 2: Rock id**	**Selley, Ch. 3.1, 3.2, 3.5**
3	• Subsurface geology and maps • Formation Evaluation	**Hwk 3: Examining well cuttings and well logs**	
	• Gravity and Magnetics		
4	• Geophysical methods—Reflection Seismic--acquisition	**Hwk 4: Interpreting seismic**	**Selley, Ch. 3.3**
	• Seismic interpretation, 3 D, 4D		
5	**The source: How oil forms** • Source rock characteristics • Productivity and Preservation of Organic Matter. • Hydrocarbon Maturation • Hydrocarbon Migration_		**Selley, Ch. 5**
	Midterm I		

6	**The Reservoir:** **What makes a good reservoir rock?** • Porosity. • Permeability. • Effects of Diagenesis on Reservoir Quality.	**Hwk 5: Evaluating porosity and permeability in hand samples**	**Selley, Ch. 6.1-6.7**
	• Measuring reservoir properties o Lab measurements o Log evaluations		
7	• Reservoir Continuity—the importance of depositional environment: o Variations due to sed structure o Mesoscopic and map scale variations		
	• Carbonate depositional systems: a different beast	**Hwk 6: Correlating logs; Constructing subsurface isopach maps**	
8	• Reservoir prediction in the subsurface: the importance of sequence stratigraphy	**Hwk 7: Sequence stratigraphic interpretation of seismic data**	
	Traps and Seals: • Nomenclature of a Trap. • Distribution of Petroleum within a Trap.—Gas, oil, water • Characteristics of Seals and Cap Rocks.		**Selley, Ch. 7**
9	• Trap types: o Structural Traps. o Stratigraphic Traps. o Combination Traps. o Hydrodynamic Traps.	**Hwk 8: Constructing subsurface structure maps; Identifying play types from subsurface structure maps**	
	• Salt-related structures		
10	**Midterm II**		
	• Structural modifications of a reservoir: Fractured reservoirs		

11	• Timing of Trap Development Relative to Migration. **Petroleum systems & plate tectonic habitat** • Passive continental margins	**Hwk 9: Using seismic data for structural interpretation and timing**	**Selley, Ch. 8**
	• Passive continental margins, cont		
12	• Convergent margins • Strike slip basins	**Hwk 10: Plate tectonic setting of modern day basins**	
	Reservoir engineering: • Reserve calculations	**Hwk 11: Simple reserve calculation**	**Selley, Ch. 6.8-6.9**
13	**Well Drilling and Completion**		
	Non conventional hydrocarbon resources • Viscous oil • Gas hydrates • Coal bed methane		
14	• Tight gas • Shale resource plays		

Course Policies: Attendance at class is your responsibility. Students are responsible for making up any missed work. Students are encouraged to arrive to class on time. Make-up examinations will be held only under exceptional circumstances (e.g. illness, family crises, etc.). Medical documentation will be required to confirm illnesses. We follow the university guidelines for plagiarism/academic integrity as outlined in the current UAF catalog (p. 71-72).

Disability Services: The Office of Disability Services implements the Americans with Disabilities Act (ADA), and insures that UAF students have equal access to the campus and course materials. We will work with the Office of Disabilities Services (203 WHIT, 474-7043) to provide reasonable accommodation to students with disabilities.

PETE/GEOS 646

Petroleum Geology

3 credits

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- the subsurface environment
- the origin and nature of hydrocarbons
- how and where hydrocarbons accumulate
- methods of hydrocarbon exploration and exploitation
- unconventional hydrocarbon resources
- basic reservoir engineering techniques

Examples from classic hydrocarbon-producing regions will be used to illustrate the principles and techniques discussed in class.

Students will be assigned additional readings each week that expand on the topics discussed in class. Students will then use the concepts and techniques discussed in both the class and the readings to research a petroleum topic related to their own area of research. Results will be summarized as a paper and presented to the class as a short presentation.

Prerequisites: Graduate standing or permission of the instructor

Instructor: Cathy Hanks, NSB 346/Duckering 417, 474-5562 or 2668
chanks@gi.alaska.edu

Text: Selley, 1999, Elements of Petroleum Geology. Academic Press, 470 p.

Additional readings will be assigned each week to augment the lectures.

Class format:

The class will consist of lectures and homework assignments. Additional readings will be assigned each week to augment the lecture material given in class.

Grading Policy

The course grade will be a letter grade (plus, minus) and will be based on:

- 2 mid-term exams (20% each)
- final exam (20% each)
- homeworks (20%)

- final project paper & oral presentation (20%)

Students will meet with the instructor during the first 2 weeks of class to determine the topic of the research project. The results of the project will be presented as an 8-10 page research paper, and in a 10 minute oral presentation to the class.

Grades will be assigned as follows:

A+ = 97-100%
A = 93-96
A- = 90-92
B+ = 87 - 89
B = 83-86%
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C+ = 77-79
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3	• Subsurface geology and maps • Formation Evaluation	**Hwk 3: Examining well cuttings and well logs**	
	• Gravity and Magnetics		
4	• Geophysical methods—Reflection	**Hwk 4: Interpreting**	**Selley, Ch. 3.3**

	Seismic--acquisition	seismic	
	• Seismic interpretation, 3 D, 4D		
5	**The source: How oil forms** • Source rock characteristics • Productivity and Preservation of Organic Matter. • Hydrocarbon Maturation • Hydrocarbon Migration_		**Selley, Ch. 5**
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	• Salt-related structures		
10	**Midterm II**		
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11	• Timing of Trap Development Relative to Migration. **Petroleum systems & plate tectonic habitat** • Passive continental margins	**Hwk 9: Using seismic data for structural interpretation and timing**	**Selley, Ch. 8**
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	Non conventional hydrocarbon resources • Viscous oil • Gas hydrates • Coal bed methane		
14	• Tight gas • Shale resource plays		
	Student presentations		

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