5-Core

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(Email electronic copy to jbharvie@alaska.edu)

REQUEST FOR CORE WRITING INTENSIVE DESIGNATOR

SUBMITTED BY:

Department	**Geology & Geophysics**	**College/School**	**CNSM**
Prepared by	**Elisabeth Nadin**	**Phone**	**X5181**
Email Contact	**enadin@alaska.edu**	**Faculty Contact**	**Elisabeth Nadin**

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

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APR - 8 2014
Dean's Office
College of Natural Science & Mathematics

1. COURSE IDENTIFICATION:

Dept	Geos	Course #	309	No. of Credits	3

COURSE TITLE	Tectonics

Existing Course	x	New Course Pending Approval*	

*Must be approved by appropriate Curriculum Council.)

2. CURRENT CATALOG DESCRIPTION AS IT APPEARS IN THE CATALOG: including dept., number, title and credits. If there extensive changes to an existing course, include the CHANGED CATALOG DESCRIPTION as well. (Doing so will facilitate correct Banner entries.)

GEOS F309 Tectonics
3 Credits
Offered Spring
In-depth exploration of the theory of Plate Tectonics including plate boundary interactions - which trigger volcanoes and earthquakes, form mountain belts and oceans - via geochemistry, sedimentology, geophysics and structure. Understanding the creation and evolution of the lithosphere and mantle, how we detect tectonic processes and how present tectonic environments help reconstruct ancient crustal events. Prerequisite: GEOS F112; GEOS F214 or GEOS F262 (either may be taken concurrently) or permission of instructor.

CHANGE TO:

GEOS F309 W Tectonics
3 Credits
Offered Fall
In-depth exploration of the theory of Plate Tectonics, including plate boundary interactions - which trigger volcanoes and earthquakes, form mountain belts and oceans - via geochemistry, sedimentology, geophysics, and structure. Understanding the creation and evolution of the lithosphere and mantle, how we detect tectonic processes, and how present tectonic environments help reconstruct ancient crustal events. Prerequisite: ENGL F211X or ENGL F213X; GEOS F112; and GEOS F214 or GEOS F262 (either may be taken concurrently).

JUSTIFICATION FOR ACTION REQUESTED

The purpose of the department and campus-wide curriculum committees is to scrutinize course designator 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 change and explain what has been done to ensure that the quality of the course is not compromised as a result.

This course requires students to write 5 short-ish (2-page) assignments that they then compile into a final report. In the past 2 years, students have requested that I make this a "W" course because of the number of written assignments and the amount of rewriting required.
In addition, I spend time to provide 1) in-class guidance on how to write up the information that I ask for; for example, I explain (in class) how to choose figures and write adequate figure captions the first time I request such, and 2) extensive editing feedback* on content, organization, and grammar. The students revise their written work in order to improve over the course of the semester, and they hand in a final and complete compilation of the 5 written assignments as a final project at the end of the semester.
The students' final grades consist of >50% written work when combining the "plate portfolio" (25% for 5

Governance 4/10/14

2-page write-ups), 2 1-page summaries of professional papers (10%), a final report (combined written + oral = 15%), and components of the exams that include paragraph-length and essay-length answers. Since I am already meeting the expectations of a "W" designated class, I feel that I am doing the students a service by making it official. Please note that in my attached (revised) syllabus, I have scheduled 2 class days (Week 9) for personal conferences with students on their writing progress.

***I would like to note that I worked as a professional science writer for several years and have a solid background in writing and editing. In addition, I co-teach our department's W&O "Presentation Techniques" class in which I also provide extensive feedback on written work. I am therefore well-versed in meeting the instrucational requirements of a "W" course.**

The **attached syllabus** must clearly reflect the following basic elements for a class to be **WRITING INTENSIVE.** Please note them directly on the syllabus, using the corresponding letter.

A	A majority of the final grade is derived from writing activities
B	A research paper/project
C	Personal conference with the student
D	Drafts/revisions/Feedback

APPROVALS:

Signature, Chair, Program/Department of: _____ Date 4-8-14.

Signature, Chair, College/School Curriculum Council for: CNSM Date 4-9-14

Signature, Dean, College/School of: _____ Date 4/10/14

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

Signature, Chair, Senate Core Review Committee Date

November 12, 1990 UAF Faculty Senate Meeting #22

GUIDELINES FOR CORE WRITING INTENSIVE DESIGNATOR:

A. General guidelines for 3-credit course with "W" designator

1. The lower-division writing sequence as specified in the Core Curriculum will be a prerequisite for all "W"- designated courses.
2. Instructors are encouraged to have students write an ungraded diagnostic composition on or near the first day of class to help assess writing ability and general competence in the discipline. [If diagnostic tests indicate that remedial work may be needed, teachers can set up specialized tutoring for their students with UAF Writing Center tutors.]
3. Teachers regularly evaluate students' writing and inform students of their progress. If a major written project (research project) is part of the course, the project should be supervised in stages. If possible, a writing activity should comprise a major portion of the final examination.
4. At least one personal conference should be devoted to the student's writing per term and drafts of papers should receive evaluation from the teacher and/or peers.
5. Written material should comprise a majority of the graded work in the course for it to be designated "intensive." "Written material" can consist of quizzes and exams with short answers or essay sections, journals, field notes, informal responses to reading or class lectures, structured essays, research projects, performance reviews, lab reports, or any forms suitable to the discipline being taught.

B. Guidelines for the "W" designator in Technical courses

1. In order to ensure that technical disciplines can meet the goals of the writing intensive requirements without compromising the technical quality of their courses, such disciplines may substitute longer courses or a series of courses (typically 1-credit labs) for each of the two necessary 3-credit writing intensive or "W"-designated courses. Courses meeting all the general guidelines will, of course, also be acceptable.
2. The longer course option allows the "W" designator for a 4- or 5-credit course in which written material comprises a portion of the grade equivalent to "a majority" of a 3-credit course. The course must also meet the other general guidelines.
3. The series option allows a student to replace one or both 3-credit "W" courses with a series of courses, each of which may be less than three credits--e.g., a series of 1-credit or 1-credit-equivalent laboratories. Each series, however, must sum to the equivalent of at least one 3-credit "W"- designated course. The initial course in the series will be designated "W1" and, while less than three credits, will fulfill all the other general requirements for a "W." The subsequent courses will base a majority of the grade on written material. Students must take the "W1" course before taking the other courses in the series.

** To grade a course on written work means to use the student's written work as the basis for his or her grade. Written work is graded mainly on content and organization, with tone, word choice, sentence structure, grammar, punctuation, and spelling accounting for a smaller fraction of the grade.

Effective: November 29, 1990

UAF		
	Course	GEOS F309 - TECTONICS
	Professor	Dr. Elisabeth Nadin
	Term	Fall 2014
	Meetings	MWF 9:15 am – 10:15 am REIC 234

Professor's Contact Information

Office Phone	907-474-5181
Office Location	REIC 334
Email Address	enadin@alaska.edu
Office Hours	MWF 1–2 pm, 3:30–4:30 pm; T R by appt
Other Information	

General Course Information

Pre-requisites, Co-requisites, & other restrictions	ENGL F111X; ENGL F211X or ENGL F213X; GEOS F112; GEOS F214 or GEOS F262 (either may be taken concurrently) or permission of instructor.
Course Description	In-depth exploration of the theory of Plate Tectonics, including plate boundary interactions—which trigger volcanoes and earthquakes, form mountain belts and oceans—via geochemistry, sedimentology, geophysics, and structure. Understanding the creation and evolution of the lithosphere and mantle, how we detect tectonic processes, and how present tectonic environments help reconstruct ancient crustal events.
Course Goals	Much of your success in this course will be measured on your ability to think like a scientist and solve problems using a variety of tools rather than your ability to recall facts (although a moderate amount of recollection of terms is necessary, too). During this course you will: • think about the dynamism of Earth (space & time!) • use quantitative methods to understand topics including plate motion, earthquake mechanisms, the types of plate boundaries, and magnetism of the sea floor • conceptually understand various geophysical methods including gravity, magnetics, and seismology. • read and extract useful information from all sorts of maps • hone your scientific writing and editing skills
Learning Outcomes	Upon completion of this course, you should be able to: • name the major tectonic plates; • explain the evidence that lithospheric plates move over modern and geological timescales (e.g., palaeomagnetic, geochronologic, geodetic, seismic measurements); • calculate relative and true plate motion and driving and retarding forces that influence plate motion at constructive, destructive and conservative plate boundaries; • fully describe active & passive plate margins, including rock types, structures, and mechanisms of crustal growth & heat transfer; • contrast the boundaries of the major tectonic plates, explain how crust is created or destroyed, and predict how plates will interact at margins and triple junctions; • report details of your particular tectonic plate, including types of boundaries, locations and types of earthquakes and volcanoes, and distribution of topography.

Required Texts & Materials	Kearey, Klepeis, & Vine (2009) Global Tectonics (3rd Edition, Wiley-Blackwell)
Supplementary Materials	http://blackwellpublishing.com/kearey/

Course Policies

Tectonics is a wonderfully interdisciplinary field that also is of common concern to academia, governmental agencies interested in natural hazards, and the mineral and hydrocarbon industries. I guarantee that the more you read, the more you will get out of this class! **Beware**: you must keep up with the readings if you are to do well in this class.

I assume that all students in this class know the geologic timescale. I will frequently refer to eras (Paleozoic, Mesozoic, Cenozoic) and periods (Cambrian, Triassic, etc.), as well as ages of events millions of years (Ma) and billions of years (Ga) ago. These ages are likely to show up on exams. If you are not comfortable with the terminology, print out and study the latest timescale http://www.geosociety.org/science/timescale/

I do not tolerate unexcused absences. Please see me ahead of time if you know you have to miss a class; only excuses that I deem valid will be accepted. No make-up exams will be offered. Plagiarism will not be tolerated. If I find that you have plagiarized any significant portion of material (i.e., more than 1 sentence copied word for word—and Google is amazing these days for showing such things!), that assignment will receive an automatic 0. A repeat offense will earn an automatic 0 for the course.

Support and Disabilities Services

Your written assignments will benefit from editing! Please use the Writing Center: http://www.alaska.edu/english/studentresources/writing/ for your final project (see **Plate Portfolio**, below). Your final portfolio must be stamped by someone at the writing center who proofed your writing.

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. I will work with the Office of Disabilities Services (208 WHITAKER BLDG, 474-5655) to provide reasonable accommodation to students with disabilities.

Grading

25% 5 plate portfolio assignments through the semester
5% attendance and participation (especially in paper discussions!)
20% 5 problem sets
10% midterm exam
10% reporting on short articles: 2 one-page explanations with oral presentation
15% final oral presentation and plate report
15% final exam

Up to 10 points extra credit (for attending Friday afternoon departmental seminar, 2 points each. Must get faculty signature and date for talk. Will be added to your cumulative exam grade.)

Final Grade will be based on the percentage of total course points earned, as follows (I will apply the +/- options for borderline cases):	A = 90–100% B = 80–89% C = 70–79% D = 65–69% F = 0–64%

Paper Explanations and Class Discussions
You will choose two of the many papers listed below under any week's suggested readings (we will have to negotiate a little to make sure there are no repeats among students). For each of these two papers, you will 1) write a one-page summary of the major points of the paper and lead a brief informal class discussion, AND you will make a short oral presentation and lead a class discussion, during the appropriate week, on that paper. We will assume your classmates will have at least skimmed these papers and will participate in discussions, but it may be useful for you to write up a list of talking points for your classmates in advance of the discussion. Discussions will typically happen on Fridays.

Plate Portfolio and Final Project
Throughout the course of the semester, you will develop a portfolio that catalogs the major tectonic features and events for a particular major plate (your choice!). This will be accomplished through text and figures with full captions. There will be 5 assignments (staggered with the problem sets) that will cover: 1) the size and major surface features of your plate, as well as the types of boundaries around your plate; 2) rates and directions of motion of your plate and neighboring plates; 3) locations of major topographic features and how they coincide with gravity anomalies; 4) earthquake locations and focal mechanisms; and 5) volcano locations both active and dormant. Each assignment will be 1–2 pages.

Your final project consists of two parts. In the first, you will combine your (corrected) portfolio submissions into a final, ~12-page report that includes a summary of the tectonic history/major geologic events across your plate that culminated in the features that we see today. In the second part, you will orally and visually present a 10-minute overview of your plate's features to your classmates.

In order to facilitate improvements in your writing over the course of the semester, I will provide extensive feedback on the content, organization, and grammar of your written assignments. We will also set aside class time in the middle of the semester to meet one on one to discuss your progress.

Class Schedule (* indicates supplementary information and reading)

Week 1: Introduction: Continental Drift
Kearey et al. Chapter 3 (14 p); Kearey et al. Chapter 4 (17 pages).
Scotese, 2004. A Continental Drift Flipbook. J. Geology 112, 729–741.

Week 2: Paleomagnetism and Sea Floor Spreading
Look at videos
http://emvc.geol.ucsb.edu/1_DownloadPage/Download_Page.html#GlobalTectonics
South Atlantic spreading, Seafloor spreading and magnetic reversals, and Pangean breakup and continental drift puzzle
http://www.earthbyte.org/Research/Current/agegrid2008.html
Age, Spreading Rates and Spreading Asymmetry of the World's Ocean Crust
http://emvc.geol.ucsb.edu/2_infopgs/IP1GTect/iTransFaultDemos.html
Oceanic transform fault geometry

http://emvc.geol.ucsb.edu/1_DownloadPage/Download_Page.html - RegionalPlateTect
Animations of how the San Andreas fault formed:
North Pacific Plate Tectonic History, 80–0 Ma
N.E. Pacific and W. North America Plate History, 38–0 Ma
Southern California: Plate Tectonic History, 20–0 Ma

ASSIGNMENTS: Plate 1 (boundaries and topography); Problem Set 1 (paleomagnetism)

Week 3: The Framework of Plate Tectonics
Kearey et al., Chapter 5 (29 pages)

- Iris.edu explanation on GPS: Measuring Plate Motion

http://www.iris.edu/hq/files/programs/education_and_outreach/aotm/14/1.GPS_Background.pdf
*DeMets et al. 1994. "Effect of Recent revisions to the Geologic Time Scale on estimates of current plate motions" Geophys. Res. Lett. 21, 2191-2194.
*Bird, 2003. "An updated digital model of plate boundaries" Geochemistry, Geophysics, Geosystems v. 4, no. 3, 1027, doi:10.1029/2001GC000252 -- Read ONLY sections 1 & 8, and choose one plate-boundary pair to discuss. See also http://peterbird.name/publications/2003_PB2002/2003_PB2002.htm for an interactive overview.
*Sella et al., 2002. "REVEL: A model for current plate velocities from space geodesy" J.Geophys. Res. 107, B4, 10.1029/2000JB000033, 2002 . Read ONLY sections 1, 2, and 5, and choose one site locality to discuss.
*DeMets et al., 2010, "Geologically current plate motions" Geophys. J. Int'l. 181, 1–80. Read ONLY ps. 1–15.

Week 4: Ocean Ridges and Triple Junctions
Kearey Chapter 6 (27 p.)

ASSIGNMENTS: Plate 2 (plate motion); Problem Set 2 (Euler poles; plate motion).

Week 5: Continental rifts and rifted margins
Kearey Chapter 7 (56 p.)
A.M.C. Sengor and B.A. Natal'in, 2001, Rifts of the World, in Ernst, R.E., and Buchan, K. I. eds., Mantle Plumes: Their Identification Through Time. GSA Spec. Paper 352, p. 389-482 ***(It's really <10 pages of reading!!)***
*Sengor and Burke, 1978. "Relative Timing of Rifting and Volcanism on Earth and its Tectonic Implications." Geophys Res Lett. 5, p. 419-421.
*Buck, W.R., (1991) "Modes of Continental Lithospheric Extension." J. Geophysical Research vol. 96 no. B12. P. 20,161-20,178. (Just an OVERVIEW, no heavy math!!)
*Taylor, Goodliffe, and Martinez (1999) "How continents break up: Insights from Papua New Guinea. JGR v. 104, p. 7497-7512 (Read for an OVERVIEW!!)

Week 6: Continental rifts and rifted margins (cont'd.)
*Wikipedia entries: "Passive Margin", "Volcanic Passive margin" and "Non-volcanic passive margin"
*Skogseid, 2001. Volcanic Margins: Geodynamic and Exploration Aspects. Marine and Petroleum Geology, 18: 457-461.
*Berndt, Planke, Alvestad, Tsikalas, and Rasmussen. 2001. Seismic volcanostratigraphy of the Norwegian margin: Constraints on tectonomagmatic break-up processes. J. Geol. Soc. London 158, 413-426

- **Exam 1 Review**

Week 7: Continental Transforms and Strike-slip margins
Kearey et al. Chapter 8 (36 pages)
Exam 1, Monday in class

Week 8: Subduction Zones
Kearey et al. Chapter 9 (32 pages)
http://emvc.geol.ucsb.edu/2_infopgs/IP1GTect/cSubduction.html Ocean–Continent Subduction

Stern (2003) Subduction Zones. Reviews of Geophysics, 40, 4 (38 pages)

*Clift and Vannucchi, 2004. Controls on Tectonic Accretion versus Erosion in Subduction Zones: Implications for the Origin and Recycling of the Continental Crust. Reviews of Geophysics, 42, RG2001, doi:10.1029/2003RG000127.

*von Huene, et al., 2004. Generic model of Subduction erosion. Geology 32, 913-916.

* von Huene and Scholl, 2010. Subduction zone recycling processes and the rock record of crustal suture zones. Can. J Earth Sci. 47, 633–654.

ASSIGNMENT: Plate 3 (Volcanoes)

Week 9: Subduction Zones (cont'd). ***Conferences to discuss improvements in written assignments.***

ASSIGNMENT: Problem Set 3 (chemical inputs & outputs at subduction zones)

Week 10: Orogenic Belts
Kearey et al. Chapter 10 (56 pages)

*Cloos, M. (1993) "Lithospheric buoyancy and collisional orogenesis: Subduction of oceanic plateaus, continental margins, island arcs, spreading ridges, and seamounts" Geological Society of America Bulletin, v. 105, p. 715-737.

*Mann, P., and Taira, A., 2004. Global tectonic significance of the Solomon Islands and Ontong Java convergent zone. Tectonophysics 389, 137-190

ASSIGNMENT: Plate 4 (Topography and Gravity)

Week 11: The Interior of the Earth—Crust and Lithosphere
Kearey et al.: Chapter 2 (42p)

*Anderson, D.L. (1995) "Lithosphere, asthenosphere, and perisphere" Reviews of Geophysics v.33, p. 125-149. (Read ONLY asthenosphere and perisphere)

*Mooney, Laske, and Masters 1998 CRUST 5.1: A global crustal model at 5°x5° JGR 103, 727-748

ASSIGNMENT: Problem Set 4 (balancing crustal columns)

Week 12: The Interior of the Earth Lecture—Geophysical Techniques
Go to http://igppweb.ucsd.edu/~gabi/crust2.html to look at thicknesses of crust and sedimentary basins.

*Morris, 2003. A paleomagnetic and rock magnetic glossary. Tectonophysics 377, 211-228. (Choose FIVE relevant and interesting – to you – terms.)

*Fault plane solutions: http://www.learninggeoscience.net/free/00071/

*Earthquake epicenters: http://neic.cr.usgs.gov/neis/epic/

ASSIGNMENT: Plate 5 (Earthquakes)

Week 13: The Interior of the Earth—Rheology

*Maggi, Jackson, McKenzie, and Priestley, 2000. Earthquake focal depths, effective elastic thickness, and the strength of the continental lithosphere. Geology 28, 495-498

*Jackson, 2002. Strength of the continental lithosphere: Time to abandon the jelly sandwich? GSA Today, 4-9

Week 14: The Mechanism of Plate Tectonics

Kearey et al. Chapter 12 (22 pages)

*Conrad and Lithgow-Bertelloni (2002) How mantle slabs drive plate tectonics Science, vol. 298, no.5591, pp.207-209, 04 Oct 2002 *

*Bird P., Z. Liu, W. K. Rucker (2008), Stresses that drive the plates from below: Definitions, computational path, model optimization, and error analysis, J. Geophys. Res., 113, B11406

Bonus Topic: The Supercontinent Cycle

Kearey et al. Chapter 11 (28 pages)

*Rollinson 2007. When did plate tectonics begin? Geology Today 23, 186-191.

Week 15: Student Presentations

Final Exam: