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.

TRIAL COURSE OR NEW COURSE PROPOSAL

SUBMITTED BY:

Department	**Geology & Geophysics**	**College/School**	**University of Alaska Fairbanks**
Prepared by	**Elisabeth Nadin**	**Phone**	**907-474-5181**
Email Contact	**enadin@alaska.edu**	**Faculty Contact**	**Elisabeth Nadin**

1. ACTION DESIRED (CHECK ONE):	Trial Course		New Course	X	
2. COURSE IDENTIFICATION:	Dept	**Geos**	Course #	**309**	No. of Credits **3**
Justify upper/lower division status & number of credits:	**Requires basic understanding of Geology; no labs involved, but readings, assignments, and final paper will make it work-intensive.**				
3. PROPOSED COURSE TITLE:	**Tectonics**				
4. To be CROSS LISTED? *YES/NO*	**No**	If yes, Dept:		Course #	
(Requires approval of both departments and deans involved. Add lines at end of form for such signatures.)					
5. To be STACKED? *YES/NO*	**No**	If yes, Dept.		Course #	
6. FREQUENCY OF OFFERING:	**Spring, every year**				
	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, weekly assignments, end-of-term paper/presentation**										

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):

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. Prerequisite or Corequisite: GEOS F214 OR GEOS F262. Permission of Instructor permitted. (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**	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*	Prerequisite: GEOS F112, and GEOS F214 or GEOS F262 (can be co-requisite); OR permission of instructor

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

15. *SPECIAL RESTRICTIONS, CONDITIONS*	

16. *PROPOSED COURSE FEES*	**$0**
Has a memo been submitted through your dean to the Provost for fee approval? **Yes/No**	**no**

17. *PREVIOUS HISTORY*

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

If yes, give semester, year, course #, etc.:	

18. *ESTIMATED IMPACT*

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

Will require use of a classroom twice per week. No course fees charged. Two computer-based assignments will be done using free software in the department computer lab. Will utilize expertise of new faculty member Elisabeth Nadin, who is establishing her long-term workload.

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		Yes	**yes**	**8/23/11. Library has adequate facilities.**

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)

Geology & Geophysics – Most faculty agree that tectonics is integral material for the geology major. All of the proposed new options in the Geoscience BS require Tectonics. It will be a foundation course.

21. *POSITIVE AND NEGATIVE IMPACTS*

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

Positive: Will better prepare students entering higher-level classes, specifically Structural Geology (F314), Sed/Strat (F322), Field Geology (F351), and Foundations in Geophysics (F431). Will apply expertise of new faculty member (Elisabeth Nadin, arrived August 2010), who so far is teaching mostly introductory-level courses.

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.

Plate tectonic theory is one of the (very few!) fundamental theories of the scientific world, and forms the apex of an education in geological sciences. In the Geology & Geophysics curriculum, we cover aspects of plate tectonic theory in 3 core courses: Dynamic Earth (F101), History of Earth and Life (F112), and Structural Geology (F314). In Spring 2011 our department hosted a visiting curriculum enhancement program, Building Strong Geoscience Departments (sponsored by NSF and implemented by the Science Education Resource Center at Carleton College). In a focus group on curriculum design, 7 of 10 of our faculty participants independently listed plate tectonics as one of three basic ideas that every student majoring in Geoscience should learn. In meetings that followed, the Geology & Geophysics faculty agreed that our department should offer a course dedicated to plate tectonics. Concurrently, we decided to provide concentrations within the Geoscience major. The geophysics program will require Tectonics because this class will cover subjects that the students may not otherwise take, including Structural Geology and Mineralogy, and because it will help prepare them for geophysics courses. This class will become part of Elisabeth Nadin's annual teaching workload, which currently consists of introductory-level classes. Tectonics is one area of expertise that Nadin will be able to employ through teaching this course. The new Tectonics class (see attached proposed syllabus) will begin with the early ideas about continental drift and seafloor spreading, followed by examining major fault types and the key geomorphic and petrologic features of plate tectonic boundaries. We will conclude with studies of Earth's interior through geophysical and petrological observations. These topics are covered cursorily in other classes, but what makes the Tectonics course different is how it ties together the major themes of geology in support of the fundamental theory. Observations are connected to processes, or, conversely, processes are induced from observations. This is the heart of science.

Throughout the course of the semester we will read and review seminal papers in Tectonics and discuss continuing debates in plate tectonic theory, including when the first rocks and continents formed and when plate tectonics actually began. Students will be required to choose two papers on which to write short summaries, and a student will lead paper discussion for each discussion session, thereby ensuring that they have done reading outside of the required text. Each student will choose a tectonic plate on which to collect pertinent data—locations of earthquakes, volcanoes, mountain belts; age distributions of rocks across the plate; modern rates of motion and deformation along plate boundaries—and explain how these relate to neighboring plates. This assignment is writing intensive, and will accumulate through the semester. The course will conclude with a final presentation on their chosen plate. Thus, the course has moderate written and oral requirements.

APPROVALS: Add additional signature lines as needed. As per attached.

	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.

APPROVALS: Add additional signature lines as needed.

Sarah Tindall — Date 9/26/11
Signature, Chair, Program/Department of: Geology & Geophysics

[signature] — Date 10/5/11
Signature, Chair, College/School Curriculum Council for: CNSM

Paul W Lasley — Date Oct 7, 2011
Signature, Dean, College/School of: CNSM

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
Signature, Chair, Program/Department of:

Date
Signature, Chair, College/School Curriculum Council for:

Date
Signature, Dean, College/School of:

ATTACH COMPLETE SYLLABUS (as part of this application). Note: The guidelines are online:
http://www.uaf.edu/uafgov/faculty-senate/curriculum/course-degree-procedures-/uaf-syllabus-requirements/
The Faculty Senate curriculum committees will review the syllabus to ensure that each of the items listed below are included. If items are missi or unclear, the proposed course (or changes to it) may be denied.

SYLLABUS CHECKLIST FOR ALL UAF COURSES

During the first week of class, instructors will distribute a course syllabus. Although modifications may be made throughout the semester, this document will contain the following information (as applicable to the discipline):

1. **Course information:**
   ❑Title, ❑ number, ❑credits, ❑prerequisites, ❑ location, ❑ meeting time
   (make sure that contact hours are in line with credits).
2. **Instructor (and if applicable, Teaching Assistant) information:**
   ❑ Name, ❑ office location, ❑ office hours, ❑ telephone, ❑ email address.
3. **Course readings/materials:**
   ❑ Course textbook title, ❑ author, ❑ edition/publisher.
   ❑ Supplementary readings (indicate whether ❑ required or ❑ recommended) and
   ❑ any supplies required.
4. **Course description:**
   ❑ Content of the course and how it fits into the broader curriculum;
   ❑ Expected proficiencies required to undertake the course, if applicable.
   ❑ Inclusion of catalog description is *strongly* recommended, and
   ❑ Description in syllabus must be consistent with catalog course description.
5. ❑ **Course Goals (general), and (see #6)**
6. ❑ **Student Learning Outcomes (more specific)**
7. **Instructional methods:**
   ❑ Describe the teaching techniques (eg: lecture, case study, small group discussion, private instruction, studio instruction, values clarification, games, journal writing, use of Blackboard, audio/video conferencing, etc.).
8. **Course calendar:**
   ❑ A schedule of class topics and assignments must be included. Be specific so that it is clear that the instructor has thought this through and will not be making it up on the fly (e.g. it is not adequate to say "lab". Instead, give each lab a title that describes its content). You may call the outline Tentative or Work in Progress to allow for modifications during the semester.
9. **Course policies:**
   ❑ Specify course rules, including your policies on attendance, tardiness, class participation, make-up exams, and plagiarism/academic integrity.
10. **Evaluation:**
    ❑ Specify how students will be evaluated, ❑ what factors will be included, ❑ their relative value, and ❑ how they will be tabulated into grades (on a curve, absolute scores, etc.) ❑ Publicize UAF regulations with regard to the grades of "C" and below as applicable to this course. (Not required in the syllabus, but may be a convenient way to publicize this.) Faculty Senate Meeting #171:
    http://www.uaf.edu/uafgov/faculty-senate/meetings/2010-2011-meetings/#171
11. **Support Services:**
    ❑ Describe the student support services such as tutoring (local and/or regional) appropriate for the course.
12. **Disabilities 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.
    ❑ State that you will work with the Office of Disabilities Services (208 WHITAKER BLDG, 474-5655)to provide reasonable accommodation to students with disabilities.

UAF		
	Course	GEOS F309 - TECTONICS
	Professor	Dr. Elisabeth Nadin
	Term	Spring 2013
	Meetings	T Th 9:15–10:45 am REIC 306

Professor's Contact Information

Office Phone	907-474-5181
Office Location	REIC 334
Email Address	enadin@alaska.edu
Office Hours	T Th 11 am – 2 pm
Other Information	

General Course Information

Pre-requisites, Co-requisites, & other restrictions	Prerequisite: History of Earth & Life (Geos 112). Pre- or Co-requisite: Petrography & Petrology (Geos F214) OR Rocks & Minerals (Geos F262). Instructor's permission may be granted.
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 and passive plate margins, including

	rock types, structures, and mechanisms of crustal growth and 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
Required Texts & Materials	Kearey, Klepeis, & Vine (2009) Global Tectonics (Third 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. Repetition of the 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

30% for your plate portfolio (bi-weekly assignments through the semester)
20% midterm
20% final
10% for two one-page explanations of short articles
10 % for oral presentation
10% attendance and participation (including leading discussions)

Up to 5 points extra credit (for attending Friday afternoon departmental seminar OR Chapman series seminar, 1 point each. Must get faculty signature and date for talk.)

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 write a one-page summary of the major points of the paper AND you will 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 the discussion. It will be useful for you to compile a list of targeted questions to ask your classmates, and a list of salient points (or crucial figures) from the paper. You may choose to hand out the questions the week before the class discussion, and the salient points during or after the discussion.

Plate Portfolio
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. Assignments will be bi-weekly and will cover: the size and major surface features of your plate; the types of boundaries around your plate; rates and directions of motion of your plate and neighboring plates; locations of major topographic features; earthquake locations and focal mechanisms; volcano locations both active and dormant; and tectonic history/major geologic events across your plate.

Class Schedule (* indicates supplementary information and reading)

Week 1: Introduction: Continental Drift
Kearey et al. Chapter 3 (14 p)
*Scotese, 2004. A Continental Drift Flipbook. J. Geology 112, 729-741

Week 2: Seafloor Spreading and Transform Faults
Kearey et al. Chapter 4 (17 pages)
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://gdcinfo.agg.nrcan.gc.ca/app/agegrid_e.html
Digital Isochrons of the World's Ocean Floor
http://emvc.geol.ucsb.edu/1_DownloadPage/Download_Page.html#GlobalTectonics
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

Week 3: The Framework of Plate Tectonics
Kearey et al., Chapter 5 (29 pages)
*DeMets et al., 1990, "Current Plate Motions" Geophys. J. Int'l. 101, 425-478
*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.
*Sella et al., 2002. "REVEL: A model for current plate velocities from space geodesy" J.Geophys. Res. 107, B4, 10.1029/2000JB000033, 2002
*Bird, 2003. "An updated digital model of plate boundaries" Geochemistry, Geophysics, Geosystems v. 4, no. 3, 1027, doi:10.1029/2001GC000252

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

Week 5: Continental rifts and rifted margins
Kearey Ch. 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
*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.
*Taylor, Goodliffe, and Martinez (1999) "How continents break up: Insights from Papua New Guinea. JGR v. 104, p. 7497-7512

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

Week 7: Continental Transforms and Strike-slip margins
Kearey et al. Ch. 8 (36 pages)

Week 8: Subduction Zones
Kearey et al. Ch. 9 (32p.)
http://emvc.geol.ucsb.edu/1_DownloadPage/Download_Page.html - GlobalTectonics 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, Ranero, and Vannucchi, 2004. Generic model of Subduction erosion. Geology 32, 913-916.

Week 9: Subduction Zones (cont'd.)

Week 10: Orogenic Belts
Kearey et al. Ch. 10 (56 p)
*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

Week 11: The Interior of the Earth—Crust and Lithosphere
Kearey et al.: Chapter 2 (42p)
*Morris, 2003. A paleomagnetic and rock magnetic glossary. Tectonophysics 377, 211-228
*Fault plane solutions: http://www.learninggeoscience.net/free/00071/
*Earthquake epicenters: http://neic.cr.usgs.gov/neis/epic/

Week 12: 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 13: The Interior of the Earth Lecture—Geophysical Techniques
Go to http://igppweb.ucsd.edu/~gabi/crust2.html to look at maps showing crustal thickness and thickness of sedimentary basins.
*Anderson, D.L. (1995) "Lithosphere, asthenosphere, and perisphere" Reviews of Geophysics v.33, p. 125-149.
*Mooney, Laske, and Masters 1998 CRUST 5.1: A global crustal model at 5° x 5° JGR 103, B1, 727-748

Week 14: The Mechanism of Plate Tectonics
Kearey et al. Ch. 12 (22p.)
Mantle plume/convection videos
*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, doi:10.1029/2007JB005460.

If there is time: Precambrian tectonics and the Supercontinent Cycle
Kearey et al. Ch. 11 (28p)
*Rollinson 2008. When did plate tectonics begin? Geology Today 23, 186-191.

Week 15: Student Presentations

Final Exam