LSC Use Only Proposal No:	UWUCC Use Only Proposal No: 14-979
LSC Action-Date:	UWUCC Action-Date: 11/20/14 Senate Action Date: 11/2/14

Curriculum Proposal Cover Sheet – University Wide Un

mittee Chair		College Curriculum Co
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Part II. Description of Curricular Change

1. SYLLABUS OF RECORD

I. Catalog Description

GEOS 362 Plate Tectonics (3c-3l-4cr)
Prerequisite: Grade of C or better in GEOS 201

Introduction to formal theory of plate tectonics. Topics include magnetic anomalies, first motion studies, thermal structures of the plates, kinematics, crustal generation, sea floor spreading, collision, and subduction deformation.

II. Course Objectives

1. Students will quantify constraints on lithospheric plate architecture and motion using paleomagnetic, seismic and geochronologic data.
2. Students will describe and understand modern and past plate motions using spherical geometry.
3. Students will relate rock lithologies and rock associations to unique plate tectonic settings.
4. Students will identify gaps in scientific knowledge through reading primary scientific literature on a plate tectonics topic of their choice, and craft a National Science Foundation-style research proposal to address the gaps in knowledge.

III. Course Outline

Lecture Schedule

A. Basis of a scientific revolution (4 hours)

Continental drift versus plate tectonics. Introduction to the rock record in the context of plate

F. Where three plate boundaries meet; i.e., triple junctions (4 hours)

Stability of triple junctions. Migration of triple junctions and implications for the rock record.

G. Plate interactions in velocity space (6 hours)

Velocity space diagrams. Methods for exploring spherical geometry.

H. Seismologic constraints on plate motion (4 hours)

Earthquake first-motion studies. Earthquake focal mechanisms and their relation to tectonic setting. The relation between fault kinematics and tectonic setting.

I. Exam 2 (1 hour)

J. Research proposal development (6 hours)

In-class roundtable discussions and "chalk talk" presentations on research proposals.

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IV. Evaluation Methods

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

Lecture exam 1	15%
Lecture exam 2	15%
In-class writing	5%
Research proposal	30%
Lab/Hands-on activities	20%

[redacted]

Total	100 %

V. Example Grading Scale

[redacted]

Gillis, K. M., Snow, J. E., Klaus, A., Abe, N., Adriao, A. B., Akizawa, N., Ceuleneer, G., Cheadle, M. J., Faak, K., Falloon, T. J., Friedman, S. A., Godard, M., Guerin, G., Harigane, Y., Horst, A. J., Hoshide, T., Ildefonse, B., Jean, M. M., John, B. E., Koepke, J., Machi, S., Maeda, J., Marks, N. E., McCaig, A. M., Meyer, R., Morris, A., Nozaka, T., Python, M., Saha, A., and Wintsch, R. P., 2014, Primitive layered gabbros from fast-spreading lower oceanic crust: Nature, v. 505, no. 7482, p. 204-207.

Ito, Y., Asano, Y., and Obara, K., 2009, Very-low-frequency earthquakes indicate a transpressional stress regime in the Nankai accretionary prism: Geophysical Research Letters, v. 36.

Jackson, J., 2002, Strength of the continental lithosphere; time to abandon the jelly sandwich?: GSA Today, v. 12, no. 9, p. 4-10.

Jagoutz, O., and Behn, M. D., 2013, Foundering of lower island-arc crust as an explanation for the origin of the continental Moho: Nature, v. 504, no. 7478, p. 131-134.

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IV. Students will develop effective scientific communication skills in both written and oral formats.

The theory of plate tectonics provides a profoundly unifying lens through which Earth processes

PREVIOUS SYLLABUS OF RECORD

A. Catalog description

GEOS 362 Plate Tectonics

2 lecture hours
3 lab hours
3 credits
(2c-3l-3cr)

Prerequisites: GEOS 131 and a minimum of 16sh of GEOS coursework

The impact of plate tectonic processes on different disciplines within the field of geology. Emphasis is placed on the relationship of plate tectonics relates to the global environment

Midterm Exam	30%
Final Exam	30%
Research Paper	30%
Oral Presentations	10%

Research paper and presentation:

[redacted]

McKenzie, D., and M.J. Bickle, The volume and composition of melt generated by extension of the lithosphere, *J. Petrol.*, 29, 625-679, 1988.

Morgan, J. P., Isotope topology of individual hotspot basalt arrays: mixing curves or melt extraction trajectories?, *Geochem., Geophys. Geosyst.*, 1, 1999GC000004, 1999.

Oxburgh, E.R., and D.L. Turcotte, Mid-ocean ridges and geotherm distribution during mantle convection, *J. Geophys. Res.*, 73, 2643-2661, 1968.

Plank, T., and C.H. Langmuir, Effects of the melting regime on the composition of the oceanic crust, *J. Geophys. Res.*, 97, 19749—19770, 1992.

Putirka, K. Melting depths and mantle heterogeneity beneath Hawaii and the East Pacific Rise: Constraints from Na/Ti and rare earth element ratios, *J. Geophys. Res.*, 104, 2817-2829, 1999.

Spear, F. S., Metamorphic phase equilibria and pressure-temperature-time paths, *Mineralogical Society of America Monograph*, Washington D. C., 799 p., 1993.

Takahashi, E., E. Ito E, Mineralogy of mantle peridotite along a model geotherm up to 700 km depth, in *High Pressure Research in Mineral Physics*, edited by M.H. Manghnani, and Y. Syono, *AGU*, pp 427-437, 1987.

van der Hilst, R. D., and H. Karason, Compositional heterogeneity in the bottom 1000