

Syllabus

GEOPHYSICS II: GLOBAL GEOPHYSICS

Luc Lavier, Harm van Avendonk.

January 19th 2011: **Introduction** (van Avendonk)

*Description of the class (Format of class, 55 min lectures)

*Office hours. We are available but please email before or tell us in class ahead of visit.

*Questionnaires

*Homework, mid terms and final, writing class.

*Examples of problems addressed in Global Geophysics.

January 21nd 2011: Basic plate tectonics on a sphere (van Avendonk)

January 23rd 2011: Rotations in plate tectonics (van Avendonk).

First Homework

January 24th 2011: Basic physics of the Earth magnetic field (Lavier, movies from Groetzinger)

January 26th 2011: Remnant Magnetization of Rocks (Lavier).

January 28th 2011: Paleo-magnetism and seafloor spreading (Lavier).

Second Homework

January 31st 2011: (Talwani, Pitman paper on sea floor spreading (Lavier).

February 2nd 2011: Earthquakes and dislocations (Aki) (van Avendonk)

February 4th 2011: Gutenberg-Richter laws (van Avendonk).

Third Homework

February 7th 2011: paper discussion on spectral slope (van Avendonk).

February 9th 2011: Introduction to gravity, Isostasy (Lavier).

February 11th 2011: Isostasy (Lavier).

Fourth Homework

February 14th 2011: Flexure (Lavier).

February 16th 2011: Admittance-Coherence. Read a paper on admittance (Lavier)

February 18th 2011: Geoid (Lavier)

Fifth Homework

February 21st 2011: Sealevel variations and Geoid (paper discussion) (Lavier).

February 23nd 2011: Stress strain relationships (van Avendonk).

February 25th 2011: Wave equation (van Avendonk).

Sixth Homework

February 28th 2011: Solutions to the wave equations (P, S, Surface waves) (van Avendonk).

March 2nd 2011: Basic refraction seismology (van Avendonk).

March 4th 2011: paper discussion (basic tomography, plume in Iceland) (van Avendonk).

Seventh Homework

March 7th 2011: Shear wave splits (van Avendonk).

March 9th 2011: Review.

March 11th 2011: Midterm exam (take home).

SPRING BREAK (March 14th – 19th)

March 21st 2011: Paper discussion on shear wave splits beneath continents (van Avendonk).

March 23rd 2011: Heat in the Earth (sources and sink) (Lavier).

March 25th 2011: Heat flow equation (advection diffusion) (Lavier).

Eighth Homework (Peclet number).

March 28th 2011: Geotherm and adiabats (Lavier).

March 30th 2011: Erosion and cooling. Thermochronology (Lavier).

April 1st 2011: Heat flow in oceans (Lavier).

Ninth Homework

April 4th 2011: (Parsons and Sclater 1977) (van Avendonk).

April 6th 2011: seismic structure of whole Earth (van Avendonk).

April 8th 2011: Rheology (Brittle/ductile) (Lavier).

Tenth Homework

April 11th 2011: Moho discontinuity (petro/seismic) (van Avendonk).

April 13th 2011: Continent-Ocean rheology/earthquakes (Lavier).

April 15th 2011: Jelly sandwich (Lavier).

April 18th 2011: Lithosphere Aesthenosphere boundary (van Avendonk).

April 20th 2011: Stoke's flow (Lavier).

April 22nd 2011: Mantle convection (Lavier).

Eleventh Homework

April 25th 2011: paper on mantle stratification (van Avendonk).

April 27th 2011: Subduction (Guest?).

April 29th 2011: D'' structure and origin (Eh Tan).

May 2nd 2011: MagnetoHydrodynamics of the core paper (Lavier, van Avendonk)

May 4th 2011: Paper presentations.

May 6th 2011: Paper presentations.

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Midterm: Take home exam.

Final: paper

Grade, Homework (includes paper resume) 35 %, Midterm (Take home) 15 %, paper presentation 10%, final paper 40%.

12 min presentation in groups of 2 students with Powerpoint or Pdf (AGU format).