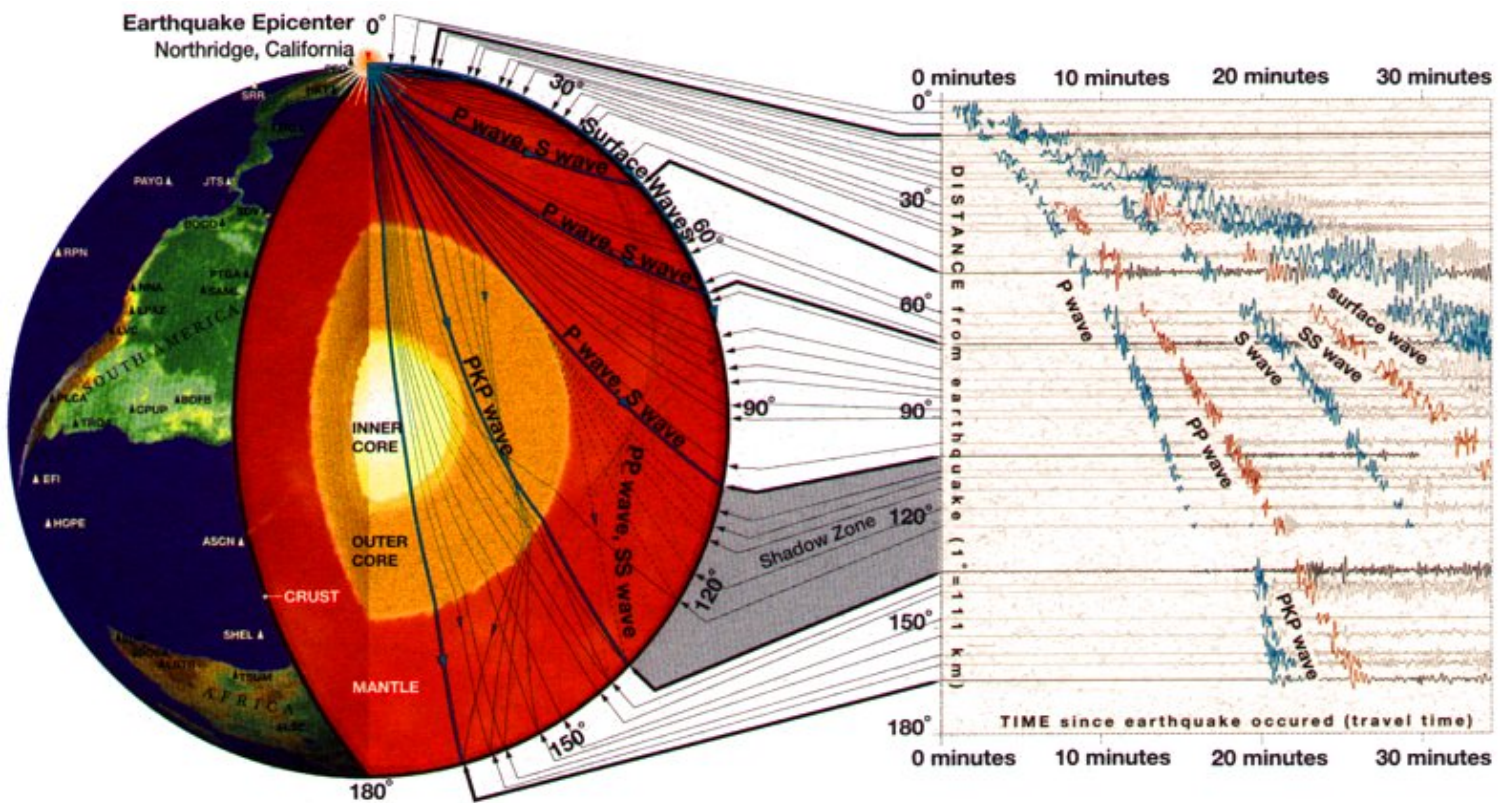


EOS/PHYS 210

Introductory Geophysics

September–December, 2017



Example of geophysical remote sensing: Earthquake-generated seismic waves penetrate the Earth, providing information on deep interior structure (IRIS Educational Materials).

COURSE OUTLINE
University of Victoria
School of Earth and Ocean Sciences
Department of Physics and Astronomy

EOS/PHYS 210
Introductory Geophysics

Fall 2017 (Term 201709, A01)

Class Schedule:

Tuesdays, Wednesdays & Fridays, 9:30–10:20, COR B135

Instructor:

Dr. Stan Dosso

Office: Room A409 (SEOS Director's Office), Bob Wright Centre

Email: sdosso@uvic.ca (please include "EOS 210" or "PHYS 210" in the subject line)

Office Hours: 1:30–3:00 Mondays (but check any time or make an appointment by email)

Teaching Assistant:

Carlos Herrera (SEOS PhD student in Earthquake Seismology)

Office: B313, Wright Centre for Ocean, Earth and Atmospheric Sciences

Email: carlosfherrera@uvic.ca (include "EOS 210" or "PHYS 210" in subject line)

Course Description:

Introduction to seismology, gravity, geomagnetism, paleomagnetism and heat flow, and how they contribute to our understanding of whole Earth structure and plate tectonics.

Prerequisites:

One of PHYS 110, 112, 120 or 122; MATH 100 and 101.

Text:

R. J. Lillie, 1999. *Whole Earth Geophysics: An Introductory Textbook for Geologists and Geophysicists*, Prentice Hall, Toronto. Selected topics from Chapters 1–10.

Course Website:

The course website is on the UVic CourseSpaces system. Go to coursespaces.uvic.ca and enter your UVic NetLink ID and password. You should then find a list of your courses including EOS 210 or PHYS 210.

Assignments, handouts, etc. will be available as pdf files at this site. Class notes will be posted at the end of the week they are given in class as an additional resource. *Please attend classes and take notes!*

Grading:

Weekly Assignments (8 or 9)	— 20 %
Midterm Exam 1 (Oct. 11)	— 20 %
Midterm Exam 2 (Nov. 17)	— 20 %
Final Exam (within Dec. 4–18)	— 40 %

Notes:

- Assignments are due in class one week after they are given out in class (also posted at course website).
- If you miss a midterm exam contact me as soon as possible. For valid reasons (e.g., documented illness) the value of a missed midterm will be added to the final exam. If two midterms are missed, a make-up exam must be scheduled.
- All requests for Deferred Status for the final exam must be made at Records Services on a Request for Academic Concession form.
- Marks will be posted at the course website using student numbers. Any student not wanting his/her marks posted must inform the Instructor at the beginning of the course.
- Useful dates: Sept. 22 is the last day for adding a course. Oct. 31 is the last day for withdrawal without penalty of failure. Exam period: Dec. 4–18.
- Any instances of cheating or plagiarism will be acted upon. Students are advised to refer to the UVic policy on Academic Integrity found at web.uvic.ca/calendar/FACS/UnIn/UARe/PoAcI.html

Grade Equivalences at UVic:

Percentage	Letter Grade	Num. Grade	Standing
90–100	A+	9	1st Class
85–89	A	8	
80–84	A–	7	
77–79	B+	6	2nd Class
73–76	B	5	
70–72	B–	4	
65–69	C+	3	Pass
60–64	C	2	
50–59	D	1	
< 50	F	0	Fail

Course Outline:

The following is an approximate outline for EOS/PHYS 210. The text will provide a useful reference for most of the material. Note that several topics will be covered that are not in the text, and a number of topics in the text will not be included in the course.

1. **Introduction** (Text pages 14–44; Approximately 3 classes)

- What is Geophysics?
- Basic Geophysical Approaches
- Basic Earth Structure (crust/mantle/core; lithosphere/asthenosphere)
- Basic Plate Tectonics (plate margins; tectonic cycle)
- Juan de Fuca Plate system

2. **Seismic Waves in the Earth** (Text pages 45–59; Approximately 6 classes)

- Elastic properties of solids (stress and strain, Hooke's law, bulk modulus, shear modulus, Young's modulus, Poisson's ratio)
- Body waves (compressional and shear waves)
- Surface waves (Rayleigh and Love waves; wave dispersion)
- Wave propagation losses (geometric spreading, absorption)
- Waves at boundaries: Reflection, refraction, conversion; Snell's law

3. **Seismic Refraction** (Text pages 59–96; Approximately 4 classes)

- Critical refraction
- Slope-intercept method (single and multiple layers)
- Crustal structure and thickness

4. **Seismic Reflection** (Text pages 100–111; Approximately 4 classes)

- Reflection time-distance curves (single and multiple layers, Dix inversion)
- Imaging the subsurface: Seismic data processing (velocity analysis, normal moveout, stacking, migration)
- Seismic images of geologic/tectonic features

5. **Earthquake Seismology** (Text pages 185–205; Approximately 6 classes)

- Earthquake mechanisms and locations (normal/reverse/strike-slip faults; earthquakes at tectonic margins)
- Locating earthquakes (uniform-velocity method; time-distance curves)

- Earthquake intensity and magnitude scales (Mercalli intensity; Richter magnitude, surface-wave magnitude, body-wave magnitude, moment magnitude)
- Earthquake seismograms and Earth structure

6. **Gravity and Isostasy** (Text chapter 8; Approximately 6 classes)

- Gravity on the Earth's surface
- Measuring gravity
- Gravity corrections and anomalies (latitude adjustment, elevation adjustment, excess mass adjustment, Bouguer gravity anomaly)
- Isostasy
- Gravity and geologic/tectonic features

7. **Heat Flow** (Text chapter 10; Approximately 4 classes)

- Heat sources within the Earth
- Heat transfer (conduction, convection, radiation)
- Heat-flow equation
- Heat flow measurements
- Radial temperature variation
- Oceanic heat flow and evolution of oceanic crust
- Heat as a driving force for plate tectonics

8. **Magnetic Methods** (Text chapter 9; Approximately 4 classes)

- Source of magnetic field (geodynamo)
- Earth's magnetic field (axial dipole model)
- Magnetic induction and susceptibility
- Magnetization and magnetic anomalies
- Paleomagnetism (geomagnetic polarity time scale)
- Oceanic magnetic anomalies and plate kinematics