Course 206-23481 Flow, fracture, and yielding of planetary materials

Ben-Gurion University of the Negev

Department of Geological and Environmental sciences

Spring semester, 2020

Instructor: Dr. Yuval Boneh / bonehyuv@bgu.ac.il / Room 333 (building 58) / Office hours TBD

Pre-requisite: Structural Geology (course 206-12311), English (classes will be given in English)

Course structure: 2 weekly hours of class

Evaluation: Homework – 30%

Mid-semester test – 30%

Final project – 40%

Textbook:

(1) "Deformation of Earth Materials : An Introduction to the Rheology of Solid Earth" - Shun Karato, Cambridge University Press, 2012.
(2) "Creep of crystals: high-temperature deformation processes in metals, ceramics and minerals" - Jean-Paul Poirier, 1985.

Course topics:

(1) Stress & strain – the whole story
(2) Introduction to Rheology – the study of material strength
(3) Linear elasticity, brittle failure, and acoustic emissions
(4) Friction sliding – the strength of the lithosphere

(5-7) Creep 'flow' of rocks (lower crust, mantle)
Plastic deformation (I) – Diffusion creep
Plastic deformation (II) – Dislocation creep
Plastic deformation (III) – Deformation mechanism maps

(8) The strength of the Earth's crust and mantle through experimental data

(9) The brittle - ductile transition and global seismicity

(10) Modeling material response: Viscoelastic Burgers model

(11) Final project