

Environmental Geomechanics – Geology 462/562

Winter 2018, MW 2:00-3:20, Col. 254

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This course focusses on the mechanics of solids and fluids and their interactions in the near-surface environment. We take a quantitative approach and discuss useful strategies for modeling the behavior of a range of systems, including problems involving phase changes, soil mechanics, thin viscous flows, inviscid flows, suspensions and rheology, fault mechanics, and fracture mechanics.

Course Theme:

To provide focus, we'll center the class around the mechanics of fast glacier flow, which involves aspects of all of the problem types listed above, and is also the subject of 4 of the first 5 Earth Sciences seminars this quarter (Wednesdays at 4pm in Willamette 110).

Tentative Schedule:

- (1) Introduction and context. Balance equations. Seminar 01/10 Colin Meyer.
- (2) MLK day – no class 01/15; Scaling. Seminar 01/17 Kiya Riverman.
- (3) Lubrication flows. Dynamical Systems. Seminar 01/24 Alex Robel.
- (4) Rheology, non-Newtonian flows, fabric and suspensions.
- (5) Instability analysis and pattern formation. Seminar 02/07 Elisa Mantelli.
- (6) Phase changes. Stefan problems. Till and mush.
- (7) Inviscid fluid flow. Drainage descriptions.
- (8) Sliding, friction, effective stress, dilatancy.
- (9) Fracture mechanics, calving.
- (10) Bedforms. Presentations.

Grading:

Homework: 40%

Term Paper (written and oral): 40%

Final Exam (oral – during Exam week): 20%

Office Hours:

Alan – 2-4pm Thursdays; Colin – 2-4pm Tuesdays

email for an appointment at other times (or stop by and take your chances)