This course has been taught to Stanford students for a number of years and was filmed in 2014. It was first available as a free Massive Open Online Course (MOOC) in the spring of 2014. It is available now as a MOOC for the fourth time with the same lectures but modified homework problems. To date, approximately 7000 students have successfully completed the course. Eighteen of the twenty lectures follow Mark Zoback’s text, *Reservoir Geomechanics*, originally published in 2007—now in its 12th printing. The book is available from Cambridge University Press or Amazon. Chinese and Russian editions are available.

Two lectures (referred to as Units) are made available online each week throughout the ten-week course. Each lecture is broken into ~15 minute segments that can be viewed by students at their convenience.

Those who correctly complete 70% of the 8 homework assignments will receive a statement of accomplishment shortly after the course is completed. The homework assignments are due two weeks after being assigned (see schedule below). **The 8 homeworks will be due on Tuesday mornings at 07:30 AM UTC time.** In many cases, local times will be earlier than UTC times, so make sure that you know your local time zone in UTC! Solutions will be posted shortly after the homework is due. Therefore, the homework must be submitted on time and extensions are not permitted.

Because there are thousands of students in this free course, it is not feasible for us to answer questions or handle individual requests by email. We try to address the most common and pressing issues through Piazza, the online discussion forum, so please check there when a question arises. A link to Piazza is provided on the course website, in the top menu. We have been encouraged in past classes to see students helping each other on the discussion forum, and we urge you to contribute to it.

— Prof. Mark Zoback

TAs Gader Alalli and Jens-Erik Lund Snee

Class email: resgeo202@gmail.com
Week 1 (Posted Online 3 April)
Unit 1 – Course Overview
Unit 2 – (Ch. 1 of Reservoir Geomechanics) The Tectonic Stress Field
HW1 Assigned: Calculating Overburden Stress

Week 2 (Posted Online 10 April)
Unit 3 – (Ch. 2) Pore Pressure at Depth
Unit 4 – (Ch. 3) Basic Constitutive Laws
HW2 Assigned: Estimating the Onset of Overpressure

Week 3 (Posted Online 17 April)
Unit 5 – (Ch. 4) Rock Strength
Unit 6 – (Ch. 5) Fault Friction and Crustal Strength
HW1 Due 18 April; HW3 Assigned: Estimating Rock Strength from Geophysical Logs

Week 4 (Posted Online 24 April)
Unit 7 – (Ch. 5) Faults and Fractures
Unit 8 – (Ch. 6) Stress Concentrations around Vertical Wells
HW2 Due 25 April; HW4 Assigned: Calculating Limits on Crustal Stresses

Week 5 (Posted Online 1 May)
Unit 9 – (Ch. 7) Hydraulic Fracturing, Measuring \( S_{min} \) and Constraining \( S_{Hmax} \)
Unit 10 – (Ch. 8) Failure of Deviated Wells
HW3 Due 2 May; HW5 Assigned: Analysis of Fractures in Image Logs

Week 6 (Posted Online 8 May)
Unit 11 – (Ch. 9) State of Stress in Sedimentary Basins
Unit 12 – (Ch. 10) Wellbore Stability I
HW4 Due 9 May; HW6 Assigned: Analysis of Stress-Induced Wellbore Failures

Week 7 (Posted Online 15 May)
Unit 13 – (Ch. 10) Wellbore Stability II
Unit 14 – (Ch. 11) Critically-Stressed Faults and Fluid Flow
HW5 Due 16 May; HW7 Assigned: Identifying Critically-Stressed Faults

Week 8 (Posted Online 22 May)
Unit 15 – (Ch. 11) Fault Seal and Dynamic Constraints on Hydrocarbon Migration
Unit 16 – (Ch. 12) Effects of Depletion, Reservoir Stress Paths
HW6 Due 23 May; HW8 Assigned: Building a Geomechanical Model

Week 9 (Posted Online 29 May)
Unit 17 – (Ch. 12) Compaction of Weak Sands and Shales, Surface Subsidence
Unit 18 – Geomechanics of Shale Gas and Tight Oil Production I
HW7 Due 30 May

Week 10 (Posted Online 5 June)
Unit 19 – Geomechanics of Shale Gas and Tight Oil Production II
Unit 20 – Geomechanics and Induced and Triggered Seismicity
HW8 Due 6 June