

Computational Reservoir Geomechanics
Derek Elsworth
ShanDong University, Jinan, China
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http://www.ems.psu.edu/~elsworth/courses/comp_res_geomechs/2019/
<http://www.youtube.com/derekelsworth>

Day 1 (Monday February 18th)

1. Reactive Flow and Permeability Dynamics – I [09:00-10:15]*
2. Reactive Flow and Permeability Dynamics – II [10:30-11:45]*
----- Lunch ----- [11:45-14:30]
3. **Introduction to Computational Reservoir Geomechanics [1:1] [Self-Study]**
4. Fluid Flow and Pressure Diffusion [2:-]
 - a. Finite Element Methods [2:1] [14:30-15:45]
 - b. Conservation Equations and Galerkin Approximation [2:2] [16:00-17:15]

Day 2 (Tuesday February 19th)

1. Fluid Flow and Pressure Diffusion, [2:-] Continued
 - a. 2D Triangular Constant Gradient Elements [2:3] [09:00-10:15]
 - b. 1D Isoparametric Elements [2:4] [10:30-11:45]
 - c. **2D Isoparametric Elements and Numerical Integration [2:5] [Self-Study]**
 - d. **Transient Behavior – “Mass” Matrices [2:6] [Self-Study]**
 - e. **Transient Behavior – Integration in Time [2:7] [Self-Study]**

Day 3 (Wednesday February 20th)

1. **Mass Transport [3:-]**
 - a. **Conservation of Mass and 1D Models [3:1] [Self-Study]**
 - b. **2D Constant Gradient Elements [3:2] [Self-Study]**
 - c. **Sorption and Reactive Transport [3:3] [Self-Study]**
2. **Momentum Transport [4:-]**
 - a. **Self Study – Fluids, Navier-Stokes Equations [4:1] [Self-Study]**

Day 4 (Thursday February 21st)

1. **Seismicity-permeability Coupling in Breaching and Sealing of Caprocks [Self-Study]***
2. Solid Mechanics [5:-]
 - a. 1D and 2D Elements [5:1] [09:00-10:15]
 - b. **Self Study – Constitutive Equations [5:2] [Self-Study]**
 - c. **Self Study – Preamble for Coupled Systems [5:3] [Self-Study]**

Day 5 (Friday February 22nd)

1. “Coupled” Multiphysics Systems [6:-]
 - a. Dual-Porosity/Dual-Permeability Models [6:1] [09:00-10:15]
 - b. Coupled Hydro-Mechanical Models [6:2] [10:30-11:45]
 - c. **Self-Study – ComSol Models for HM Coupling [6:3] [Self-Study]**
 - d. **Self-Study – EGEEfem Models for HM Coupling [6:4] [Self-Study]**