

Mechanics of Deformable Porous Media

InterPore Academy Short Course

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August 3–6, 2026 (Mon–Thu)

4 sessions $\times$ 3 hours = 12 hours total, fully online

Level: Bachelor/Master

Day 1: Foundations

- Slot 1 (1.5 hrs): Continuum mechanics essentials — stress, strain, constitutive laws
- Slot 2 (1.5 hrs): Calculus of variations — functionals, Euler–Lagrange, boundary conditions

Day 2: Energy Methods and Dissipation

- Slot 1 (1.5 hrs): Virtual work, strain energy, principle of minimum energy, Castigliano
- Slot 2 (1.5 hrs): Dissipation potentials, extending variational principles to irreversible systems

Day 3: Plasticity and Fracture

- Slot 1 (1.5 hrs): Plasticity — yield surfaces, flow rules, hardening, connection to dissipation
- Slot 2 (1.5 hrs): Phase-field fracture — Griffith, regularization, coupled PDEs, irreversibility

Day 4: Finite Strains and Pore-Scale Modeling

- Slot 1 (1.5 hrs): Finite strain mechanics — deformation gradient, hyperelasticity, inelasticity
 - Slot 2 (1.5 hrs): Pore-scale modeling — CT images to stress, nucleation, research examples
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Notes:

- Course is free for InterPore members.
- Material and recording enabled by NSF CAREER grant #CMMI-2145222.
- Day 4 content (finite strains, pore scale) is flexible.