

## CE 234 Computational Inelasticity

### **Instructor:**

Francisco Armero  
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Office hours: To be announced.

**Location and time:** To be announced.

**Textbook:** J.C. Simo & T.J.R. Hughes, "Computational Inelasticity" (Springer Verlag, 1998) with additional material given for newer and more advanced topics.

### **Grading system:**

Grades will be based on homework assignments and the final exam. The final exam is planned to be take-home.

### **Topics to be covered:**

1. One dimensional plasticity and viscoplasticity.
2. Integration algorithms for 1-D plasticity and viscoplasticity; the elastoplastic problem.
3. Multi-dimensional plasticity, thermodynamics and dissipation.
4. Integration algorithms for plasticity and viscoplasticity; general return mapping algorithms (operator splits, closest-point projection,...).
5. Weak formulations and finite element implementation; consistent linearization.
6. Nonlinear stability of integration algorithms for plasticity and viscoplasticity.
7. Review of nonlinear continuum mechanics; finite elasticity.
8. Hypoelastic plasticity models; objective integration algorithms.
9. Multiplicative finite strain plasticity.
10. Integration algorithms for multiplicative plasticity.
11. Coupled theories: thermo-plasticity, poro-plasticity.
12. Extensions(time permitting, following class interests): damage, variational theories and relaxation,...