**ME125RM/225RM Chemo-Mechanics: The Intersection of Solid Mechanics and Chemistry**

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**Abstract:** Chemo-Mechanics is an old subject in engineering, dating back at least as far as the invention of gunpowder in China during the Tang dynasty. Steam and internal combustion engines increased the engineering importance of the subject, and, of course, the nature of the mechanical properties of materials is fundamentally an issue of their chemistry. Today there are a large number of additional topics where the intersection of solid mechanics and chemistry is of importance. Subjects such as corrosion and oxidation, lithium-ion batteries, biological cell mechanics, and the behavior of gels and elastomers are all areas where interactions between chemistry and solid mechanics influence the state of the system.

The class will cover basic thermodynamics, the role of chemistry and mechanics in thermodynamics, and the issue of kinetics when the system is not in thermodynamic equilibrium. Emphasis will be placed on the thermodynamics of deformable solids, with mechanical stress, chemical reactions, other chemical phenomena, and species transport included in the formulation. As indicated above, examples will be selected from oxidation and corrosion, electrochemical energy conversion and storage, the behavior of gels and elastomers, biological cell mechanics, and other topics.