Theoretical and Applied Mechanics

TAM 598  **Advanced Special Topics**  credit: 1 TO 4 hours.
Subject offerings of new and developing areas of knowledge in theoretical and applied mechanics intended to augment the existing curriculum. See Class Schedule or departmental course information for topics and prerequisites. May be repeated in the same or separate terms if topics vary to a maximum of 12 hours.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>69007</td>
<td>Lecture</td>
<td>HTJ</td>
<td>02:00 PM - 03:50 PM</td>
<td>TR</td>
<td>106B3 - Engineering Hall</td>
<td>Johnson, H</td>
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<tr>
<td>60164</td>
<td>Lecture-Discussion</td>
<td>RE</td>
<td>01:00 PM - 02:50 PM</td>
<td>MW</td>
<td>305 - Materials Science &amp; Eng Bld</td>
<td>Ewoldt, R, Singh, P</td>
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Credit Hours: 4 hours
Atomistic Solid Mechanics
Restricted to Graduate - Urbana-Champaign.
Advanced solid mechanics topics based on an atomistic perspective: empirical, semi-empirical, and first-principles atomistic total energy descriptions; atomistic stress, strain, and displacement definitions; atomistic elasticity theory and fitting of interatomic potentials; algorithms for total energy minimization; boundary value problems involving point, line, and planar defects.

Credit Hours: 4 hours
Non-Newt Fl. Mech. & Rheology
This course will provide a basic foundation in the mechanics and rheology of structurally complex liquids whose behavior can be modeled as a continuum but cannot be modeled as Newtonian with constant viscosity. Key ideas include rheological property measurement, tensorial constitutive models, flow calculations, basic structure-property relations, and design with nonlinear viscoelastic properties. Concepts will apply to a diverse range of materials such as polymer solutions, polymer melts, colloidal suspensions, emulsions, foams, pastes, biological fluids, biological gels, hydrogels, active soft matter, nano-composites, and inks. PREREQUISITES A general knowledge of ordinary and partial differential equations is required. Introductory coursework in mechanics (fluid, solid or continuum) is necessary. Intermediate fluid dynamics is strongly suggested (e.g. TAM 435).