## AIRCRAFT 416: Theory of Plates and Shells

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<thead>
<tr>
<th>COURSE #: AE 416</th>
<th>COURSE TITLE: THEORY OF PLATES AND SHELLS</th>
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<tr>
<td>TERMS OFFERED: Winter every third year</td>
<td>PREREQUISITES: Aero 315</td>
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<td>INSTRUCTOR(S): Triantafyllidis, Karr (Naval/Marine Engin.)</td>
<td>SCIENCE/DESIGN CREDITS: 3/0 (elective course)</td>
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**CATALOG DESCRIPTION:**

**COURSE TOPICS:**
1. Classical Membrane, Plate and Shell Theories.
2. Energy Formulations.
3. Consistent derivation of boundary conditions and edge effects.
4. Vibration and instabilities in membrane, plates and shells.
5. Numerical approximations such as the Finite Element method.

**COURSE OBJECTIVES**
1. Introduce students to the classical structural mechanics approximations of Membrane, Plate and Shell theories.
2. Use energy formulations to demonstrate the consistent derivation of approximate boundary conditions and edge effects.
3. Demonstrate the analysis tools necessary to describe static, dynamic and non-linear motions.
4. Demonstrate the approximation of the classical formulations using numerical approximation techniques.

**COURSE OUTCOMES**
On completion of Aero 416, students can:
1. Apply the structural mechanics approximations of membrane, plates and shells. (Assessed by: 1,2,3)
2. Derive simple modifications to the membrane plate and shell theories. (Assessed by: 1,2,3)
3. Use analysis to determine the static, dynamic, and non-linear motion of membrane, plate and shell structures. (Assessed by: 1,2,3)
4. Compute numerical approximations. (Assessed by: 1,2,3)

**ASSESSMENT TOOLS**
1. Individual homework.
2. Hourly exams.
3. Final exam.

Updated: May 2005