Aero 524: Aerodynamics II

<table>
<thead>
<tr>
<th>COURSE #: AE 524</th>
<th>COURSE TITLE: AERODYNAMICS II</th>
</tr>
</thead>
<tbody>
<tr>
<td>TERMS OFFERED: Winter</td>
<td>PREREQUISITES: Aero 325</td>
</tr>
<tr>
<td>INSTRUCTOR(S): Powell, Roe</td>
<td>SCIENCE/DESIGN CREDITS: 2/1 (elective course)</td>
</tr>
</tbody>
</table>

**CATALOG DESCRIPTION:**
Two- and three-dimensional potential flow about wings and bodies; complex-variable methods; singularity distributions; numerical solution using panel methods. Unsteady aerodynamics; slender-body theory. Viscous effects: airfoil stall, high-lift systems, boundary-layer control. Wings and bodies at transonic and supersonic speeds; numerical methods.

**COURSE TOPICS:**
1. Applications of complex-variable methods to potential flows.
2. Panel methods for 2D flows.
3. Effects of airfoil flaps and slats.
4. Vortex-lattice techniques for 3D flows.
5. Slender-body and slender-wing theory.
6. Aerodynamics of supercritical flight.
7. Wings and bodies at supersonic speeds.
8. Euler and Navier-Stokes CFD methods for aerodynamics.

**COURSE OBJECTIVES**
1. To introduce students to panel and vortex-lattice methods for computing potential flows.
2. To extend students’ knowledge of induced drag.
3. To introduce students to slender-body and slender-wing theory.
4. To teach students the aerodynamics of transonic flows.
5. To introduce students to modern CFD tools for aerodynamic analysis.

**COURSE OUTCOMES**
On completion of Aero 524, students can:
1. Use complex-potential superposition and conformal mapping for simple 2D potential flows. (Assessed by: 1)
2. Develop a 2D panel method for lifting airfoils. (Assessed by: 1,2,3,4)
3. Describe qualitatively the effects of leading-edge slats and trailing edge flaps on airfoil aerodynamics. (Assessed by: 2,3)
4. Describe the vortex-lattice technique. (Assessed by: 1,2)
5. Describe qualitatively the transonic flow pattern over a supercritical airfoil. (Assessed by: 1,2)
6. Develop a 2D Euler solver. (Assessed by: 4)

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

Generated: May 1999
Updated prereq. course number: April 2005