# Aero 545: Principles of Helicopter and V/STOL Flight

<table>
<thead>
<tr>
<th>COURSE #: AE 545</th>
<th>COURSE TITLE: PRINCIPLES OF HELICOPTER AND V/STOL FLIGHT</th>
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<tbody>
<tr>
<td>TERMS OFFERED:</td>
<td>PREREQUISITES: Aero 414 or Aero 540</td>
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<td>INSTRUCTOR(S): Friedmann</td>
<td>SCIENCE/DESIGN CREDITS: 2/1 (elective course)</td>
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## CATALOG DESCRIPTION:
Introduction to helicopter performance, aerodynamics, stability and control, vibration and flutter. Other V/STOL topics of current interest.

## COURSE TOPICS:
2. Rotor blade aerodynamics.
3. Flow states.
4. Rotor dynamics.
6. Other VTOL concepts.

## COURSE OBJECTIVES
1. Teach students methods for elementary performance analysis of helicopters.
2. Teach students methods for describing forces acting on a rotor blade element.
3. Give students an understanding of a variety of flow states corresponding to different flight conditions.
4. Teach students approximate analytical methods for prediction of stability derivatives and description of helicopter responses to small disturbances.
5. Familiarize students with the issues to be considered in aeroelastic analysis of rotors.
6. Acquaint students with some of the other ideas that have been proposed for VTOL flight.

## COURSE OUTCOMES
1. Estimate power required for a helicopter in hover and forward or-blade section lift and drag coefficients under simple flow conditions.
2. Give performance estimates for climb, powered descent, and autorotative descent.
3. Recognize various flow states in which a rotor might operate.
4. Determine approximate trim requirements for level forward flight.
5. Calculate approximate stability derivatives for hovering helicopter.
6. Describe dynamic response of helicopter to abrupt hinges in blade pitch.
7. Understand major aeroelastic effects.

## ASSESSMENT TOOLS
1. Individual homework.
2. Hour exams.
3. Final exam.

Updated: May 2005