THE UNIVERSITY OF TEXAS AT AUSTIN
Department of Aerospace Engineering and Engineering Mechanics

ASE 396 Rotary Wing Aircraft
Fall 2012

SYLLABUS

Unique Number: 13885

Instructor: Dr. Jayant Sirohi
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Time: MWF 1100-1200 hrs
Location: WRW 312
Office hours: MWF 1300-1400hrs or by prior arrangement.

Prerequisite: Basic aerodynamics and structural dynamics.

Class Outline/ Schedule:
The schedule given below is approximate.

- **Week 1:** Historical development of rotorcraft and types of rotary wing aircraft.
- **Week 2-4:** Basic momentum theory. Behavior in axial flight and forward flight. Rotor working states, power curve and figure of merit.
- **Week 5-6:** Blade element momentum theory. Ideal twist and taper distribution. Autorotation and gyrocopters.
- **Week 7-8**: Unsteady aerodynamics. Theodoresens theory, Wagners function, Kussners function , Sears function.
- **Week 9-11:** Rotorcraft trim. Rigid flap, lag and torsion. Elastic blade motion. Rotor loads, multi-blade coordinate transform, Floquet theory.
- **Week 12-13**: Rotor divergence and flutter. Pitch flap stability. Flap lag stability.
- **Week 14-15:** Introduction to rotorcraft performance and weights.

Grading:
Grades are based on homework assignments (50%) a mid-term exam (20%) and a final exam (30%).

Recommended Textbooks:

- *Helicopter Theory*, Wayne Johnson, Dover Publications, October 1994, ISBN-13: 978048668230
- *Principles of Helicopter Aerodynamics, 2nd Edition*, J. Gordon Leishman, Cambridge University Press, January 2006, ISBN-13: 9780521858601
- *Introduction to Helicopter and Tiltrotor Simulation*, Mark E. Dreier, American Institute of Aeronautics & Astronautics, January 2007, ISBN-13: 9781563478734
- *Helicopter Performance, Stability and Control,* Raymond R. Prouty, Krieger Publishing Company, December 2001, ISBN-13: 9781575242095.

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Prepared by: Dr. Jayant Sirohi **Date:** 21 August 2012