

AE 301 Aerodynamics I

Introduction to Aerodynamics and Airplane Performance

8/26/2004

Course Requirements

- Homework - 10%
 - Used primarily as an aid for your learning
 - Group work strongly encouraged. That doesn't mean copying others mistakes!
- Mid-term Exams - 2 at 20% each
 - Closed book, one cheat sheet, individual effort
- Design Project - 20%
 - Team project concentrating on Aerodynamics portion of course
- Final - 30%
 - Open book, comprehensive, individual effort

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Semester Topics

- Text: **Introduction to Flight**, John Anderson
- Aerodynamics
 - History of Airplanes
 - Fundamentals
 - Standard Atmosphere
 - Mass and Momentum Conservation
 - Thermodynamics
 - Airspeed and the Speed of Sound
 - Viscous Effects
 - Airfoil Definitions and Force Coefficients
 - Pressure Coefficients
 - Critical and Drag Divergent Mach Numbers
 - Wave Drag and Total Airfoil Drag
 - Finite Wings and Induced Drag
 - Lift Curve Slope and Swept Wing Effects
- Performance
 - Equations of Motion and Thrust
 - Power Required and Available
 - Altitude Effects on Power
 - Rate of Climb, Gliding
 - Ceilings
 - Time to Climb
 - Range
 - Endurance
 - Takeoff Performance
 - Landing Performance
 - Maneuvering Flight
 - V-n Diagrams

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History of Airplane Development

- Montgolfier Brothers (~1793)
 - Hot air balloons
- Sir George Cayley (1773-1857)
 - Modern airplane configuration with manned gliders
- Otto Lilienthal (1848-1896)
 - Advanced aerodynamics and hang glider design
- Samuel Langley (1834-1906)
 - Moved aviation into mainstream scientific circles
- Wright Brothers (~1903)
 - First sustained, manned flight and lateral flight controls
