

THE DEPARTMENT OF AERONAUTICS AND ASTRONAUTICS

AA 311 ATMOSPHERIC FLIGHT MECHANICS

AUTUMN QUARTER

CREDITS AND

CONTACT HOURS: 4 credits, Three 50-minute lectures per week. One 50-minute period review.

COORDINATOR: Robert Breidenthal, Professor of Aeronautics and Astronautics

TEXTBOOK: Introduction to Flight, Anderson, John M., McGraw Hill, 7th Ed. 2011

SUPPLEMENTAL MATERIAL: Aerodynamics, Aeronautics and Flight Mechanics, McCormick, B.W., John Wiley, New York, 1995 (2nd Edition).

CATALOG DATA: ATMOSPHERIC FLIGHT MECHANICS, Required
Applied aerodynamics, aircraft flight "envelope," minimum and maximum speeds, climb and glide performance. Range and endurance, take-off and landing performance, using both jet and propeller power plants. Longitudinal and dynamic stability and control, wing downwash, stabilizer and elevator effectiveness, power effects. Lateral and directional stability and control.
Prerequisite: Junior Standing. Offered: A.

PREREQUISITES BY TOPIC:

- 1) Calculus and analytic geometry
- 2) Differential equations
- 3) Engineering dynamics

OUTCOMES:

- 1) Student will understand the hydrostatics of the atmosphere.
- 2) Student will understand the physical basis of parasite and induced drag of 3D airplane configurations and estimate the drag polar and maximum lift.
- 3) Students will be able to estimate the drag, and then the thrust, and power required for level flight.
- 4) Students will be able to read performance charts and use them for analysis.
- 5) Students will be able to estimate aircraft neutral points and calculate required control surface positions from engineering data.
- 6) Student will be able to estimate longitudinal stability parameters.

RELATIONSHIP TO STUDENT OUTCOMES:

- a) An ability to apply knowledge of mathematics, science, and engineering
- e) An ability to identify, formulate, and solve engineering problems
- k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

TOPICS:

- 1) Applied aerodynamics for lift and drag evaluation
- 2) Introductory propulsion for propeller and jet airplanes
- 3) Airplane performance
- 4) Static Stability and control

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- 5) Dynamic Stability and control
- 6) Problems of airplane design
- 7) Reviews, quizzes