

DEPARTMENT OF AERONAUTICS AND ASTRONAUTICS

AA 321 AEROSPACE LABORATORY I

WINTER QUARTER

CREDITS AND

CONTACT HOURS: 3 credits, One 50 minute lecture and one 2-hour-20-minute laboratory.

COORDINATOR: Adam Bruckner, Professor of Aeronautics and Astronautics

TEXTBOOK: None

SUPPLEMENTAL MATERIAL: Experimental Methods for Engineers, Holman, J.P., 7th ed. McGraw-Hill, New York, 2000.

CATALOG DATA: AEROSPACE LABORATORY I, Required

The design and conduct of experimental inquiry in the fields of aeronautics and astronautics. Laboratory experiments on supersonic flow, structures, vibrations and material properties, and other topics. Theory, calibration, and use of instruments, measurement techniques, analysis of data, report writing.

PREREQUISITES BY TOPIC: Junior standing in department.

OUTCOMES:

- 1) Students will be able to perform wind tunnel tests and reduce wind tunnel data.
- 2) Students will be able to test materials, apply strain gauges, and measure stresses.
- 3) Students will understand how to take data on dynamic systems in vibration.
- 4) Students will be able to perform supersonic wind tunnel tests and reduce the resulting tunnel data.
- 5) Students will know how to write good lab reports.

RELATIONSHIP TO STUDENT OUTCOMES:

- a) An ability to apply knowledge of mathematics, science, and engineering
- b) An ability to design and conduct experiments, as well as to analyze and interpret data.
- e) An ability to identify, formulate and solve engineering problems
- g) An ability to communicate effectively
- k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

TOPICS:

- 1) Wind Tunnel q-calibration
- 2) Sphere drag
- 3) 2-D wing
- 4) Stress analysis with strain gages
- 5) Propeller performance
- 6) Materials testing
- 7) Lift and drag of finite wings
- 8) Stress concentration
- 9) Beam bending and vibration
- 10) Supersonic flow

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March 17, 2017