DEPARTMENT OF AERONAUTICS AND ASTRONAUTICS

AA 301 COMPRESSIBLE AERODYNAMICS

WINTER QUARTER

CREDITS AND CONTACT HOURS: 4 credits, Four 50-minute lectures per week.

COORDINATOR: M. Kurosaka, Professor of Aeronautics and Astronautics

TEXTBOOK: Fundamentals of Aerodynamics, John Anderson, 5th Ed., McGraw Hill, 2010.

SUPPLEMENTAL MATERIALS: None

CATALOG DATA: **COMPRESSIBLE AERODYNAMICS, Required**
Aerodynamics as applied to the problems of performance of flight vehicles in the atmosphere. Kinematics and dynamics of flow fields. Thin airfoil theory; Compressible fluids; one-dimensional compressible flow; two-dimensional supersonic flow. Prerequisite: either AA 260 or ME 323. Offered: W.

PREREQUISITES:
1) Vector analysis
2) Physics (mechanics)

OUTCOMES:
1. Students will understand the effects of compressibility on fluid flow.
2. Students will be able to solve problems with shock waves and expansions.
3. Students will be able to solve one-dimensional, compressible flow problems.
4. Student will be able to calculate the performance of supersonic airfoils.
5. Student groups will be able to design a supersonic nozzle.

TOPICS:
1) Dimensionless parameters, magnitude of force and movement coefficients (3 lectures)
2) Continuity and momentum laws in 3-D (4 lectures)
3) Shock and expansion waves (6 lectures)
3) One-dimensional flow fundamentals (10 lectures)
4) Linear equations with application to airfoils (10 lectures)
5) Method of characteristics and application to 2D, supersonic flows (7 lectures)