

Memorandum

To: The Faculty of the College of Engineering
From: The School of Aeronautics and Astronautics
Date: November 14, 2025
Re: AAE 33400 updating course description, Learning outcomes, and prerequisites

Course: AAE 33400 Aerodynamics**Current AAE 33400 Course Description:**

Incompressible airfoil and lifting line theory. Steady and unsteady, one-dimensional, linear and nonlinear flows. Normal shock waves. Steady, supersonic, two-dimensional linear and nonlinear flows. Oblique shock waves. Perturbation theory for wings and bodies. Design applications.

Proposed AAE 33400 Course Description:

Incompressible airfoil and lifting line theory. Steady and unsteady, one-dimensional, linear and nonlinear flows. Normal and oblique shock waves. Isentropic expansions. Steady, supersonic, two-dimensional linear and nonlinear flow applied to airfoils. Linear subsonic compressible flow for airfoils. Design applications.

Reasons: A course review revealed the new description better described the course content.

Current AAE 33400 Learning Outcomes:

1. Calculate thin airfoil performance parameters for incompressible flow
2. Calculate general wing loading by lifting line theory and compare to elliptic loading case
3. Determine horizontal tail location to maintain trim and a specified static margin
4. Compute isentropic stagnation conditions and apply in problem solving
5. Compute jumps in properties across steady shocks and expansions
6. Determine supersonic airfoil performance by shock-expansion method
7. Determine supersonic airfoil performance by linearized supersonic theory
8. Apply subsonic compressibility corrections to incompressible results
9. Determine critical Mach number for sub-sonic flight
10. Determine supply or back pressures for supersonic nozzle operating conditions

Proposed AAE 33400 Learning Outcomes:

1. Calculate thin airfoil performance parameters for incompressible flow
2. Utilize lifting line theory to analyze wings and determine parameters such as lift coefficient, induced drag coefficient, and/or wing loading.
3. Perform static longitudinal stability analyses to determine if a wing-horizontal tail configuration is stable and/or trimmable and explain the impact of design variables on the longitudinal stability of an airplane.
4. Predict the variation of properties in a converging-diverging nozzle under subsonic and supersonic conditions
5. Determine supersonic airfoil performance by shock-expansion theory
6. Determine supersonic airfoil performance by linearized supersonic theory
7. Apply subsonic compressibility corrections for airfoils to incompressible results
8. Describe the impact of airfoil geometry and wing geometry on the determination of the critical Mach number

Reasons: The new learning outcomes remove redundant learning outcomes and provide clearer statements to assess student learning.

Current AAE 33400 Prerequisites:

AAE 33300, AAE 33301, and ME 20000. ME 30900 may serve in place of AAE 33300 and AAE 33301.

Proposed AAE 33400 Prerequisites:

AAE 33300, and ME 20000. ME 30900 may serve in place of AAE 33300.

Reasons: AAE 33301 (Fluid Mechanics Laboratory) has been waived as a prerequisite for AAE 33400 for any student who completed AAE 33300 (Fluid Mechanics) over the summer for several years. The result is about 5% of our students requesting a prerequisite waiver for AAE 33400 every year. Moreover, the instructors for AAE 33400 do not believe that the knowledge gained in AAE 33301 is critical for a student to be successful in AAE 33400. By removing this prerequisite, students can remain on track to graduate on time without the need for prerequisite waivers.

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