ABET Course Syllabus

ENAE 414 Aerodynamics II

Credits & Contact Hours: 3 credits (3 hours of lecture)

Course Status: Required

Schedule: Offered every Spring semester

Course Description: Aerodynamics of inviscid incompressible flows. Aerodynamic forces and moments. Fluid statics/buoyancy force. Vorticity, circulation, the stream function and the velocity potential. Bernoulli's and Laplace's equations. Flows in low speed wind tunnels and airspeed measurement. Potential flows involving sources and sinks, doublets, and vortices. Development of the theory of airfoils and wings.

Pre-Requisites: ENAE 311

Co-Requisites: None

Textbooks: (1). J. Anderson. Fundamentals of Aerodynamics. McGraw Hill, 5th Edition, 2010

Other Required Material: Course lecture notes and handouts

Course Oversight: Aerodynamics and Propulsion Committee

Syllabus Prepared By/Date: Dr. Pino Martin, June 2011

Course Objectives/Student Learning Outcomes:

1. Understand the theoretical concepts underlying the development of lift, drag, and movement forces on aeronautical vehicles
2. Be able to visualize the flow around aeronautical vehicles and physically understand the concepts of pathlines, streamlines, and vorticity
3. Understand the concept of superposition of elementary flows for linear incompressible flow
4. Analyze the characteristics of airfoil geometries and planform shapes to assist in determining aircraft performance
5. Be equipped to evaluate new lift-enhancement or drag-reduction devices and appreciate the directions and promise of upcoming developments in aerodynamic technology

Topics Covered:

1. Aerodynamics of inviscid incompressible flows.
2. Vorticity, circulation, the stream function and the velocity potential.
3. Bernoulli's and Laplace's equations.
4. Flows in low speed wind tunnels and airspeed measurement.
5. Potential flows involving sources and sinks, doublets, and vortices.
6. Development of the theory of airfoils and wings.
7. An introduction to boundary layer flows.

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Relationship of Course Objectives to Program Outcomes

This course addresses program outcomes: 1, 3, 5, 9, 10, 12, 13, 14, 15