

Course Title: AENG 3220 Aerodynamics

Course Level: Undergraduate

Course Information:

- (a) Description: This course is the study of classic aerodynamics. The course covers the concepts of circulation; vorticity, potential flow theory including the Kutta-Joukowski Theorem, the Kutta condition, subsonic thin airfoil and finite wing theory. The course also discusses various forms of drag, including viscous, form, induced, and wave drag. The effect of compressibility is considered through the Prandtl-Glauret transformation, supersonic thin airfoil theory, slender body theory, and Newtonian impact theory.
- (b) Prerequisite: ESCI 3200 Fluid Dynamics, MATH 3270 Adv. Math for Engineers (concurrent)

Required/Elective: Required

Textbook Used: G.D. McBain, Theory of Lift. Wiley, 1st edition, 2012. ISBN: 978-1-119-95228-2

Course Outcomes: At the conclusion of AENG 3220, the student should be able to:

1. Explain the role of circulation and vorticity in aerodynamics;
2. Apply potential flow theories to determine the aerodynamic flow properties over airfoils and wings.
3. Apply analytical techniques for compressible flow
4. Analyze the lift and drag of wings and aircraft using experimental, analytical, and computational approaches.
5. Assess the impact of wing and airfoil design on aircraft performance in the context of technical, market, and societal requirements.

Topics Covered:

1. Flow kinematics
2. Vorticity and circulation
3. Potential flow theory
4. Kutta-Joukowski theorem
5. Thin airfoil theory
6. Induced and profile drag
7. Finite wing theory
8. Compressible aerodynamics
9. Slender body theory
10. Hypersonic aerodynamic effects

Qualifications:

PhD. In Aerospace Engineering preferred or MS in aerospace engineering with sufficient years of experience in aerodynamics field. Prior teaching experience is preferred, but not required.

Class timings will be flexible depending on the needs of the instructor (either early morning or evenings)
The class typically meets three days a week (50 minutes a day) or two days a week (75 minutes a day)

Appropriate remuneration will be provided as per SLU policies.

Interested candidates are requested to send their CV to Dr. Sanjay Jayaram, Aerospace Program Coordinator via email – sanjay.jayaram@slu.edu