Introduction to Aerospace Engineering I

AEROENG 2200

Credit Hours:
4.00

Course Coordinator:

Course Length:
14 weeks (autumn or spring)
12 weeks (summer only)

Representative Textbooks and Other Course Materials:

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<tr>
<th>Title</th>
<th>Author</th>
<th>Year</th>
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Course Description:
An introduction to fundamental concepts leading to aircraft design, with an emphasis on aerodynamics and aircraft performance.

Prerequisites and Co-requisites:
Prereq: Physics 1250 or 1260 (131); and Math 1152 (152), 1161 (161), 1172 (154), or 1181H, or a grade of C- or above in Math 1544. Prereq or concur: Math 2173 (254), 2153 (153), or 2162 (263).

Designation:
Required
Elective

Course Goals / Objectives:
Introduce students to the nomenclature and environment of flight
Educate students in the fundamentals of fluid flow and the concepts of lift and drag
Train students in the methodology for prediction of aerodynamic characteristics of aircraft
Introduce aerodynamic concepts of vertical flight and rotorcraft performance
Develop in students an understanding of how the equations of aircraft motion can be specialized to steady and accelerated flight
Stimulate understanding of the basic principles with simple laboratory experiences
### ABET-EAC Criterion 3 Outcomes:

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<tr>
<th>Contribution Level</th>
<th>Hours</th>
<th>Description</th>
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<tbody>
<tr>
<td>Significant</td>
<td>7+</td>
<td>1 an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics</td>
</tr>
<tr>
<td>Substantial</td>
<td>3-6</td>
<td>2 an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors</td>
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<tr>
<td>Substantial</td>
<td>3-6</td>
<td>3 an ability to communicate effectively with a range of audiences - pre-2019 EAC SLO (g)</td>
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<tr>
<td>Substantial</td>
<td>3-6</td>
<td>4 an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts</td>
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<tr>
<td>Some</td>
<td>1-2</td>
<td>5 an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives</td>
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<tr>
<td>Significant</td>
<td>7+</td>
<td>6 an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions</td>
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<tr>
<td>Some</td>
<td>1-2</td>
<td>7 an ability to acquire and apply new knowledge as needed, using appropriate learning strategies</td>
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**Course Topics:**

- Flight environment, fundamental quantitative concepts, perfect gas law, and the standard atmosphere.

- Equations of fluid flow. Equations of conservation of mass, momentum and energy in one dimension.

- Elementary thermodynamics; isentropic flow; nozzles.

- Applications to subsonic and supersonic wind tunnels.

- Applied aerodynamics; Lift of airfoils, finite wings, pressure distributions; drag of bodies, boundary layers and separation.

- Rotorcraft aerodynamics in hover and forward flight. Basic momentum-disk theory. Helicopter operation and performance characteristics.

- Drag estimates of vehicles; parasitic and induced drag.

- Airplane performance; level and unaccelerated flight; thrust and power.

- Climbs and glides.

- Range and Endurance.

- Accelerated flight: turns, banks, takeoff, and landing.