

ABET Course Syllabus**ENAE 471 Introduction to the Principles of Aircraft Flight Testing**

<b>Credits &amp; Contact Hours:</b>	3 credits (3 hours of lecture)
<b>Course Status:</b>	Not required
<b>Schedule:</b>	Offered every Spring semester
<b>Course Description:</b>	Provides basic instruction to aircraft flight testing and demonstrates need for systematic, well-proven technique to allow for accurate airplane performance. Concepts of aerodynamics, airplane performance, and stability and control. Emphasis on single-engine general aviation type aircraft.
<b>Pre-Requisites:</b>	ENAE 414
<b>Co-Requisites:</b>	ENAE 403
<b>Textbooks:</b>	None
<b>Other Required Material:</b>	Course lecture notes and handouts
<b>Course Oversight:</b>	Aerodynamics and Propulsion Committee
<b>Syllabus Prepared By/Date:</b>	Dr. Gordon Leishman, June 2011

**Course Objectives/Student Learning Outcomes:**

The objective of this course is to provide an introduction to the basic engineering principles of aircraft flight-testing.

**Topics Covered:**

1. Introduction to philosophy and practicalities of flight-testing: Aircraft design and flight standards, certification requirements, regulatory bodies such as ICAO, FAA, EASA, the FAR's, JAR's, etc.
2. Review of standard aircraft flight and engine instruments
3. Review of standard atmosphere: Pitot and pitot-static systems, altimetry, pressure and density altitude calculation/measurement.
4. Airspeeds: Indicated, calibrated (i.e., equivalent) and true airspeeds. Instrument errors and calibration procedures.
5. Static position error
6. Review of basic airplane aerodynamics
7. Piston engine performance
8. Review of propeller theory and operation
9. Equivalent weight, fuel burn, propulsive efficiency, basic method of determining power required from flight test measurements.
10. Basic single engine airplane performance
11. Climb performance issues, excess power available, rate of climb, climb angle, review of aircraft take-off and climb charts.
12. Telemetry and data recording systems.
13. Aircraft handling qualities

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14. Aircraft weight and balance
15. Review of aircraft stability
16. FAA certification requirements on aircraft stability and control.
17. Aircraft operating limitations
18. Aircraft stalling
19. Airfoil and wing aerodynamic characteristics
20. FAA/EASA stall and spin certification requirements for aircraft

**Relationship of Course Objectives to Program Outcomes**

This course addresses program outcomes:

For X,Y,Z...use the attached table in the following manner: if a course is listed as "3" or "4" in a given row, include that outcome number in the list above. If the course has 0,1,2 listed in a row, do not list that outcome number.

- a. Ability to apply knowledge of mathematics, science, and engineering
  - o Relevant Content:
  - o Proficiency Demonstrated By:
  - o Level of Coverage:
- b. Ability to design and conduct experiments, as well as analyze and interpret data
  - o Relevant Content:
- c. Ability to design a system, component, or process to meet desired needs
  - o Relevant Content:
  - o Proficiency Demonstrated By:
  - o Emphasis:
- d. Ability to function on a multi-disciplinary team
  - o Relevant Content:
- e. Ability to identify, formulate, and solve engineering problems
  - o Relevant Content:
  - o Proficiency Demonstrated By:
  - o Emphasis:
- f. Understanding of professional and ethical responsibility
  - o Relevant Content:
- g. Ability to communicate effectively
  - o Relevant Content:
- h. Broad education necessary to understand the impact of engineering solutions in a global and societal context
  - o Relevant Content:
- i. Recognition of the need for, and an ability to engage in life-long learning
  - o Relevant Content:
  - o Proficiency Demonstrated By:
  - o Emphasis:
- j. Knowledge of contemporary issues
  - o Relevant Content:
- k. Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
  - o Relevant Content:
  - o Proficiency Demonstrated By:
  - o Emphasis: