

## AE 6361 - Air Breathing Propulsion System Design

**Catalog Data:** AE 6361: Air Breathing Propulsion System Design. Credit 3 (3-0-3)

Air breathing propulsion system from an aircraft system level. Multidisciplinary design with maintainability, reliability, cost, cycle selection, and impact on aerodynamics, structures.

**Textbook:** Mattingly, J. D. *Aircraft Engine Design*. AIAA. 1987.

**References:** Oates, Gordon C. *Aerothermodynamics of Aircraft Engine Components*. AIAA. 19xx.

Oates, Gordon C. *Aircraft Propulsion Systems Technology and Design*, AIAA, 19xx.

**Coordinator:** Dr. Dimitri N. Mavris, assistant professor of A.E.

**Goals:** The course exposes students to modern air breathing propulsion system design. The general objectives of the course are described below:

- a) to familiarize the student with the role the propulsion system has on an aircraft system and the multidisciplinary nature of aircraft design
- b) to familiarize the student with the process of designing and selecting an air breathing propulsion system
- c) to expose the student to the tools available for engine and aircraft synthesis and analysis

### Prerequisites by Topic:

1. Consent of the school.
2. Background in thermodynamics.
3. Familiarity with a programming language (C++, C, FORTRAN, Matlab, UNIX, etc.).

### Topics:

1. Introduction to aircraft systems; missions; requirements; sizing/synthesis
2. Engine-airframe integration
3. Engine cycle selection for military and commercial aircraft
4. Review of thermodynamics
5. Environmental constraints such as noise and emissions
6. Introduce Response Surface Methodology and modeling sophisticated analysis tools
7. Introduction to engine and aircraft design and analysis tools
8. Quantify system level engine metrics
9. Analyzing and quantifying the impact of the engine on the aircraft

### Computer Usage:

Students will be required to access a workstation for homework, individual, and team assignments. Suitable computers can be found in the school and Institute's computing laboratories and in research laboratories.

### Programming Projects:

None