Aerospace Propulsion (AERO 417)

Course Syllabus - Spring 2013

INSTRUCTOR: Paul Cizmas, Professor of Aerospace Engineering
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TEXTBOOK (not required):

ADDITIONAL REFERENCES:
Class notes, http://dayton.tamu.edu/aero417.htm

COURSE OBJECTIVES: Present methodologies for the design and analysis of air breathing propulsion systems. Design inlets, compressors, combustors, turbines and nozzles for turbojet, turboprop and turbofan engines.

PREREQUISITES: AERO 351.

ATTENDANCE POLICY: Students are expected to attend class.

COURSE DESCRIPTION: Present methodologies for the design and analysis of air breathing propulsion systems. Design and analysis of inlets, compressors, combustors, turbines and nozzles for turbojet, turboprop and turbofan engines.

LEARNING OBJECTIVES: At the end of this course, students will be able to:

1. Predict jet engine performance based on the real cycle.

2. Design a jet engine inlet nozzle optimized for a given airplane and flight conditions.

3. Design a multi-stage axial compressor. Predict the compressor map, including choke and surge line. Understand the influence of the design parameters on the performance of the axial compressor.

4. Design a centrifugal compressor (if needed for the engine).

5. Design a combustion chamber. Understand the current limitations in the combustor design.

6. Design a turbine for their jet engine. Understand the influence of the design parameters on the turbine performance. Match the turbine and the compressor.

7. Design an exit nozzle for their jet engine.

8. Predict jet engine performance at various rotor speeds, altitude and Mach number. Understand the impact of jet engine performance on the airplane performance.
COURSE CONTENT:

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<thead>
<tr>
<th>Topic</th>
<th>Hours</th>
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<tr>
<td>1. Lab safety</td>
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<tr>
<td>2. Jet Engine Real Cycle</td>
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<td>3. Inlet Nozzle</td>
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<td>4. Axial Compressor. Design Compressor</td>
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<td>5. Centrifugal Compressor</td>
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<td>6. Combustion Chamber</td>
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<td>7. Turbine</td>
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<td>8. Exit Nozzle</td>
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<td>9. Engine Performance Variation with Rotor Angular Velocity, Altitude and Mach Number</td>
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Total 42 Hours

GRADE EVALUATION:

Project 80%
Final oral examination 20%

Grading policy: Standard TAMU grading system, that is,

\[ A \geq 90\%, \ 80\% < B \leq 89\%, \ 70\% < C \leq 79\%, \ 60\% < D \leq 69\%, \ F \leq 59\% \]

Note 1: Homework, that is, project tasks, must be turned in on the assigned day, before class starts. Late homework will be penalized 5 points out of a total of 100 points for each day it is late. Homework will not be accepted if is more than one week late.

Note 2: Students are encouraged to discuss with each other how to approach the project tasks but each student must re-think, privately prepare and write up his/her final solution to each problem. The homework solutions submitted must represent your work that you have carefully thought through and you must be prepared to explain each answer in detail.

Note 3: Complaints about grades must be made within two weeks of when the material is returned to the class. Beyond that time, the grade will not be changed.

Note 4: Makeup exams must take place during the approved academic calendar period and no later than one week from the date of the original exam.

OFFICE HOURS: I do not have any set office hours. Come by when it is convenient for you. However, I may request you to come back at another time if I am busy. To avoid this, you can e-mail ahead and set up a time to meet.

NOTICE: The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring accommodation, please contact Disability Services, in Cain Hall, Room B118, or call 845-1637.

ACADEMIC INTEGRITY: “An Aggie does not lie, cheat or steal, or tolerate those who do.” (see http://www.tamu.edu/aggiehonor)