AEE 452 - Aeronautical Engineering Design II
COURSE OUTLINE
Spring 2011-2012

Instructor: Prof. Dr. Serkan ÖZGEN
e-mail: sozgen@ae.metu.edu.tr
url: www.ae.metu.edu.tr/~ae452
Phone: 210 4273 and 210 2504
Office: 207

Description:
Preliminary and detailed design of aircraft. Demonstration of the design by
manufacturing a reduced scale flying model of the aircraft. Use of computer
aided design tool for sizing, trade-off and configuration layout studies. Landing
gear design, integration of propulsion system, and structural design. Calculation
of moments of inertia, weights and balance, center of gravity of the design.
Static and dynamic stability, control characteristics and performance prediction
of the aircraft.

Textbook
  Education Series, 1999.

Reference books:
- "Aeroplane Aerodynamics and Performance", Roskam J., Darcorporation,
  1997.
- "Methods for Estimating Stability and Control Derivatives of Conventional
  Subsonic Aircraft", Roskam J.,
- "Dynamics of flight, stability and control", Etkin B. and Reid L.D., Wiley,
  1996.

Grading:
1 midterm: 10 %
1 final: 20 %
Study assignments: 20 %
Project report: 30 %
Project presentation: 20 %
Grading and course policy:
- There will be only one make-up exam. It will be after the finals and it will cover everything. Try not to miss the exams!
- If you miss an exam you need to contact me within three days after the exam. You need a valid excuse (a medical certificate, etc.) for you to qualify for a make-up.
- Attendance is highly recommended.
- Study assignments are to be submitted on due date. Late submissions will not be accepted.

Course Outline:
1. Propulsion
   Jet-engine thrust: installed thrust, installed engine thrust corrections, partial power operation.
   Turboprop performance.
2. Air loads
   Maneuver loads, gust loads, V-n diagram.
3. Weights
   Approximate group weights method, statistical group weights method.
4. Performance and energy maneuverability methods
   Energy equations, $P_S$ plots, minimum time to climb trajectory, minimum fuel to climb trajectory, operating envelope, other fighter performance measures of merit.
5. Cost analysis
   Elements of life cycle cost, DAPCA IV model
6. Sizing and trade analysis
   Sizing methods, improved conceptual sizing methods, sizing matrix and carpet plots, trade studies.