SAN DIEGO STATE UNIVERSITY

Introduction

AE 460

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Lecturer

Introductions

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- Course Material
- Team Organization and Responsibilities
- Design Notebook
- Preliminary Design Process
- Problem Solving Approach
- Schedule
- Office Hours
- Website
- Homework

Course Material

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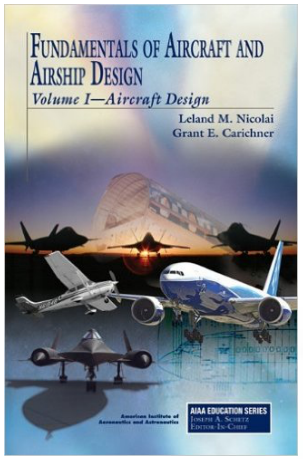
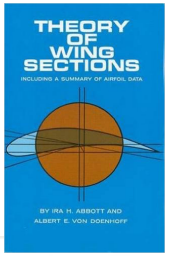
- Course References Documents
  - Course Description Document
  - Statement of Work (SOW)
  - System Requirements Document (SRD)
  - Report Content Requirements (RCR)
  - Presentation Requirements (PR)
  - Engine Data

Advanced Jet Trainer
Close Air Support
Supersonic Business Jet

- Course Text Books
  - Nicolai (1 per student)
  - Roskam (1 per team)
  - Abbott/Doenhoff (1 per team)
  - Etkin

- Other References
  - NACA reports
  - USAF DATCOM
  - MIL-STD requirements





Primary Tools
- Your Brain
- Pencil
- Paper
- Ruler
- Calculator

Computer Tools
- Word
- Excel
- PowerPoint
- MATLAB
- XFOIL
- VSAERO
- Solid Works
- PTC Creo

Course Description Summary

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- Design projects are described in detail by material provided by the instructor. There are three project options for this year: Air Force Advanced Pilot Trainer (APT), Close Air Support aircraft (CAS), or Supersonic Business Jet (SBJ).

- The following constraints and conditions apply:
  - Teams shall be a minimum of 5 students, with a maximum of 6.
  - Technical and administrative guidance will be provided by the instructor.
  - Tasking, grading and general format and content is specified in the Statement of Work (SOW)
  - Technical memos and design reports shall follow the Statement of Work (SOW) and Report Content Requirements (RCR).
  - A System Requirements Review (SRR) will be held in early October
  - A Peer Review (PDR with peers) informal oral presentation will be made in early November.
  - A Preliminary Design Review (PDR) formal oral presentation will be made to a panel selected from the industry in late April.
  - To ensure a variety, the instructor will assign the student projects, but will based on the order of the team's requested preference.

Student Outcomes

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- At the conclusion of AE 460B, the student is expected to have reached most of the following goals:
  - An ability to apply knowledge of mathematics, science, and engineering (ABET Criterion 3a).
  - An ability to design and conduct experiments, as well as to analyze and interpret data (ABET Criterion 3b).
  - An ability to work on multi-disciplinary teams to design a complex system, such as aircraft or spacecraft, from conceptual to preliminary design, within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability. (ABET Criterion 3c, 3d & 3j).
  - An ability to identify, formulate, and solve engineering problems (ABET Criterion 3e).
  - An understanding of professional and ethical responsibility (ABET Criterion 3f).
  - An ability to communicate effectively, using oral, written and graphical communication skills (ABET Criterion 3g).
  - The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context (ABET Criterion 3h).
  - A recognition of the need for, and an ability to engage in, life-long learning (ABET Criterion 3i).
  - An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice (ABET Criterion 3k).
  - An understanding of aerodynamics, aerospace materials, structures, propulsion, flight mechanics, and stability and control.

Team Organization and Responsibilities (notional)

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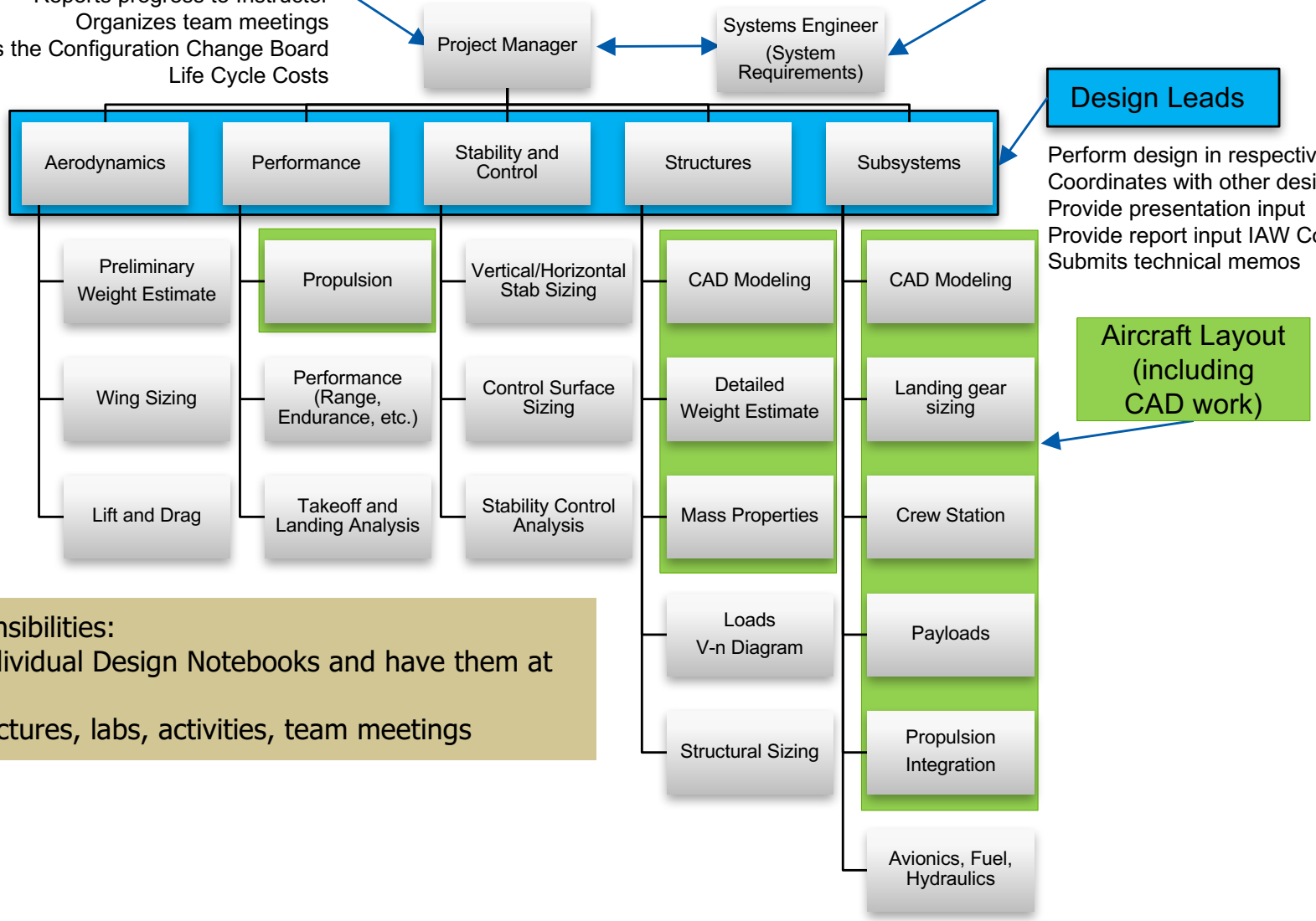
Maintains schedule
Maintains Work Breakdown Structure (WBS)
Maintains Action Items list
Reports progress to Instructor
Organizes team meetings
Chairs the Configuration Change Board
Life Cycle Costs

Breaks down System Requirements Document (SRD)
Allocates requirements to Design Leads
Organizes report



Perform design in respective areas
Coordinates with other design leads
Provide presentation input
Provide report input IAW Content Req.
Submits technical memos

Aircraft Layout (including CAD work)

Other Responsibilities:
-Maintain Individual Design Notebooks and have them at all times
-Attend all lectures, labs, activities, team meetings

Design Notebook

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- Design Notebook
  - Used to easily reference important information
  - Allows you to show team members and the instructor information on the design
- Use a 3-D-ring binder
- Typical Content
  - SOW, RCR, SRD
  - 3-view drawing/inboard profile
  - Technical Memorandums
  - Design Ideas
  - Sample calculations of developed spreadsheets
  - Any information other Design Leads have submitted to you in order to complete your task
  - Action Items

Preliminary Design Process (Roskam)

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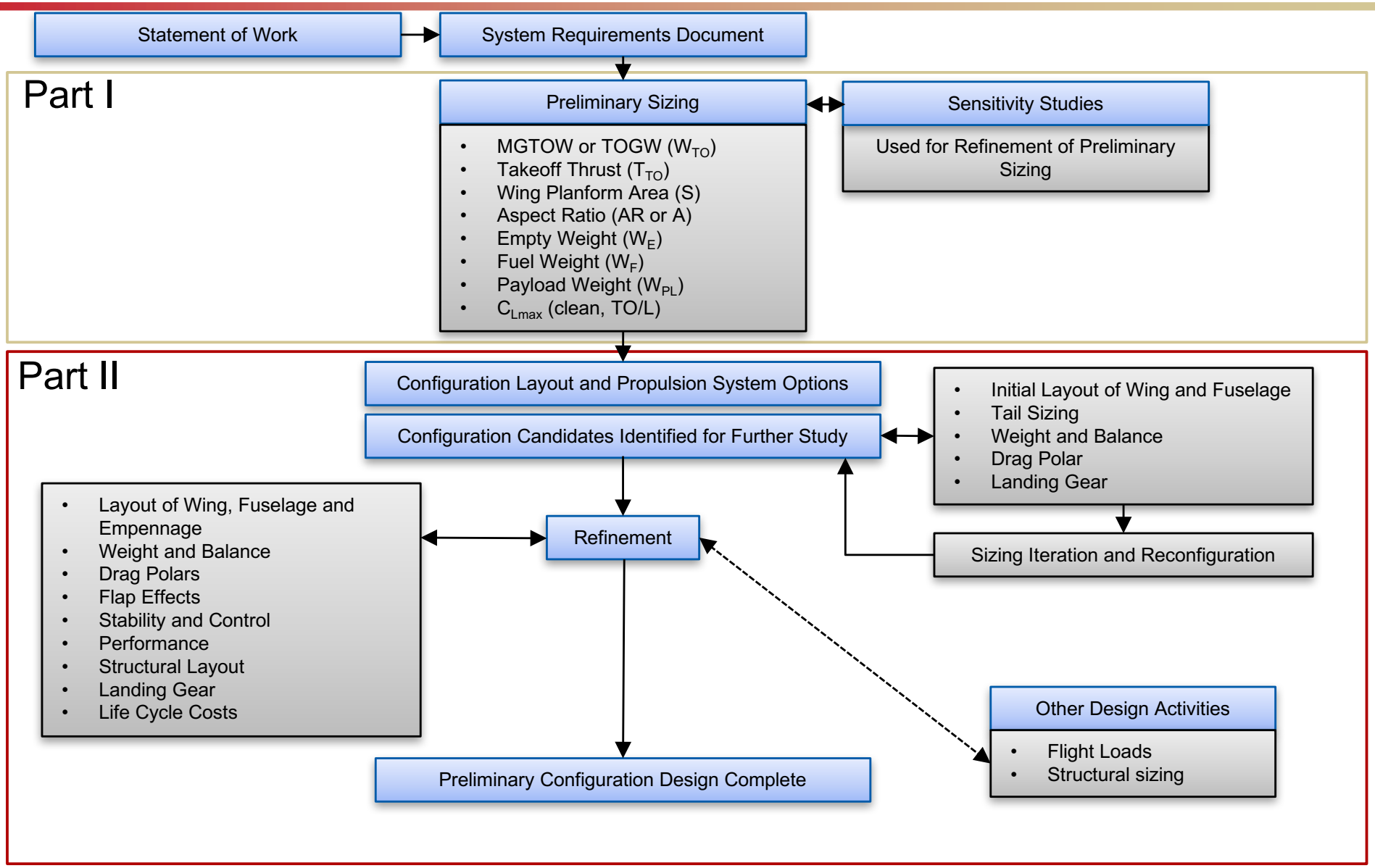

Problem Solving Approach

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This class is different than any other class you have had to date!

Most classes:

1. Lecture
2. Reading
3. Do problems 1 thru 9, odd
4. Answers in the back of book… always a correct answer!

AE 460:

1. Lecture
2. Reading
3. Answer is stated in the SRD
4. Develop the “problem” that will obtain the correct answer

Infinite number of ways to obtain a correct answer

- 100 good ways
- 10 really good ways
- 1 outstanding way, which wins you a contract

Common Errors in Problem Solving

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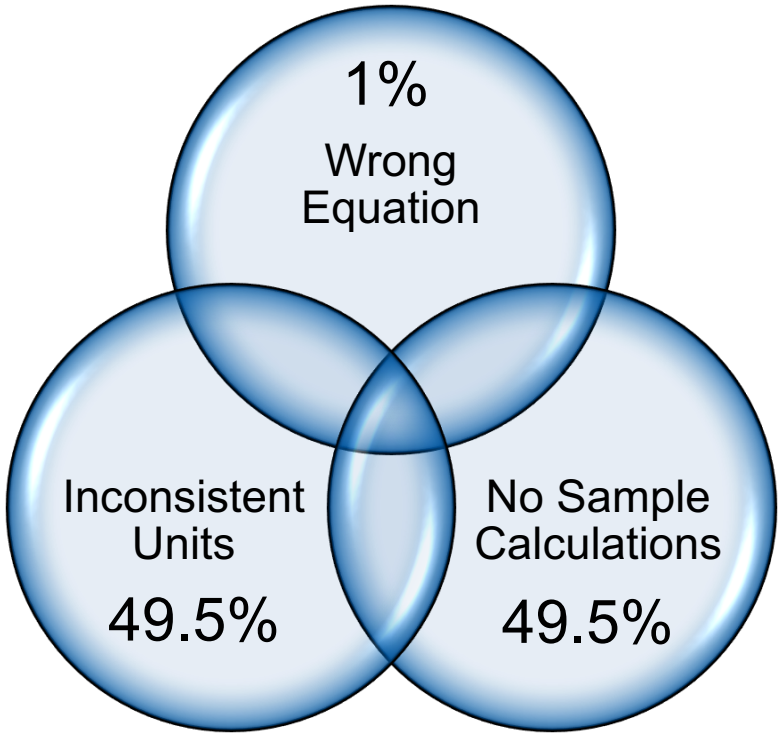

Major frustration is starting a spreadsheet before the math has been determined and initial calculation performed

Before reaching out for help, ensure you have your ducks in a row!

*These statistics not backed up with real data, but I think you get the idea

AE460 Schedule “Strawman”

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	2017					2018				
TASK	A	S	O	N	D	J	F	M	A	M
Class Begins	8/28									
Design Mission/Preliminary Weight										
Labor Day		9/4								
Teams Formed		9/6								
Weight Estimate of 3 Aircraft										
Preliminary Sizing										
Configuration Design/Layouts										
Miramar Airshow or Museum		9/22 or 9/23								
Lift and Drag										
Performance										
Report/Presentation Requirements Review			10/25							
Preliminary Design Review (Peer)				11/6 & 11/8						
Thanksgiving Weekend – no class				11/22						
Interim Reports Due					12/4					
Grades Due						12/30				
Report Writing										

AE460 Schedule “Strawman”

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	2017					2018				
TASK	A	S	O	N	D	J	F	M	A	M
Class Begins						1/18				
Stability and Control										
Flight Loads										
Structural Layout/Life Cycle Cost										
Spring Break										
Preliminary Design Review (Peer)								4/3 & 4/5		
Preliminary Design Review Delta (Peer)									4/17	
Final Presentation Due									4/18	
PDR (Professional Panel)									4/20	
Final Reports Due									4/24	
Grades Due										5/17
Report Writing										

Dates TBD

Office Hours

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- During normal class time when not lecturing
- In the same room that the lecture/activity/lab is scheduled
- After regular scheduled time if needed
- By appointment

Assignment

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- Reading
  - Course Description
  - SOW
  - RCR (Download)
  - SRD's (Download)
- Buy Books
- Design Notebook
- Resume – Due next class
  - Hard Copy
  - Email copy – file name format - "last name.first name"
  - Single page only, 10 point font minimum
  - Picture in upper right corner
  - Any prior Leadership roles
  - Organizational involvement
  - Extra-Curricular Activities
  - GPA – optional
  - Write list on back with your preferred team members

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