San José State University
Charles W. Davidson College of Engineering
Aerospace Engineering
AE 295B – Aerospace Engineering Project II – Spring 2018

Course and Contact Information

Instructor-of-Record:	Dr. Nikos J. Mourtos
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Class Days/Time:	F 4:30 – 7:15 pm
Classroom:	Engr. 164
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Prerequisites:	Letter grade of "B" or better in AE295A

Required Text: None

Course Description

This is a second-semester Master's Project course. Students perform graduate level research and/or design and/or development, involving aerospace systems or components in consultation with an aerospace engineering faculty member. Students are encouraged to submit and present their work at student and professional conferences.

Course Goals

1. Apply contemporary professional and lifelong learning skills to access and process project related information effectively and efficiently from a variety of sources.
2. Acquire the expertise necessary to work in the analysis and design of aerospace systems with possible specialization in one of the following 2 areas: (a) aircraft design, (b) space transportation and exploration.
3. Improve verbal and written communication skills, including the ability to write aerospace engineering technical reports and conference papers.
4. Improve ability to perform research and work independently to solve open-ended aerospace engineering problems.

Course Learning Outcomes (CLO)

Upon completion of this course students will be able to:

1. Conduct a literature review on an aerospace engineering topic using appropriate sources from the worldwide web, the library, professional journals, conference papers, and technical reports.
2. Use the results of the literature review to define appropriate project objectives.
3. Apply graduate level mathematics, science, and engineering principles to carry out the project using analytical and/or experimental, and/or computational methods.
4. Document the project results in a detailed engineering report following the AIAA (American Institute for Aeronautics and Astronautics) format and guidelines.

Course Requirements and Assignments

Spring Semester	Assignment
February 28	4th written report due (Chapters 4, 5, …; chapters 1-3 completed in AE295A)
March 31	5th written report due (Chapters 5, 6, 7, ….)
April 30	Draft of final written report due for review
May 15	Final written report (soft copy, Word document) with corrections, due to advisor and the Instructor-of-Record

Grading Policy

Grades are determined by the thesis / project advisor and committee members based on the criteria shown on the evaluation form included below. However, a formal written report following the posted AE guidelines or a published paper, must be submitted to the Instructor-of-Record before a grade can be assigned.

MSAE Thesis / Project Evaluation Form

Title					
Name				Semester –	
Advisor					
Max Possible Score = 100		Max Possible	***Average score***	Project Advisor	Other Evaluator
1	Application of AE science (aerodynamics, propulsion, flight mechanics, stability & control, aerospace structures & materials, etc.) and/or aerospace vehicle design, appropriate for graduate level	20			
2	Use of modern tools (computational or experimental)	10			
3	Appropriate literature search (# and appropriateness of references cited)	10			
4	Understanding of the cited literature (summary of previous work)	10			
5	In-depth analysis and / or design of an AE system	20			
6	Correct language and terminology	20			

7	Appropriate use of graphs and tables	10			
	Total Score	***100***			

Grade Distribution/Overall Score:

Total Score	Letter Grade
90 - 100	A (Excellent)
80 - 89	B (Good)
0 - 79	F (Not Acceptable)

Reports Reports are graded for English (grammar, spelling, punctuation, etc.) as well as for technical content. Please see general guidelines for professional reports below.
Written reports not meeting minimum writing proficiency standards will be returned without a grade. Revised reports may be re-submitted (once each) with a *20% penalty*.
If your report is returned for English please seek help from our *Graduate Writing Fellow*.

AE Department Policies

Can be found at <http://www.sjsu.edu/ae/programs/policies/>

University Policies

Can be found at <http://info.sjsu.edu/static/catalog/policies.html>

GENERAL COMMENTS ON PROFESSIONAL REPORT WRITING

Each report must meet minimum standards of professionalism. Unprofessional reports will be **severely downgraded even if** the technical content is correct. The following items explain some of the features of a professional report.

1. All reports must be prepared with a **word processor**.
2. Organize reports using a **decimal numbering system**. The chapters, Sections, Sub-Sections should be indicated as follows:
   4. TITLE OF CHAPTER
   4.1 TITLE OF SECTION
   4.1.1 Title of Sub-Section
   4.1.1.1 Title of sub-sub-section
3. Many reports require **calculations**. At least one "hand" calculation **must** be performed and documented for each case in a separate sub-section. These hand-calculations do not have to be typed but should be clearly written and well organized. **If they are lengthy (i.e. more than 2 pages)**, they should be placed in a separate appendix but the results should be discussed in the main body of the report.
4. **All** pages must be numbered. Start the introduction at page 1. Pages in the main body of the report are numbered: 1, 2, 3, etc. Preliminary pages such as Table of Contents, List of Symbols etc. are numbered sequentially : i, ii, iii, iv, etc.
5. A minimum **margin** of **one inch** must be observed on all pages including graphs, figures, tables, computer print-outs, etc.
6. The report must be written in good **English.** All words must be properly spelled. You are expected to proofread your reports before handing them in.
7. Avoid using sentences longer than 2 lines. If you do not, your report will have a high "**Fog Index**" (i.e. it will be difficult to read).
8. **Do not** use I, You, We, They, etc. in a technical report. Also, **do not** treat an airplane or airplane components as persons, i.e., DO NOT write: *the airplane's landing gear is of the retractable type.* Instead, write: *the landing gear of the Cessna 182 is of the retractable type* or, even better, *the airplane has a retractable landing gear.*
9. **Do not use** the words: **'in order to ...'**. Remember, the words 'in order' are nearly always out of order!
10. Make use of the technique called **"bulletizing"**.
    Instead of: *in this chapter, the results of calculations of wing-loading, maximum lift coefficients, thrust-to weight ratio, lift-to-drag ratio and cruise lift coefficients are presented.*
    Write: *In this chapter the following characteristics of the Spartan Jet are presented:*
    - *Wing Loading*
    - *Maximum Lift Coefficients*
    - *Thrust-to-Weight Ratio*
    - *Lift-to-Drag Ratio*
    - *Cruise Lift Coefficient*
11. Make sure that no **symbols** are **omitted** from your equations. Again, it is important to proofread your reports before handing them in!
12. All **equations** must be numbered and numbered sequentially. Within a chapter use a decimal numbering system. For example:
    $$X = Y + Z \qquad (4.17)$$
13. All **references** must be numbered sequentially as they appear in your report. See examples below (1 is a book, 2 is a technical report, 3 is a journal article, 4 is a conference paper, 5 is an internet reference). In your report refer to each of them with a number in a bracket. For example: *The vortex increases the lift of the flat plate [2]* or *Mourtos [2] found that the existence of the vortex increased the lift on the flat plate at any given angle-of-attack.*

1. Nickel, K., Wohlfahrt, M., *Tailless Aircraft in Theory and Practice*, AIAA Education Series, 1994.
2. Mourtos, N.J., Couillaud, S., Carter, D., Hange, C., Wardwell, D., Margason, R.J., Flow Visualization Studies of Jet VTOL models during Hover in Ground Effect, *NASA TM 108860*, Jan. 1995.
3. Mourtos, N.J., Flow past a Flat Plate with a Vortex / Sink Combination, *ASME Journal of Applied Mechanics*, Jun. 1996.
4. Papadopoulos, P., Subrahmanyam, P., Airbreathing Engine Analysis and Simulation Tool for Space Vehicle Design, *Proc., AIAA/CIRA 13th International Space Planes and Hypersonics Systems and Technologies Conf.,* Centro Italiano Ricerche Aerospaziali (CIRA), Capua, Italy, 16-20 May 2005.
5. UAV, Wikipedia, URL: <http://en.wikipedia.org/wiki/Unmanned_aerial_vehicle>, retrieved

Dec. 5, 2007.

14. All **figures** and **graphs** must be **numbered** and numbered sequentially. They must also have descriptive **titles**. Titles must appear **below** the figure. All **axes** must have scale and descriptive **labels** including **units** whenever appropriate. **Curves** must also have descriptive **labels**. All lettering must be at least 3 mm high to be legible! For example:

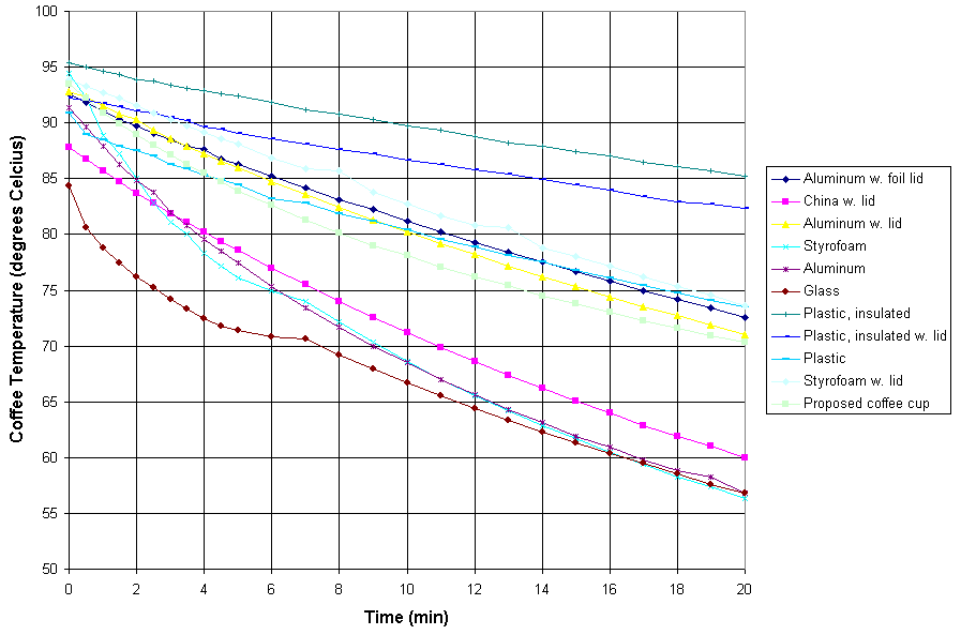

Figure 3.1 – Coffee temperature decline in various cups.

15. All **tables** must be **numbered** and numbered sequentially. They must also have descriptive **titles**. Titles must appear **above** the table. Again, all lettering must be at least 3 mm high to be legible!

Table 5.1 - The heaviest ten airplanes. MTOW = Maximum take-off weight, MLW = Maximum landing weight, TOR = Take-off run (SL, ISA+15°, MTOW), LR = Landing run (SL, ISA+15°, MLW)

Type	MTOW [tons]	MLW [tons]	TOR [m]	LR [m]
Antonov An-225	640			
Airbus A380-800F	590	427		
Boeing 747-8I	439.985	306.175		
Antonov An-124	405			
Airbus A340-500	368	240	3050	2010
Boeing 777-300ER	351.535	251.29		
MD-11	273.314	195.04	3115	2118
Ilyushin IL-96M	270	175		
Boeing 787-9	244.94			
L-1011-500	231.54	166.92	2636	

16. When presenting **aerodynamic data** in a table, graph or figure it is mandatory that you include the following information:
    - Reference geometries: S, c and b in ft (or inches) and m (or cm).
    - Moment center information in fractions of the m.g.c.
    - Airplane weight consistent with the presentation of the data.
    - Airplane configuration information, such as:
        - Clean
        - Flaps down, gear up
        - Flaps down, gear down
        - Thrust or power setting
        - Speed brake deployment
        - Flight condition

- C.g. location in fractions of m.g.c.

17. Remember: **tables, graphs** and **figures** are much easier to understand than **prose** so use them as much as possible.
18. Do not put **lengthy derivations** in the main body of the report. Put such material in an appendix (or appendices) and **summarize** the result in the main part of the report.
19. **Plagiarism** will result in **total loss of credit for the entire report**! If you decide to use material, which was not generated by you, clearly identify the source of such material. Give credit where credit is due!
20. A **list of symbols** must be included in your report. This list must define all symbols used anywhere in the report (including figures, appendices, etc.). Do not include symbols which are not used in your report! Do not copy a list of symbols from another reference! The list of symbols must be presented in the following manner:

Symbol	**Definition**	**Units (SI)**
W	Weight	lbs (N)
Greek Symbols		
α	Angle of attack	deg or rad
Subscripts		
$( )_{TO}$	Takeoff	-------
Acronyms		
APU	Auxiliary Power Unit	-------

21. Never make an **unsubstantiated claim**! Example: if you claim that you have optimized airplane weight, you are expected to prove it. If you cannot, do not make the claim!
22. **Avoid** the use of **superlatives, (**e.g. *this is the best airplane ever designed* or *the wing area selected is the smallest possible for this type of airplane*).
23. If you **extrapolate** data or if you extrapolate existing technology, discuss the consequences to your design of not being able to achieve the extrapolated characteristics.
24. Include **units** (both systems) with all your results.
25. Appendices must be sequenced using capital letters and must have specific titles. For example:
    Appendix A - Hand Calculations
    Appendix B - Design Parameters of Comparable Aircraft