

AOE 4124 Syllabus
Configuration Aerodynamics: - Spring 2019 (CRN 10354)
GBJ 100 MWF 1:25 – 2:15

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Office hours: Mon: 10:30-11:30, Wed: 2:30-3:30 and Fri: 10:30-11:30 or appointment

Catalog:

Aerodynamic design of flight vehicles, with emphasis on nonlinear flowfields and configuration concepts. Aerodynamic analysis and design for transonic, supersonic, and hypersonic flows, and low speed high alpha flight. Includes case studies of classic configurations and aerodynamic design papers. Pre: 3014, 3114, (3044 would be a good one too), (3H, 3C).

Explicit Objectives:

1. Develop the flow physics insight to form a “mental model” of each flowfield or concept against which to gauge computational/experimental “reality.”
2. Understand that computational/experimental tools must be used together, it’s not either/or. Both have strengths and weaknesses.
3. Value analytical theory: airplanes were built before CFD (UFD!). Analytical formulas provide insight into the role of key flow and configuration shape parameters.
4. Answer the question based on physics: “What configuration do I want to do this job?”

Implicit Objectives

- Engineering Practice
- Problem Solving
- Effective Communication – **good plots!**
- Lifelong Learning

Approach for each topic

1. Flowfield physics, conceptual/mental models of the flowfield
2. Key issues for aerodynamicists – previous experience
3. What’s good/bad: attainable performance
4. Relevant tools (codes/wind tunnel tests/available data/theory)
5. Typical applications/expectations

Honor Code:

Some of the work will be individual, you must do your own work. Teams will do projects and you may collaborate. ALL figures and text by someone else must be properly cited.

<i>Grades:</i>	Test 1	20%
	Test 2	20%
	Homework/Readings	30% (late deduction, 15% a day)
	Team Project/Presentation	10%
	Exam	20% (Fri., May 10, 2019: 1:05pm)

Project/

Presentation

“Readings”

Computations

Texts:

Special needs:

- Report and presentation to class on team projects
- either an aerodynamic concept investigation or a case study
- In some cases I will assign a paper to read, and the class will not be “a lecture”, but a class discussion of the paper
- I will make various codes available to use for the homeworks and project
- No text to buy, we will use my notes off the web (or free NASA and AIAA pdf files), http://www.dept.aoe.vt.edu/~mason/Mason_f/ConfigAero.html
- Let me know if any accommodation is needed