MAE 112 Description – Fall 2024

This course will have eighteen 80-minute lecture periods on M, W, at 2 pm starting September 30. Holiday on November 11 and Midterm Exam on November 13. There will eight 50-minute discussion periods starting on Monday, October 7, excepting November 11. There will be eight homework assignments, each assigned about one week in advance of the submission deadline. The first homework will be due Sunday, October 13. Final grade distribution: 20% Homework, 35% Midterm Exam, and 45% Final Exam. Slides from 2020 are posted on Canvas. Lectures are delivered using the whiteboard. Some differences can exist with 2020 slides, but they can be helpful as augmentation.

The recommended text is *Mechanics And Thermodynamics Of Propulsion* by P.G. Hill and C.R. Peterson, Addison Wesley Publishing.

Professor William Sirignano will be the instructor; however, Professor Feng Liu will deliver lectures during the first week while Professor Sirignano is on travel to professional conferences. The teaching assistants, Wes Hellwig and Andrew Nichols, are very able PhD students with prior TA experience for this MAE 112 course. An approximate schedule follows:

Week	Reading	Lecture Topics	Discussion Topic
1	H&P, pp. 1-31.	1. Momentum Balance 2. Thrust	No discussion period.
	H&P, 31-63.	3. Chemical Thermodynamics	
2	H&P, 65-92, 569-605	4. Combustion Chamber Dynamics	Online chem. eq. calculator
	H&P, 264-74, 513-40	5. Nozzle Flow	
3	H&P, 467 -512, 242-63	6. Rocket Engine Performance	Homework solutions
	H&P, 217-41	7. Air Intakes	
4		8. Oblique Shockwaves	Homework solutions
	H&P, 141-63	9. Efficiencies	
5		10. Ramjet, Scramjet Engine Performance	Homework solutions
	H&P, 275-354	11. Compressors	
6	H&P, 367-99	12. Turbines	Homework solutions
	H&P, 400-13	13. Turbojet Performance (with, without afterburn)	
7		No lecture – holiday, Midterm Exam	No discussion (holiday)
		Midterm Exam covers topics 1 -12.	
8		14. Turboprop, Turbofan Performance	Homework solutions
	H&P, 490-94, 651-679	15. Electrothermal and Electrostatic Rockets	
9		16. Hall Thrusters	Homework solutions
		17. Electromagnetic Thrusters	
10		18. Solar Sails and Solar Panels	Homework solutions
		19. Nuclear Rockets	
11		**Final Exam covers topics 1-19.**	