AME 513a

Fundamentals and Applications of Combustion

Fall 2023, OHE 100C, MW 2:00-3:50 pm

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References:

1. Combustion Physics, by C.K. Law, 1st Edition, Cambridge University Press, 2006, (required).
2. Unpublished notes updated yearly, by C.K. Law & F.N. Egolfopoulos (will be provided).
3. Combustion Theory, by Forman A. Williams, 2nd Edition, Addison-Wesley, 1985.
4. Combustion, Flames, and Explosions of Gases, by Bernard Lewis and Guenther von Elbe, 3rd Edition, Academic Press, 1987.
5. Combustion, by Irvin Glassman, 3rd Edition, Academic Press, 1996.
6. An Introduction to Combustion, Concepts and Applications, by Stephen R. Turns, 2nd Edition, McGraw-Hill, 2000.
7. Molecular Theory of Gases and Liquids, by Joseph O. Hirschfelder, Charles F. Curtiss, and R. Byron Bird, 2nd Edition, John Wiley & Sons, 1963.
8. Physical Chemistry, by P.W. Atkins, 4th Edition, W.H. Freeman and Company, New York, 1990.
9. Chemical Kinetics, by Keith Laidler, 3rd Edition, Harper and Row, 1987.
10. Chemical Kinetics of Gas Reactions, by V.N. Kondrat'ev, Pergamon Press, 1964.
11. Physical Chemistry of Fast Reactions, Volume 1, Gas Phase Reactions of Small Molecules, edited by B.P. Levitt, Plenum Press, 1973.
12. Thermochemical Kinetics, by Sidney W. Benson, John Wiley & Sons, 1968.

Topics:

Introduction; Chemical Thermodynamics; Chemical Kinetics; Transport Phenomena; Conservation Equations; Non-Premixed Flames; Premixed Flames; Aerodynamics of Laminar Flames; Environmental Impacts of Combustion and Sustainability

Emphasis on the fundamental physical and chemical processes relevant to:

Power generation; piston engines; conventional and hypersonic air-breathing propulsion (jet engines, ramjets, scramjets); rocket propulsion; urban- and wild-fires; explosions and detonations; air pollution and climate change; sustainable fuels and role of combustion in sustainable energy

Dates:

Monday, August 21, 2023:	First class meeting
Wednesday, November 29, 2023:	Last class meeting

Grading:

Midterm Exam	October 16, 2023 (M)	(2:15 pm - 3:45 pm)	30% of the grade
Final Exam	December 8, 2023 (F)	(2:00 pm - 4:00 pm)	40% of the grade
Homework			30% of the grade

Note: **The use of laptops or cell phones to access the internet/e-mail during class and/or exams is not allowed. Such devices are allowed only to access material pertaining to the course.**