

ME 554 Rocket Propulsion (3-0-0-6)

Syllabus:

Classification of rockets – chemical, electrical and nuclear; Applications of rockets in launch vehicles, spacecraft, and missiles; Criteria of performance – thrust, specific impulse, energy and efficiencies, characteristic velocity, effective exhaust velocity; Flow through ideal and real nozzles; Solid rocket motors, double-base and composite propellants, grain configurations, erosive burning; Liquid rocket engines, types of propellants; cryogenic and gelled propellants, injector design, gas pressure and turbo-pump feed systems, combustion instability; Heat transfer analysis; Thrust vector control; Hybrid rocket engines; Electrothermal, ion and magnetoplasma rockets; Rocket testing.

References:

1. G. P. Sutton and O. Biblarz, *Rocket Propulsion Elements*, Wiley, 2001.
2. R. W. Humble, G. N. Henry, W. J. Larson, *Space Propulsion Analysis and Design*, McGraw Hill, 1995.
3. G. C. Oates, *Aerothermodynamics of Gas Turbine and Rocket Propulsion*, AIAA, 1988.
4. M. L. Turner, *Rocket and Spacecraft Propulsion*, Springer, 2009.
5. D. K. Huzel, and D. H. Huang, *Design of Liquid Propellant Rocket Engines*, AIAA, 1992.
6. P. G. Hill and C. R. Peterson, *Mechanics and Thermodynamics of Propulsion*, Addison Wesley, 1965.
7. M. Barrere, A. Joumotte, B. F. Veubeke and J. Vandekerckhove, *Rocket Propulsion*, Elsevier, 1960.
8. J. W. Cornelisse, H. F. R. Schoyer, and K. F. Wakker, *Rocket Propulsion and Spaceflight Dynamics*, Pitman, 1979.
9. M. J. Zucrow, *Aircraft and Missile Propulsion (Vol. I and II)*, John Wiley, 1958.
10. Pasquale M. Sforza, *Theory of Aerospace Propulsion*, Elsevier, 2011