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<b>DEPARTMENT</b>	Department of Aerospace Engineering
<b>INSTITUTE</b>	Indian Institute Of Technology Madras
<b>COURSE OUTLINE</b>	The fundamental aspects of rockets and the current trends in rocket propulsion are dealt with in this course. Starting with description of motion in space, the requirements of rockets for placing space-crafts in different orbits and escaping the gravitational fields of the planets are examined.

## COURSE DETAILS

S. No	Module ID/ Lecture ID	Lecture Title/Topic
1.	Module1_L1	Introduction
2.	Module1_L2	Motion in Space
3.	Module1_L3	Rotational Frame of Reference and Orbital Velocities
4.	Module2_L4	Velocity Requirements
5.	Module2_L5	Theory of rocket Propulsion
6.	Module2_L6	Rocket Equation and Staging of Rockets
7.	Module3_L7	Review of Rocket Principles: Propulsion Efficiency
8.	Module3_L8	Examples Illustrating Theory of Rocket Propulsion and Introduction to Nozzles
9.	Module3_L9	Theory of Nozzles
10.	Module4_L10	Nozzle Shape
11.	Module4_L11	Area Ratio of Nozzles: Under Expansion and Over Expansion

12.	Module4_L12	Characteristic Velocity and Thrust Coefficient
13.	Module5_L13	Divergence Loss in Conical Nozzles and the Bell Nozzles
14.	Module5_L14	Unconventional Nozzles and Problems in Nozzles
15.	Module5_L15	Criterion for Choice of Chemical Propellants
16.	Module6_L16	Choice of Fuel-Rich Propellants
17.	Module6_L17	Performance Prediction Analysis
18.	Module6_L18	Factors Influencing Choice of Chemical Propellants
19.	Module7_L19	Low Energy Liquid Propellants and Hybrid Propellants Chap 5: Solid Propellant Rockets
20.	Module7_L20	Introduction to Solid Propellant Rockets
21.	Module7_L21	Burn Rate of Solid Propellants and Equilibrium Pressure in Solid Propellant Rockets
22.	Module8_L22	Design Aspects of Solid Propellant Rockets
23.	Module8_L23	Burning Surface Area of Solid Propellant Grains
24.	Module8_L24	Ignition of Solid Propellant Rockets
25.	Module9_L25	Review of Solid Propellant Rockets
26.	Module9_L26	Feed Systems for Liquid Propellant Rockets
27.	Module9_L27	Feed System Cycles for Pump Fed Liquid Propellant Rockets
28.	Module10_L28	Analysis of Gas Generator and Staged Combustion Cycles and Introduction to Injectors
29.	Module10_L29	Injectors, Cooling of Chambers and Mixture Ratio Distribution
30.	Module10_L30	Efficiencies due to Mixture Ratio Distribution and Incomplete Vaporization
31.	Module11_L31	Pumps and Turbines: Propellant Feed System at Zero "g" □ Conditions
32.	Module11_L32	Review of Liquid Bi-Propellant Rockets and Introduction to Mono-Propellant Rockets
33.	Module11_L33	Introduction to Hybrid Rockets and a Simple Illustration of Combustion Instability in Liquid Propellant Rockets

<b>34.</b>	<b>Module12_L34</b>	Electric and Magnetic Fields and the Electrostatic Thruster
<b>35.</b>	<b>Module12_L35</b>	Electrical Thrusters
<b>36.</b>	<b>Module12_L36</b>	Advance in Rocket Propulsion

**List of reference material/ books:**

**Name and contact details of two referees for the course:**