

COURSE CODE	COURSE TITLE	L	T	P	C
1154AE104	SATELLITE LAUNCH VEHICLE	3	0	0	3

Course Category:

University Elective

a. Preamble:

This course provides fundamental concepts of Satellites Launch Vehicles with emphasis on exploring its applications and modern launch methods . This course also introduce the modern techniques in space propulsion.

b. Prerequisite Courses:

Physics

c. Related Courses:

- Space Mechanics

d. Course Educational Objectives:

- To understand the structure, components of launch vehicle.
- To familiarize launching techniques used.
- To impart knowledge on satellite applications

e. Course Outcomes:

Upon the successful completion of the course, students will be able to:

CO Nos.	Course Outcomes	Knowledge Level (Based on revised Bloom's Taxonomy)
CO1	Describe the Orbits and Orbital elements	K2
CO2	Describe the fundamentals of Rocket Propulsion	K2
CO3	Explain the parameters of launch vehicle and its integration	K2
CO4	Explain reliability ,ground testing and safety precaution of launch vehicle.	K3
CO5	Explain application of satellites	K3

Correlation of COs with POs :

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H		H	H			M	H				
CO2	H		H	H			M	H				
CO3	H		H	H			M	H				
CO4	H		H	H			M	H				
CO5	H		H	H			M	H		H		

H- High; M-Medium; L-Low

g. Course Content :

Unit 1 Introduction L-9

History & Early Missions - Geostationary Satellites - Low Earth Orbiting Satellites - Low Polar Earth Orbit Satellites - Kepler's Laws of Planetary Motion- Orbital Elements.

Unit 2 Rocket propulsion L-9

Resolution of forces - Rocket Propulsion - Generation of Thrust - The Rocket Equation –Staging - Specific Impulse - Types of Engines - Propellant and burning - Internal Ballistics - Grains – Ignition.

Unit 3 Launch Vehicle L-9

Introduction - Launch Vehicle Parameters & Performance - Thruster satellite integration - Propellant management in spacecrafts - Propellant access in microgravity- Air breathing options in launch vehicles - Nuclear Rockets - Electrostatic and Electromagnetic propulsion

Unit 4 Launch Vehicle development L-9

Launch pad & facilities - Ground testing - Safety & flight termination systems - Launch vehicle failures and reliability - Cost estimation

Unit 5 Applications L-9

Indian Satellites – Applications of Satellites - Current & future launch vehicles

Text Books:

1. Hill, P.G. & Peterson, C.R., Mechanics and Thermodynamics of Propulsion, Pearson India, 2nd Edition 2009.
2. Jack Mattingly, Elements of Gas Turbine Propulsion, Tata McGraw Hill Education (India) Pvt Ltd, 1st Edition, 2005