AMITY UNIVERSITY
UTTAR PRADESH

Course Title: Introduction to Space Flight Engineering **Credit Units: 4**

L	T	P/S	SW/ FW	TOTAL CREDIT UNITS
3	1	-	-	4

Course Code: To be decided

Course Level: PG

Course Objectives: To introduce the concept of flight vehicles in space and provide an overview of flight technologies including rocket, satellites and interplanetary mission in space.

Pre-requisites: Physics, Mathematics

Course Contents/Syllabus:

	Weightage (%)
Module I : Atmosphere	**15**
Descriptors/Topics : The Planet Earth; Earth's Gravitational Field; Earth as an Ellipsoid; Peer- shaped Earth; Ellipticity of the Earth; The Geoid and Its Importance; Thermal Structure of the Atmosphere; Atmospheric Density Variation; Van-Allen Radiation Belt; The Ionosphere.	
Module II : Space and Solar System	**25**
Descriptors/Topics : Motion and Rotation of the Planets; Geocentric and Heliocentric Systems; Sidereal and Synodic Periods; Ecliptic Plane and the Zodiac; Direct and Retrograde Motions; Configuration and Phases of Interior Planets; Configurations of Exterior Planets; Asteroids; Comets; Meteors, Meteorites and Tektites; Micrometeorites; The Milky Way, the Galaxies and the Universe.	
Module III : Rocket Trajectory	**25**
Descriptors/Topics : Mass Ratio and Propellant Mass Fraction; Equation of Motion of an Ideal Rocket; Motion of a Rocket in a Gravitational Field; Simplified Vertical Trajectory; Burn- out Velocity and Burn- out Height; Step- Rockets; Ideal Mission Velocity and Losses; Effect of Launch Angle; Factors Causing Dispersion of Rockets in Flight; Dispersion of Finned Rockets; Stability of Flight	
Module IV : Satellite	**25**

Descriptors/Topics : Orbits and Trajectories; Conic Sections; Kepler's Laws of Satellite Motion; Orbital Velocity of Satellites; Orbital Periods; Eccentric Elliptical Orbits; Effect of Injection Conditions; Perturbation of Orbits; Effect of Earth's Rotation; Low Earth Orbits; Geostationary Satellites; Sun- synchronous Satellites. Satellite Application: Satellite for Meteorological, Communication, Navigational and Geodetic Applications; Atmospheric Sounding; Satellites for Geophysical and Interplanetary Studies.	
Module V : Interplanetary Missions	**10**
Descriptors/Topics : Parking Orbit; Transfer Trajectory; Impulsive Shot; Launching of Interplanetary Spacecraft.	

Student Learning Outcomes:

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- Describe atmospheric and geometric properties of the earth.
- Understand important physical features of space flights system.
- Apply basic principles of mechanics to obtain trajectories of rocket and missiles.
- Understand and define range of subject matter covered under the topic of satellites.
- Explain and analyze combustion instability, its causes and remedial methods.

Pedagogy for Course Delivery: Session Plan / course-material uploading, Class-room teaching associated with assignments**,** Aerodynamics Lab experiments & Report preparation, quiz, viva-voce and evaluation.

Lab/ Practicals details, if applicable:.

List of Experiments:

Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	Total
100	**-**	**100**

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment - 30					End Term Examination
Components (Drop down)	**A**	**CT**	**S/V/Q**	**HA**	**70**
Weightage (%)	5	10	8	7	70

Lab/ Practical/ Studio Assessment:

	Continuous Assessment/Internal Assessment				End Term Examination	
Components (Drop down	**PR**	**LR**	**V**	**A**	**EXP**	**V**
Weightage (%)						

Text:

- E. Stuhlinger and G. Mesmer,"Space Science and Engineering",
- W. N. Hess, " Space Science".

References:

- S. Glasstone,"Source book on the space science"

Any other Study Material:

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