AMITY UNIVERSITY
UTTAR PRADESH

Course Title : Missile Systems
Course Code : SPAC 623
Credit Units : 03

Level PG

L	T	P/S	SW/FW	TOTAL CREDIT UNITS
3	0	0		03

Course Objectives :

This course is aimed to provide to the students knowledge rockets/missiles, their performance, stability and control. The course also covers methods of stabilization and mathematical treatment of stability and control and maneuverability.

Pre-requisites :

- Knowledge of mathematics and basic physics
- Knowledge of flight mechanics
- Basic knowledge of missile and rockets

Student Learning Outcomes (SLO):

On completion of the course the student will be able to:

- Analyze the performance of a closed loop Missile System and
- Understand performance of missiles and rockets
- Know about guidance and control
- Analyse maneuvering flight

Course Contents/Syllabus:

	Weightage (%)	**Feedback Rating (on scale of 6 points)**	**Comments (if any)**
Module I : General Information	**15%**		
1. Difference between Rocket and missile, Type of Rockets and missiles, Satellite launch vehicles.			
Module II: Aerodynamic Characteristics of Airframe Components	**20%**		
2. Introduction, Bodies of revolution, Different fore-body shapes, Summary of characteristics of bodies of revolution, Aerodynamic control, Jet control			

Module III: Performance of Missiles and Rockets	**25%**		
3. Introduction, various types of drags, Boost glide trajectory, Graphical solution, Boost sustainer trajectory, long range cruise trajectory, long range ballistic trajectory, Powered and un-powered flight, Brief description of Fin Stabilized and spin stabilized and spin stabilized Rockets and their force systems, Thrust misalignment.			
Module IV: Guidance and Control	**20%**		
4. Guidance methods : Beam rider , Pursuit evasion , Proportional guidance systems , Missile control : bank to turn , Skid to turn Inertial guidance : Platform based , Strap down INS systems , Aided INS.			
Module V: Maneuvering Flight	**20%**		
5. Introduction, Ballistics Missile trajectory , range and burnout velocity errors. Dynamic Stability Equation of motion, longitudinal dynamic degree of freedom, classical solution, lateral dynamics. TERCOM . GPS aided navigation			

Pedagogy for Course Delivery: The course pedagogy will include lectures and tutorials, Interactive discussions, quiz, viva-voce and real problem solving of Missile guidance using MATLAB..

Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	Total
100%	**0%**	**100%**

Theory Assessment (L&T):

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

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Texts:

- 1. S.S Chin, “Missile Configuration Design” McGraw Hill
- Davis Follin and Blitzer, “Exterior Ballistics of Rockets”, Van Nostrand.
- Seifert and Brown, “Ballistic Missiles and Space Vehicle Systems”, John Wiley
- Seifert (Edited by), “Space Technology”, John Wiley.