

COURSE CODE	COURSE TITLE	L	T	P	C
1154AE116	Introduction to Aerial Robotics	3	0	0	3

Course Category:

University Elective

a. Preamble :

This course provides hands on experience on design and development of Aerial Robot system, flying of UAV category aircraft. Students will get in-depth skill set on Application based Unmanned system.

b. Prerequisite Courses:

NIL

c. Related Courses:

- Fundamentals of Flight
- Unmanned Aerial vehicle
- Flapping wing Dynamics

d. Course Educational Objectives :

- To understand the preliminary concepts of model aircraft design
- To impart practical skill on fabrication and flying of Aerial robot category aircrafts

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 History and basic aerial robot flight concepts	K2
CO2	Classification of unmanned systems, Parts and function of UAVs, UGV,UWV	K3
CO3	Describe the applications and payloads of aerial robots	K2
CO4	Demonstrate the design process of UAVs fixed wig multicopter and flapping wing	K3, S3
CO5	Describe the navigation and guidance of Aerial Robot	K3, S3

f. Correlation of COs with POs :

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

H- High; M-Medium; L-Low

g. Course Content :

UNIT-I HISTORY AND BASIC AERIAL ROBOT FLIGHT CONCEPTS 9L

History of Aerial Robotics-Taxonomy of unmanned aerial vehicles- Function of an Airplane – Structure of the atmosphere -Force acting on Airplane- Angle of attack –Lift and Drag –Airfoil nomenclature- Airfoil characteristics – Mach number –Propulsion system.

UNIT-II UNMANNED SYSTEMS 9L

Unmanned Aerial Vehicle - Classification of UAVs- Parts and function of fixed wing, Multicopter and flapping wing UAVs, Basics of UAV piloting - Unmanned ground vehicle-, Unmanned Water vehicle – Classification of UGV and UWV- Parts and function of UGV And UWV- Launching and Recovery of US –Electronics components of US- Amphibious Vehicle-Lighter-Than-Air Systems- Rules and Regulation of Aerial Robots.

UNIT-III APPLICATIONS AND PAYLOADS OF AERIAL ROBOTS 9L

Applications of Aerial Robots- Remote sensing, Aerial mapping, Disaster response, Surveillance Search and rescue, Transportation Payload delivery, Image acquisition for cinematography, Aerial Observations Military Operations, Civilian and Private Applications-of Payload -Classification of payloads -Camera –sensors-

UNIT-IV DEVELOPMENT AND INTEGRATION OF AERIAL ROBOTS 9L

Fixed wing UAVs- Multicopter UAV- Flapping wing UAV- Swarm Robot, Integration of Aerial robot- IOT based Aerial robot- Safety procedure of Aerial Robot- Material for Aerial Robot.

UNIT-V NAVIGATION AND GUIDANCE SYSTEM OF AERIAL ROBOT 9L

Flight Control System –Path planning- Way point Navigation system-GPS – GCS-Telemetry – –Transmitter & Receiver.

Total: 45Periods

h. Learning Resources

i. Text Books :

1. Andey Lennon “Basics of R/C model Aircraft design” Model airplane news publication