Tulsiramji Gaikwad-Patil College of Engineering and Technology

Wardha Road, Nagpur-441108

NAAC Accredited(A+Grade)

B.Tech. VIII th Sem Aeronautical Engineering

BAEXX14 Unmanned Aerial Systems (Open Elective-V)

Teaching Scheme	
Lectures	3hr/week
Tutorials	-
Practical	-
Total Credits	3
Duration of ESE: 03 Hrs	

Examination Scheme	
CT-I	15 Marks
CT-II	15 Marks
CIE	10 Marks
ESE	60 Marks
Total	100 Marks
Duration of Exam: 3 Hours	

The Objectives of this course are:

1	To introduce the basic concepts of unmanned aerial vehicles.
2	To make students familiarize with the design aspects of UASs
3	To impart knowledge on the hardware components and their application in the UASs.
4	To infer about the communication and control detail of UASs.
5	To introduce the basic operational futures of UASs.

Course Contents

Unit I	**Introduction to UAS :** History of UAS, classification, Introduction to Unmanned Aircraft Systems, models and prototypes, System Composition, applications, Payloads,.
Unit II	**The Design of UAS :** Introduction to Design and Selection of the System, Aerodynamics and Airframe Configurations, Characteristics of Aircraft Types, Design Standards and Regulatory Aspects, India, UK, USA and Europe, , control surfaces, specifications.
Unit III	**Avionics Hardware :** Autopilot, AGL, pressure sensors, servos, accelerometer, gyros, actuators, power supply, processor, integration, installation, configuration, and testing. Working Principles of various types of battery and its applications.
Unit IV	**Communication Payloads and Controls** Payloads, Telemetry, tracking, Aerial photography, controls, PID feedback, Radio control frequency range, modems, memory system, simulation, ground test, analysis, trouble shooting.
Unit V	**Development of UAV Systems** Waypoints navigation, ground control software, System Ground Testing, System In-flight Testing, Future Prospects and Challenges, Case Studies – Mini and Micro UAVs.

Text Books

1	Kimon P. Valavanis, “Advances in Unmanned Aerial Vehicles: State of the Art and the Road to Autonomy”, Springer, 2nd Ed., 2007..
2	Paul G Fahlstrom, Thomas J Gleason, “Introduction to UAS Systems”, UAS Systems, Inc, 4th Ed., 1998..
3	Reg Austin “Unmanned aircraft systems: UAS design, development and deployment”, Wiley, 5th Ed., 2010..

Reference Books	
1	Armand J. Chaput, “Design of Unmanned Air Vehicle Systems”, Lockheed Martin Aeronautics Company, 1st Ed., 2001.
2	“Design of Unmanned Air Vehicle Systems”, by Stoecker & Jones. McGraw-Hill.
Useful Links	
1	https://nptel.ac.in/courses/101/104/101104071/
2	https://onlinecourses.nptel.ac.in/noc20_ae03/preview

BAEXX14	Course Outcomes	CL	Class Sessions
CO1	Acquire knowledge on the importance of UAS with respect to their applications.	2	9
CO2	Distinguish between various subsystems and configurations of UAS.	3	9
CO3	Perform ground test and troubleshooting with respect to UAS operation.	3	9
CO4	Gain insights with design standards and regulatory aspects of UAS.	3	9
CO5	Distinguish between needs of mini and micro UAS.	3	9