SAVITRIBAI PHULE
PUNE UNIVERSITY
(Formerly University of Pune)

DRONEACHARYA
AERIAL INNOVATIONS
LIMITED

Board of Studies,
Department of Technology

Electronics & Electrical (EE) Technology

Curriculum Structure for

Professional Certification Programme

in

CERTIFICATE COURSE IN GIS FOR DRONE DATA PROCESSING

Course Name: Professional Certification Programme in

CERTIFICATE COURSE IN GIS FOR DRONE DATA PROCESSING

Compulsory Modules – 3

Duration: 10 DAYS

Course Intake: - 40

Course Mode: - Classroom (Hybrid)

Eligibility Criteria:

10th Pass
Education Background:- Should able to read,Understand & Write English/Hindi

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Board of Studies, Electronics and Electrical Technology(EE)

Curriculum Structure for Professional Certification

Programme in

CERTIFICATE COURSE IN GIS FOR DRONE DATA PROCESSING

Sr. No.	Subject Code	Subject Name	Credits	Teaching Scheme (Theory)	Teaching Scheme (Practical)
1	CCGDDP1	INTRODUCTION TO GIS & REMOTE SENSING	2	√	√
2	CCGDDP2	DATA ANALYSIS	2	√	√
3	CCGDDP3	PHOTOGRAMMETRY AND DRONE DATA PROCESSING	2	√	√
		Total Course Credits	6		

TAKEAWAYS AFTER COMPLETION OF (CCGDDP) COURSE

The primary benefit of completing a certificate course in GIS (Geographic Information Systems) and drone data processing is a potent combination of skills that enables individuals to utilize cutting-edge technology for spatial data analysis and mapping. The course will provide students with a comprehensive understanding of GIS principles, spatial data acquisition, and processing techniques. They will also be able to acquire, process, and analyze drone-captured data, transforming it into valuable geographical insights. This comprehensive skill set enables individuals to contribute to a variety of disciplines, including urban planning, environmental management, agriculture, and disaster response, where the integration of GIS and drone technology is becoming increasingly vital. Additionally, graduates will be well-prepared for career opportunities that demand expertise in spatial data analysis and the implementation of drones for data collection, making them valuable assets in today's data-driven world.

CCGDDP1 : INTRODUCTION TO GIS AND REMOTE SENSING

Learning Outcomes

The course objectives for Introduction to GIS and Remote Sensing with Google Earth include providing students with a thorough understanding of geospatial technologies and their practical applications. The participants will become proficient with fundamental GIS concepts, remote sensing techniques, and the use of Google Earth's potent tools. They will learn to collect, process, and analyze geospatial data from a variety of sources, enabling them to construct accurate maps, conduct spatial analysis, and track environmental changes. Additionally, students will develop the ability to harness Google Earth's capabilities for visualizing, querying, and interpreting complex spatial data, enhancing their skills in spatial problem-solving and data-driven decision-making across a broad spectrum of fields, including environmental science, urban planning, resource management, and disaster response. By the end of the course, participants should be able to employ geospatial technologies to address real-world challenges and contribute to advances in research, planning, and problem-solving across a variety of industries and sectors.

Syllabus

Introduction to Remote Sensing-1: History and Development, Concept of Remote Sensing, Elements of Remote Sensing, Introduction to GIS, Definition, Concept of GIS, Components, Objective, Power of GIS.

Cartography Introduction, Elements types, Map symbology (Man Made feature, Nature feature symbology), Data in GIS, Types (spatial, nonspatial), Sources of data, Metadata,Creation of data, Quality of Data, Quality measurement, Sources of error, Types of error.

Introduction to Google Earth: Introduction to interface, Creation of .kml, Find location using coordinates, Time series, Export data, Introduction to ArcGIS/ QGIS, Interface, Import Export data.

Projection: Introduction, Types of projection, Datum, Coordinate System, Scales.

Georeferencing: Importance, Process, Coordinate system conversion, Projection information.

Georeferencing: Toposheet.

Data Types: Data types, Data models (Spatial, Non-Spatial), Compression, DataBase Structure, DBMS, Components of DBMS, Structures of DBMS, Interoperability.

Introduction to Remote Sensing -2: Electromagnetic Spectrum, Laws of Radiation, Band Combinations, Interaction with Atmosphere, Spectral Signatures.

Introduction to Remote Sensing-3: Types of Sensors, Types of Orbits, Types of Resolutions, Applications.

CCGDDP2: DATA ANALYSIS

Learning Outcomes

This module aims to provide students with a comprehensive understanding of geospatial analysis and data manipulation. Participants will acquire a high level of skill in the utilization of QGIS software for the purposes of visualizing spatial data, conducting analysis, and creating maps. The individuals will get a comprehensive comprehension of GNSS (Global Navigation Satellite Systems) technology, enabling them to precisely acquire geographic coordinates and incorporate real-time positioning data into GIS projects. Furthermore, it is important for students to understand the importance of Continuously Operating Reference Stations (CORS) in attaining accurate Global Navigation Satellite System (GNSS) data. During the duration of the course, participants will get practical knowledge in the analysis of spatial and attribute data. This will provide them with the ability to carry out intricate geospatial activities, including spatial queries, spatial statistics, and georeferencing. Upon the culmination of the course, students will possess the necessary proficiency to effectively utilize these skills and technologies in a wide range of applications, such as land surveying, urban planning, environmental monitoring, and infrastructure management. As a result, they will be able to make data-informed decisions and solve spatial problems across various industries and domains.

Syllabus

Introduction to QGIS: Data Generation, Topology.

Digitization on Toposheet

Topology: Topology rules.

Digitization on BaseMap
Displaying Qualitative and Quantitative data: Advanced Editing, Map Creation.

CORS: Introduction, Function, Data Generation, Practical [login, data downloading, data processing].

GNSS introduction, Segments, History, Types of GPS.

Application Image Classification: Supervised Classification, Unsupervised Classification, Change Detection.
Map your Neighbourhood

Data Analysis, Spatial Data Analysis (vector), Single Layer Analysis, Multilayer Analysis (Update, Dissolve, Append, etc).

Data Analysis: Spatial Data Analysis (Raster), Map Algebra, Trend Analysis.

Surface Analysis: DEM, DSM, Interpolation Methods, Network Analysis, Introduction, Application.

Practical on Data Analysis
Working with Tables: Queries, Attribution, Join Relate.

Web GIS: Introduction to web, Characteristic, Application, HTTP Web GIS architecture GIS server, client, Web services, Advantages, Types, Service standards.
Web GIS Practical

CCGDDP3 : PHOTOGRAMMETRY AND DRONE DATA PROCESSING

Learning Outcomes

The module on Photogrammetry and Drone Data Processing aims to equip students with a thorough comprehension of the underlying ideas and methodologies utilized in the conversion of aerial footage obtained from drones into precise geospatial data. The participants will acquire expertise in various photogrammetric procedures, encompassing the capture of images, georeferencing, orthorectification, and 3D modeling. The individuals will acquire the necessary abilities to effectively process and analyze imagery obtained from drones, with the aim of obtaining valuable information for various applications including land surveying, topographic mapping, and environmental evaluation. In addition, students will acquire proficiency in utilizing specialized software tools for the purpose of image processing and data extraction. This will enable them to generate accurate and comprehensive spatial representations using data obtained from drones. Upon completion of the module, participants will possess the necessary skills to effectively utilize photogrammetry and drone data processing methods in practical situations. This proficiency will enable them to make valuable contributions to various domains, including urban planning, agriculture, infrastructure management, and disaster response. Furthermore, participants will be capable of generating precise and practical geospatial insights that can be readily implemented.

Syllabus

Introduction to Photogrammetry: Introduction Importance, Type of Photogrammetry, Overlap, DSM and DTM, Contours, 3D modeling.

Concept of LiDAR: Introduction, Mechanism, Process, Application.

Image Interpretation: Elements of Image Interpretation, Interpretation of Aerial Photograph, Interpretation of Satellite Imagery.

TopoSheet Interpretation

Geoprocessing

UAV: Introduction, Types, Categories, Applications, UAV Survey, Functioning Processes.

UAV Flight Planning: Importance, Network Planning, Drone Flight Planning, Thumb Rules, Application of Flight Planning.

UAV Data Processing: Different softwares, Process Data Generation, Applications.

Photogrammetry Software: Importing drone Data, Aerial triangulation, Point cloud generation, Elevation model generation, Contours, Orthomozaics, Feature extraction.

Hands On- Drone data Processing, Drone data, Indoor, Multi-spectral.