

Government of Pakistan

National Vocational and Technical Training Commission

Prime Minister Youth Skills Development Program

"Skills for All"



Course Contents/ Lesson Plan

Course Title: Plane Search (Aerial photography and drone mapping)

Course for Construction Professionals: A Global Prospective

Duration: 3 Months

Trainer Name	
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Course Title	Plane Search (Aerial photography and drone mapping)
Objectives and Expectations	<p>Employable skills and hands-on practice in</p> <p>Objective: The objective of this course is to provide trainees with comprehensive training in aerial photography and drone mapping techniques tailored for construction projects, aiming to improve data collection accuracy, enhance decision-making, and prepare them for global challenges and opportunities in drone technology.</p> <p>Expectations:</p> <p>Technical Proficiency</p> <p>Drone Operation: Trainees should develop a strong understanding of drone controls, including takeoff, flight, and landing. They should be comfortable handling the drone in various conditions and managing basic troubleshooting.</p> <p>Aerial Photography: Trainees should learn how to set up and adjust camera settings for optimal aerial photography, including managing exposure, focus, and composition.</p> <p>Mapping Software: Trainees should become proficient in using mapping and photogrammetry software, understanding how to process images, create maps, and analyze data.</p> <p>Practical Skills</p> <p>Mission Planning: Trainees should be able to plan and execute drone missions effectively, including setting flight paths, scheduling, and ensuring all necessary preparations are in place.</p> <p>Data Collection: Trainees should be able to collect and manage aerial imagery and mapping data, ensuring quality and consistency throughout the process.</p> <p>Analytical Skills</p> <p>Data Analysis: Trainees should be able to analyze the data collected through aerial photography and mapping, including interpreting visual data and generating actionable insights.</p> <p>Problem-Solving: Trainees should be capable of identifying and solving common issues that arise during drone operations and data processing.</p> <p>Project Management</p> <p>Team Collaboration: Trainees should be able to work effectively as part of a team, communicating clearly and collaborating on tasks related to drone operations and data analysis.</p>

	<p>Time Management: Trainees should manage their time efficiently, balancing coursework, practical exercises, and project work.</p> <p>Documentation and Reporting</p> <p>Record Keeping: Trainees should maintain thorough and accurate records of their work, including flight logs, data collected, and any issues encountered.</p> <p>Reporting: Trainees should be able to compile and present reports on their projects, including analysis, findings, and recommendations.</p> <p>Employable Skills:</p> <ol style="list-style-type: none"> i. Technical Proficiency: Demonstrates proficiency in operating drones and capturing high-quality aerial images Can process and analyze drone data using specialized software Understands the principles of photogrammetry and 3D modeling ii. Safety Awareness: Adheres to safety protocols and regulations for drone operations Can assess risks and mitigate hazards during flights iii. Legal Compliance: Understands and complies with local, national, and international regulations for drone use iv. Application Knowledge: Can apply drone mapping techniques to various construction tasks and challenges <p>Hands-on Practice:</p> <ol style="list-style-type: none"> i. Provide ample opportunities for trainees to practice drone flying and data processing ii. Encourage experimentation and exploration of different drone applications iii. Analyze case studies of successful drone projects in construction iv. Invite industry experts to share their experiences and insights v. Utilize online resources and tutorials for additional learning
Entry-level of trainees	Minimum DAE Civil, Electrical Mechanical, Architecture and Information Technology Preferably Graduation in Construction Electrical, Mechanical and IT Sector
Learning Outcomes of the course	<p>The learning outcomes of a plane search course typically include:</p> <ol style="list-style-type: none"> 1. Technical Skills in Drone Operation <ul style="list-style-type: none"> • Proficient Drone Control: Trainees will demonstrate the ability to operate drones safely and effectively, including takeoff, navigation, and landing in various conditions. • Camera Management: Trainees will be able to configure and adjust drone-mounted cameras to capture high-quality aerial images and videos. 2. Understanding of Aerial Photography <ul style="list-style-type: none"> • Image Quality: Trainees will produce high-resolution, well-composed aerial photographs that meet specific project requirements. • Technical Adjustments: Trainees will be able to adjust camera settings such as exposure, white balance, and focus to enhance image quality based on

different environmental conditions.

3. Proficiency in Drone Mapping and Software

- **Mapping Techniques:** Trainees will be able to create detailed maps using drone imagery and photogrammetry techniques.
- **Software Utilization:** Trainees will effectively use mapping and data analysis software to process and interpret aerial images, generate maps, and analyze spatial data.

4. Regulatory and Safety Knowledge

- **Regulatory Compliance:** Trainees will understand and adhere to relevant regulations and guidelines governing drone operations, including airspace restrictions and legal requirements.
- **Safety Protocols:** Trainees will implement and follow safety protocols to ensure safe drone operations and minimize risks to people and property.

5. Practical Application and Project Management

- **Mission Planning:** Trainees will plan and execute drone missions, including defining objectives, setting flight paths, and preparing for data collection.
- **Data Management:** Trainees will manage and process data collected during missions, ensuring accuracy and consistency in both imagery and mapping results.

6. Analytical Skills

- **Data Analysis:** Trainees will analyze aerial imagery and mapping data to extract meaningful insights and generate actionable recommendations.
- **Problem-Solving:** Trainees will identify and resolve issues encountered during drone operations and data processing, applying critical thinking to overcome challenges.

7. Ethical and Professional Standards

- **Ethical Practices:** Trainees will demonstrate an understanding of and adherence to ethical practices in drone operations, including respect for privacy and property rights.
- **Professional Communication:** Trainees will effectively communicate their findings and project results through well-structured reports and presentations.

8. Collaboration and Time Management

- **Teamwork:** Trainees will collaborate effectively with peers, contributing to team projects and supporting group objectives.
- **Time Management:** Trainees will manage their time efficiently to balance coursework, practical exercises, and project deadlines.

9. Continuous Improvement

- **Self-Assessment:** Trainees will be able to self-assess their performance and identify areas for improvement, demonstrating a commitment to ongoing learning and skill development.

Course Execution Plan

A comprehensive course execution plan for Plane search (Arial Photography and drone mapping) typically includes the following components:

1. Course Objectives

- Define the specific learning goals and outcomes for the course.
- Outline the skills and knowledge participants will acquire by the end of the course.

2. Course Structure

- **Modules:** Break the course into distinct modules or units, each focusing on different aspects of Plane Search
- **Topics Covered:** List the key topics to be addressed in each module, such as Plane search concepts, software tools, model creation, coordination, and data management.

3. Duration and Schedule

- **Course Length:** Specify the total duration of the course (e.g., 12 weeks, 240 hours).
- **Class Schedule:** Provide a detailed schedule, including dates and times for each module or session.

4. Teaching Methods

- **Lectures:** Include theoretical explanations and discussions.
- **Practical Exercises:** Hands-on activities using Plane search software tools.
- **Case Studies:** Analyze real-world Plane search projects and scenarios.
- **Group Work:** Collaborative tasks to enhance teamwork and problem-solving skills.

5. Learning Resources

- **Textbooks:** Recommended reading materials and reference books.
- **Software Tools:** List of plane search software and tools to be used in the course.
- **Online Resources:** Access to online tutorials, webinars, or forums.

6. Assessment and Evaluation

- **Assignments:** Regular tasks or projects to assess practical skills and knowledge.
- **Quizzes and Tests:** Periodic assessments to evaluate understanding of key concepts.
- **Final Project:** A comprehensive project or case study to demonstrate the application of plane search skills.

7. Instructor Details

- **Qualifications:** Information about the instructors' qualifications and experience in plane search.
- **Contact Information:** How participants can reach out to instructors for support or questions.

	<p>8. Support and Resources</p> <ul style="list-style-type: none"> • Technical Support: Assistance with software and technical issues. • Additional Resources: Access to supplementary materials and support services. <p>9. Feedback Mechanism</p> <ul style="list-style-type: none"> • Course Evaluation: Collect feedback from participants to improve course content and delivery. • Continuous Improvement: Use feedback to make ongoing adjustments and enhancements to the course. <p>10. Certification and Accreditation</p> <ul style="list-style-type: none"> • Certification: Details about any certifications or qualifications awarded upon successful completion of the course. • Accreditation: Information about the course's accreditation or recognition by relevant professional bodies. <p>This plan provides a structured approach to delivering a plane search course, ensuring that participants gain the necessary skills and knowledge to effectively use plane search in their professional roles.</p>
<p>Companies offering jobs in the respective trade</p>	<ul style="list-style-type: none"> • SkyVision Pakistan • Pak Drone • Drone Tech Pakistan • Geosat Solutions • Spatial Technology • Zameen.com • FWO(Frontier Works Organization) • AgriTech Companies • Environmental NGOs • Media Production Companies • Pakistan Space & Upper Atmosphere Research • Consulting Engineering Firms
<p>Job Opportunities</p>	<ul style="list-style-type: none"> • Drone Pilot/operator • Geospatial Analyst • Aerial photography • Drone mapping specialist • Surveyor • Remote Sensing Specialist • Drone Maintenance Technician
<p>No of Students</p>	<p>25</p>
<p>Learning Place</p>	<p>Classroom / Lab</p>
<p>Instructional Resources</p>	<p>Online Courses and Tutorials:</p>

1. Udemy - "Drone Photography and Video Production"

Learn the fundamentals of drone photography and videography, including equipment setup, flight techniques, and post-production.

2. Coursera - "Introduction to Drone Operations"

Offered by the University of London, this course covers the basics of drone operation, including aerial photography and data collection.

3. Skillshare - "Drone Photography: Tips and Techniques for Capturing Stunning Aerial Shots"

A course focusing on the artistic and technical aspects of drone photography, including composition and editing.

4. LinkedIn Learning - "Learning Drone Photography"

Provides a comprehensive overview of drone photography, including planning, shooting, and editing.

5. Udacity - "Introduction to Computer Vision with TensorFlow"

Although broader in scope, this course includes aspects of drone mapping and image analysis using computer vision techniques.

Books and References:

1. "Drone Photography and Videography For Dummies" by Peter B. Zoller

Website Reference: Wiley

2. "The Art of Aerial Photography" by Jeffrey L. S. Zurek

Website Reference: Amazon

3. "Introduction to Drone Photography and Videography" by Paul Meier

Website Reference: Amazon

4. "Mapping and Modeling with Drones" by Adam Juniper

Website Reference: Amazon

5. "Drone Mapping: A Beginner's Guide to Aerial Photogrammetry and 3D Modeling" by Michael J. L. Thomas

Website Reference: Amazon

6. "Drones: Mastering Flight Techniques and Aerial Photography" by David G. McDonald

Website Reference: Barnes & Noble

MODULES

DR	Module Title	Days	Learning Units	Home Assignment
Week 1	Introduction to Aerial Photography and Drone Mapping	Day 1	<ul style="list-style-type: none"> ❖ Basic principles of aerial photography ❖ Perspective and Scale knowledge of aerial photography and drone mapping ❖ Set-up Camera Orientation ❖ Project Altitude and Scale ❖ Lighting and Shadows for required captures ❖ Resolution and Image Quality Establish Georeferencing ❖ Photogrammetry for aerial Measurements ❖ Flight Planning for aerial photography 	Define types of drone and their applications
		Day2-3	<ul style="list-style-type: none"> • Introduction to drones and their applications in construction ❖ Aircraft introduction ❖ Drone application ❖ Drone Accuracy and Efficiency in Construction ❖ Conclusion for tool of Construction Industry 	
		Day 4-5	<ul style="list-style-type: none"> • Understand Safety protocols and best practices for drone pilots ❖ Regulatory Compliance: Trainees will understand and adhere to relevant regulations and guidelines governing 	

			<p>drone operations, including airspace restrictions and legal requirements.</p> <ul style="list-style-type: none"> ❖ Safety Protocols: Trainees will implement and follow safety protocols to ensure safe drone operations and minimize risks to people and property. 	
Week 2	Drone Technology and Equipment	Day 1-3	<ul style="list-style-type: none"> • Types of Drones and their capabilities □ Capabilities of various drones <ul style="list-style-type: none"> • Camera Quality: • Flight Time: • Range: • Features(GPS) 	Define Components of Drone
		Day 4-5	<ul style="list-style-type: none"> • Drone components • Drones are complex systems made up of various components: camera, gimbals, flight controller 	
Week 3	Drone Technology and Equipment	Day 1-3	<ul style="list-style-type: none"> • Selecting the right drone for construction projects • It requires careful consideration of the project's specific needs 	Select drone as per construction of building project
		Day 4-5	<ul style="list-style-type: none"> • Essential Accessories • When operating drones like construction projects • Right accessories is crucial to ensure smooth operations 	
Week 4		Day 1-5	<ul style="list-style-type: none"> • Pre-flight planning and risk assessment • Steps for ensuring safe and effective drone operations. • Preflight planning in complex environments. 	Consider preflight risk

Week 5		Day 1-3	<ul style="list-style-type: none"> • Understanding airspace regulations and restrictions • Steps for applications such as construction, surveying, or aerial photography 	Define drone flight techniques
		Day 4-5	<ul style="list-style-type: none"> • Drone flight techniques and maneuvers • Data collection strategies for construction projects vary based on the specific scenario and objectives of the project 	
Week 6	Image Processing and Analysis	Day 1-3	<ul style="list-style-type: none"> • Software for image processing (e.g., Pix4D, Drone Deploy) • Mapping, modeling and analysis software for drone image processing. 	Draw 2D map with the help of photogrammetry data.
		Day 4-5	<ul style="list-style-type: none"> • Photogrammetry techniques • Map, Models and spatial data creating technique from measurements. • 2D or 3D representations of captured image from various perspective 	
Week 7	Image Processing and Analysis	Day 1-3	<ul style="list-style-type: none"> • Creating 3D models and point clouds • Ability to create detailed and accurate building models of building 	Prepare a 3D representation of map with the help of photogrammetry data
		Day 4-5	<ul style="list-style-type: none"> • Extracting measurements and data from images • Ability to interpret the image and take measurement and record in book. 	
Week 8		Day 1-3	<ul style="list-style-type: none"> • Topographic surveys and site analysis • Process and understanding topographic survey • Interpret site analysis 	Define topographic survey
		Day 4-5	<ul style="list-style-type: none"> • Progress monitoring and documentation • Ability to create detailed 	

			<ul style="list-style-type: none"> construction document Skills in producing monitoring reports 	
Week 9		Day 1-3	<ul style="list-style-type: none"> Volume calculations and material estimation Must have knowledge of building construction estimation and calculation 	Document monitored progress and report writing
		Day 4-5	<ul style="list-style-type: none"> Safety inspections and risk assessment Health and safety involved in drone mapping 	
Week 10		Day 1-5	<ul style="list-style-type: none"> Construction progress monitoring Must have knowledge of project management, scheduling and report writing 	Calculate volume and material estimation
Week 11	Advanced Topics and Future Trends	Day 1-3	<ul style="list-style-type: none"> Thermal imaging and infrared analysis Knowledge of common types of infrared detectors 	Explain LiDAR scanner and its use
		Day 4-5	<ul style="list-style-type: none"> LiDAR (Light Detection and Ranging) for precise measurement Knowledge of components of LiDAR system 	
Week 12	Advanced Topics and Future Trends	Day 1-3	<ul style="list-style-type: none"> Integration of drone data with BIM and other construction software Knowledge of different data types 	Integrate Drone data with any building information modeling software
		Day 4-5	<ul style="list-style-type: none"> Emerging trends and future applications of drone technology Trends like Advanced AI and Machine Learning 	

Practical Tasks:

	Task	Description	Week
1	Define types of drone and their applications	<ul style="list-style-type: none"> • Familiarize yourself with Drone and its application 	Week 1
2	Define Components of Drone	<ul style="list-style-type: none"> • Learn about components of drone 	Week 2
3	Select drone as per construction of building project	<ul style="list-style-type: none"> • Learn about types of building construction projects and drones used in the projects. 	Week 3
4	Consider preflight risk	<ul style="list-style-type: none"> • Learn about safe and effective drone operations 	Week 4
5	Define drone flight techniques	<ul style="list-style-type: none"> • Understand airspace regulations and drone flight techniques 	Week 5
6	Draw 2D map with the help of photogrammetry data.	<ul style="list-style-type: none"> • Learn about data measurements in photogrammetry 	Week 6
7	Prepare a 3D representation of map with the help of photogrammetry data	<ul style="list-style-type: none"> • Understand 3D modeling of map using photogrammetry data 	Week 7
8	Define topographic survey	<ul style="list-style-type: none"> • Learn about survey types 	Week 8
9	Document monitored progress and report writing	<ul style="list-style-type: none"> • Focus on report writing skills and progress monitoring • Learn about daily work done 	Week 9
10	Calculate volume and material estimation	<ul style="list-style-type: none"> • Learn about estimation and types of materials 	Week 10
11	Explain LiDAR scanner and its use	<ul style="list-style-type: none"> • Learn LiDAR sensor and measuring techniques 	Week 11

12	Integrate Drone data with any building information modeling software	<ul style="list-style-type: none"> • Understand BIM software and data type used in it 	Week 12
13	Prepare a map on BIM software using data points collected from Drone	<ul style="list-style-type: none"> • Learn about BIM software • Understand photogrammetry data collection • Understand types of drones and their data types 	Final Exam

Annexure-IV:

Workplace/Institute Ethics Guide

Work ethic is a standard of conduct and values for job performance. The modern definition of what constitutes good work ethics often varies. Different businesses have different expectations. Work ethic is a belief that hard work and diligence have a moral benefit and an inherent ability, virtue, or value to strengthen character and individual abilities. It is a set of values-centered on the importance of work and manifested by determination or desire to work hard.

The following ten work ethics are defined as essential for student success:

1. Attendance:

Be at work every day possible, plan your absences don't abuse leave time. Be punctual every day.

2. Character:

Honesty is the single most important factor having a direct bearing on the final success of an individual, corporation, or product. Complete assigned tasks correctly and promptly. Look to improve your skills.

3. Team Work:

The ability to get along with others including those you don't necessarily like. The ability to carry your weight and help others who are struggling. Recognize when to speak up with an idea and when to compromise by blend ideas together.

4. Appearance:

Dress for success set your best foot forward, personal hygiene, good manner, remember that the first impression of who you are can last a lifetime

5. Attitude:

Listen to suggestions and be positive, accept responsibility. If you make a mistake, admit it. Values workplace safety rules and precautions for personal and co-worker safety. Avoids unnecessary risks. Willing to learn new processes, systems, and procedures in light of changing responsibilities.

6. Productivity:

Do the work correctly, quality and timelines are prized. Get along with fellows, cooperation is the key to productivity. Help out whenever asked, do extra without being asked. Take pride in your work, do things the best you know-how. Eagerly focuses energy on accomplishing tasks, also referred to as demonstrating ownership. Takes pride in work.

7. Organizational Skills:

Make an effort to improve, learn ways to better yourself. Time management; utilize time and resources to get the most out of both. Take an appropriate approach to social interactions at work. Maintains focus on work responsibilities.

8. Communication:

Written communication, being able to correctly write reports and memos. Verbal communications, being able to communicate one on one or to a group.

9. Cooperation:

Follow institute rules and regulations, learn and follow expectations. Get along with fellows, cooperation is the key to productivity. Able to welcome and adapt to changing work situations and the application of new or different skills.

10. Respect:

Work hard, work to the best of your ability. Carry out orders, do what's asked the first time. Show respect, accept, and acknowledge an individual's talents and knowledge. Respects diversity in the workplace, including showing due respect for different perspectives, opinions, and suggestions.