

UAS 205 - FIRST PERSON VIEW UAS OPERATIONS

Course Description

As the drone industry increasingly adopts First Person View (FPV) technology, there is a critical need for pilots who can build, fly, and maintain their own aircraft. By mastering the manual precision required for FPV, students develop expert-level flight skills that elevate safety and proficiency across all UAS operations. This course produces self-sufficient technicians ready for high-demand roles in cinematography, inspection, and public safety. Group 2 course.

Credit Hours

2

Contact Hours

3

Lecture Hours

1

Lab Hours

2

Required Prerequisites

UAS 141

Course Learning Outcomes

Knowledge:

- Explain the technical specifications and aerodynamic principles that govern high-performance FPV and multirotor aircraft.
- Analyze the relationship between motor ratings, battery voltage, propeller characteristics, and overall aircraft performance.
- Evaluate how thrust, torque, efficiency, and power consumption influence flight characteristics and mission outcomes.
- Describe the aerodynamic forces acting on multirotor aircraft and how those forces affect maneuverability and stability.
- Explain the purpose and function of the Proportional-Integral-Derivative (PID) control loop in stabilizing aircraft during manual flight.
- Analyze how PID tuning parameters influence aircraft responsiveness, stability, and flight performance.
- Identify the major components of an FPV aircraft and explain how they interact as an integrated flight system.
- Map the signal flow between radio transmitters, receivers, communication protocols, flight controllers, electronic speed controllers, and motors.
- Compare common radio communication protocols and evaluate their impact on control reliability, latency, and aircraft performance.
- Apply technical knowledge of aircraft systems and flight control principles to diagnose, configure, and optimize high-performance FPV aircraft.

Application:

- Demonstrate proficiency in precision soldering techniques used in the assembly and maintenance of FPV aircraft.

- Integrate individual electronic and mechanical components into a fully functional, flight-ready drone.
- Apply industry-standard assembly practices to ensure aircraft reliability, safety, and performance.
- Interpret wiring diagrams, component specifications, and system schematics during aircraft construction.
- Verify proper installation and operation of flight controllers, electronic speed controllers, motors, receivers, and FPV systems.
- Conduct pre-flight inspections and system checks to confirm aircraft airworthiness and operational readiness.
- Demonstrate craftsmanship and attention to detail throughout the aircraft assembly and configuration process.
- Perform advanced flight maneuvers in high-fidelity simulation environments using non-stabilized flight modes.
- Demonstrate proficiency in manual flight control techniques, including throttle management, orientation awareness, and precision maneuvering.
- Successfully transition from simulator-based training to live outdoor flight operations while applying safe operating practices and advanced piloting skills.

Integration:

- Integrate mechanical assembly practices with digital configuration processes to ensure optimal aircraft performance.
- Analyze the relationship between hardware quality and software tuning in high-performance FPV aircraft.
- Diagnose how physical variables, including frame resonance, motor vibrations, and component alignment, affect flight controller performance.
- Evaluate sensor data, flight logs, and telemetry information to identify performance issues and system inefficiencies.
- Explain the purpose and function of software filters, tuning parameters, and flight controller settings used to improve aircraft stability.
- Correlate flight performance characteristics with both mechanical and electronic system behavior.
- Troubleshoot and resolve issues arising from the interaction between hardware components and software configurations.
- Interpret diagnostic data to distinguish between mechanical faults and software-related performance limitations.
- Optimize aircraft behavior through systematic adjustment of hardware configurations, filtering, and tuning parameters.
- Bridge the gap between digital flight data and real-world aircraft performance by applying evidence-based troubleshooting and performance optimization techniques.

Human Dimension:

- Develop the mental discipline and professional mindset required for safe and effective FPV flight operations.
- Demonstrate situational awareness and sound judgment during dynamic and high-performance flight scenarios.
- Apply stress management techniques to maintain composure and effective decision-making under pressure.
- Recognize the physiological and psychological effects of high-intensity flight operations, including the impact of adrenaline and cognitive workload.
- Maintain focus, precision, and control during demanding flight maneuvers and rapidly changing operational conditions.

- Demonstrate effective risk assessment and decision-making consistent with the responsibilities of a Pilot-in-Command.
- Evaluate personal performance and identify strategies for improving concentration, confidence, and operational effectiveness.
- Apply human factors principles to enhance safety, reduce errors, and improve flight performance.
- Build confidence through progressively challenging flight exercises in both simulated and live flight environments.
- Demonstrate the professionalism, self-awareness, and resilience necessary to operate safely and effectively in high-pressure aviation environments.

Caring - Civic Learning:

- Evaluate the ethical responsibilities associated with operating uncrewed aircraft systems in public and private environments.
- Analyze the importance of public privacy, data protection, and responsible information collection during UAS operations.
- Demonstrate a commitment to airspace safety through adherence to established regulations, procedures, and best practices.
- Assess the potential impacts of UAS operations on individuals, communities, and other airspace users.
- Apply ethical decision-making principles to real-world operational scenarios involving safety, privacy, and public trust.
- Explain the importance of maintaining regulatory compliance and respecting operational boundaries.
- Demonstrate a safety-first mindset when planning and conducting UAS missions.
- Evaluate how pilot behavior and operational practices influence public perception of the -drone industry.
- Advocate for responsible and professional UAS operations that promote community acceptance and trust.
- Act as a positive representative of the UAS profession by conducting operations that prioritize safety, accountability, and respect for the rights of others.

Learning How to Learn:

- Develop self-directed learning strategies to remain current with evolving FPV technologies, software, and industry practices.
- Demonstrate the ability to independently research and troubleshoot hardware, software, and configuration issues.
- Navigate technical documentation, repositories, and manufacturer resources to identify solutions to operational challenges.
- Interpret firmware release notes, software updates, and technical change logs to assess their impact on aircraft performance and functionality.
- Utilize professional and community-based knowledge resources to diagnose and resolve unscripted technical problems.
- Evaluate emerging radio protocols, flight control software, and system architectures for potential application and integration.
- Apply critical thinking and problem-solving skills to identify root causes of hardware failures and performance issues.
- Assess the reliability and credibility of technical information obtained from online communities and industry resources.
- Implement software and firmware updates while maintaining system integrity, safety, and performance.
- Demonstrate a commitment to continuous professional development and lifelong learning in a rapidly evolving FPV and UAS industry.