



WHITE EAGLE
AEROSPACE



Aerospace Vehicle Performance

MAKE YOUR CAREER SOAR



Course Description

The Aerospace Vehicle Performance (AVP) professional short course provides participants with a thorough training experience in the fundamentals of propeller-driven and jet-propelled aircraft flight performance.

Course material explores the manner in which the primary driving forces of thrust, lift, drag, and weight profoundly affect aircraft flight performance. This includes the key performance factors of range, endurance, maximum climb rate and load factor capability as functions of Mach number and altitude.

Addressed and clearly explained are the topics of thrust-required and thrust-available for jet-powered aircraft and power-required and power-available for propeller-driven aircraft. Key flight states addressed include steady, level flight and climbing flight. Aircraft horizontal and vertical turning flight performance are highlighted as well. The relevance of the V-n diagram in aircraft structural design is thoroughly explained.

Participants will come to understand and apply the powerful principles of Energy Maneuverability in planning aircraft minimum time-to-climb and minimum fuel-to-climb schedules. They will also acquire the knowledge and skills to accurately estimate aircraft take-off and landing performance. With these and other simple tools, participants will be better equipped to estimate the performance of a wide variety of general aviation, commercial, military and special purpose aircraft missions.

Key Course Topics

- The Aircraft Drag Polar
- Prop-Driven Propulsion
- Turbojet Propulsion
- Turbofan Propulsion
- Thrust-Required
- Power-Required
- Thrust-Available
- Power-Available
- Steady, Level Flight
- Rate-of-Climb
- Gliding Flight
- Horizontal Turning Flight
- Vertical Turning Flight
- V- η Diagram
- Range
- Endurance
- Energy Management
- Take-Off Performance
- Landing Performance
- Atmospheric Properties
- Air Data Parameters
- Historical Flight Programs



Course Outline

Aerospace Vehicle Performance (AVP) is intended for those seeking a thorough training experience in the fundamentals of propeller-driven and jet-propelled aircraft flight performance.

Aerospace Vehicle Performance Module Overview

Day	Module	Lecture Title	Key Topics
1	1	Aerodynamics of the Airplane	Lift, drag, moment, aerodynamic center, aero force and moment coefficients, lift and drag build-up, drag polar.
	2	Powerplant Characteristics	Thrust efficiency, reciprocating engine/propeller combinations, turbojets, turbofans, turboprops.
2	3	Thrust-Required	Flight forces, equations of motion, steady level flight, thrust-to-weight ratio, wing loading, lift-to-drag ratio.
	4	Thrust-Available, Power-Required and Power-Available	Propeller-driven aircraft, jet-propelled aircraft, altitude effects, velocity effects, steady level flight.
3	5	Drag Divergence, Minimum Velocity and Rate-of-Climb	Critical Mach number, Mach number at Drag Divergence, absolute ceiling, gliding flight, powerplant effects.
	6	Time-to-Climb, Range and Endurance	Range, endurance, specific fuel consumption, powerplant effects, minimum horsepower, minimum thrust, winds.
	7	Turning Flight	Horizontal turning flight, minimum turn radius, maximum turn rate, vertical turning flight, pull-up, push-over.
4	8	Accelerated Flight Performance	Load factors, maneuver point, corner velocity, energy management, energy height, specific excess energy.
	9	Take-Off and Landing Performance	Ground roll distance, airborne distance, approach distance, flare distance, powerplant effects.
	10	Philosophy of Aircraft Design	Conceptual, preliminary design and detail design, weight estimation, performance estimation, constraint diagram.