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**COMMERCIAL PILOT
GROUND TRAINING SYLLABUS
RECORD OF CHANGES**

Revision #	Date	Summary of Changes
0	1/15/2024	Complete Rewrite of the Syllabus



**COMMERCIAL PILOT
GROUND TRAINING SYLLABUS
GROUND TRAINING OBJECTIVES**

THERE ARE NO PREREQUISITES FOR ENROLLMENT IN THE GROUND TRAINING PORTION OF THE COMMERCIAL PILOT COURSE

GROUND TRAINING OBJECTIVES

The student will obtain the necessary aeronautical knowledge and meet the prerequisites specified in Federal Aviation Regulation Part 61 for a commercial pilot - airplane knowledge test.

GROUND TRAINING COMPLETION STANDARDS

The student will demonstrate through oral discussion, written and oral quizzes, and written examinations that the prerequisite knowledge required by Federal Aviation Regulation Part 61 has been met, and that the knowledge necessary to pass the commercial pilot – airplane knowledge test has been obtained.

The student must complete all lessons within a stage prior to taking the end of stage exam.

COMMERCIAL PILOT GROUND TRAINING SYLLABUS

STAGE I

Lesson # 1 -	1.3 hrs
Lesson # 2 -	1.3 hrs
Lesson # 3 -	1.3 hrs
Lesson # 4 -	1.3 hrs
Lesson # 5 -	1.3 hrs
Lesson # 6 -	1.3 hrs
Lesson # 7 -	1.3 hrs
Lesson # 8 -	1.3 hrs
Lesson # 9 -	2.6 hrs
Lesson #10 - Exam	1.3 hrs
Lesson #11 - Review	0.5 hrs

STAGE II

Lesson #12 -	1.3 hrs
Lesson #13 -	1.3 hrs
Lesson #14 -	1.3 hrs
Lesson #15 -	1.3 hrs
Lesson #16 -	1.3 hrs
Lesson #17-	1.3 hrs
Lesson #18-	1.3 hrs
Lesson #19 -	1.3 hrs
Lesson #20 -	1.3 hrs
Lesson #21 - Exam	1.3 hrs
Lesson #22 - Review	0.5 hrs

STAGE III

Lesson #23 -	1.3 hrs
Lesson #24 -	1.3 hrs
Lesson #25 -	2.6 hrs
Lesson #26 -	1.3 hrs
Lesson #27 -	1.3 hrs
Lesson #28 -	1.3 hrs
Lesson #29 - Exam	1.3 hrs
Lesson #30 - Review	0.5 hrs

TOTAL	39.2 hrs
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Note: Reference to “Instrument Commercial Manual” is the Instrument Commercial Manual published by Jeppesen Sanderson, Inc, Inglewood, Colorado. All other references listed at the beginning of each lesson are self-explanatory. The hours designated for each lesson are guidelines and may vary at the instructor's discretion. In no case will the total hours of instruction be less than the minimum number of hours defined in this syllabus.



STAGE I

STAGE OBJECTIVE

The following topics will be covered during this stage:

Principles and Functions of Aircraft Systems

Determining Aircraft Performance

Determining Aircraft Weight and Balance

Takeoffs, Landings and Go-Arounds

Performance and Ground Reference Maneuvers

Slow Flight and Stalls

Systems/Equipment Malfunctions and Emergency Procedures

Human Factors

Single Pilot Resource Management, Aeronautical Decision Making and Risk Management.

STAGE COMPLETION STANDARD

This stage is complete when the student has completed all lessons in the stage, taken the Stage I Examination and the instructor has reviewed each incorrect response to ensure complete student understanding before the student progresses to Stage II.

GROUND LESSON 1

TEXT REFERENCE: Pilot Operating Handbooks of Aircraft Used in the Commercial Pilot Course
Commercial Pilot Airman Certification Standards, Area of Operation I, Task G
(Preflight Preparation, Operation of Systems).

LESSON OBJECTIVE: To review principles and functions of aircraft systems for the aircraft used in the commercial pilot course.

CONTENT:

Primary Flight Controls

Secondary Flight Controls

Power Plant and Propeller

Landing Gear

Fuel, Oil and Hydraulic Systems

Electrical Systems

Avionics

Pitot-Static, Vacuum/Pressure and Associated Flight Instruments

Environmental System

Deicing and Anti-Icing Systems

COMPLETION STANDARDS:

Through oral quizzing and/or discussion the student will demonstrate understanding of the principles and functions of aircraft systems for aircraft used in the commercial pilot course.

GROUND LESSON 2

TEXT REFERENCE: Instrument Commercial Manual - Chapter 12, Section B, "Predicting Performance"

LESSON OBJECTIVE: Review and reinforce the background knowledge of methods for determining aircraft performance and gain an understanding of the significance and effect of exceeding aircraft performance limitations.

CONTENT:

Factors Affecting Performance

- Density Altitude
- Surface Winds
- Weight
- Runway Conditions

Performance Charts

- Takeoff Performance Charts
- Climb Performance Charts
- Cruise Performance Charts
- Descent Charts
- Landing Distance Charts
- Glide Distance
- Stall Speeds

Significance and Effect of Exceeding Aircraft Performance Limitations

COMPLETION STANDARDS:

Through oral quizzing and/or discussion, the student will demonstrate an understanding of factors affecting performance, computing performance and the significance of exceeding aircraft performance limitations.

GROUND LESSON 3

TEXT REFERENCE: Instrument Commercial Manual - Chapter 12, Section C, "Controlling Weight and Balance"

LESSON OBJECTIVE: Enable the student to review weight and balance theory and computations, and to reinforce the understanding of weight and balance and its importance to aircraft performance.

CONTENT:

Weight and Balance Limitations

- Maximum Weight
- Maximum Ramp Weight
- Maximum Takeoff Weight
- Maximum Landing Weight
- Maximum Zero Fuel Weight

Center of Gravity Limits

- Forward CG Effects
- Aft CG Effects
- Lateral CG Effects

Weight and Balance Documents

- Weight and Balance Report
- Equipment List

Weight and Balance Computations

- Moment Computations
- Determining Center of Gravity Position
- Weight and Balance Condition Checks
 - Computation Method
 - Graph Method
 - Table Method

Weight Shift Computation

Significance and Effect of Exceeding Aircraft Weight and Balance Limitations

COMPLETION STANDARDS:

Through oral quizzing and/or discussion, the student will demonstrate an understanding of weight and balance before and the significance of exceeding aircraft weight and balance limitations.

GROUND LESSON 4

TEXT REFERENCE:

FAA-H-8083-3C, Airplane Flying Handbook, Chapter 6: Takeoffs and Departure Climbs; Chapter 9, “Approaches and Landings,”

Airman Certification Standards (ACS) Commercial Pilot Airplane, Section IV: Takeoffs, Landings and Go-Arounds,”

University of Oklahoma Supplementary Information for Flight Students, Section V, “Takeoffs,” Section VI, “Landings”

LESSON OBJECTIVE: Understand the importance of checklist usage. Gain the knowledge required to perform the listed takeoff and landing tasks. This includes the objective, knowledge of how to execute the procedures, risk management aspects of the procedures, common errors associated with the procedures and minimum ACS completion standards for the procedures.

CONTENT:

Safe and Efficient Operation of Aircraft – Use of checklists - Pre-flight, Engine Starting, Engine Runup, Before Takeoff, Climb, Cruise, Before Landing, After Landing, Engine Shutdown/Secure, Post-flight.

Normal Takeoff and Climb

Normal Approach and Landing

Soft Field Takeoff and Climb

Soft Field Approach and Landing

Short Field Takeoff and Maximum Performance Climb

Short Field Approach and Landing

Power-Off 180 Degree Approach and Landing

Go-Around/Rejected Landing

COMPLETION STANDARDS:

Through oral quizzing and/or discussion, the student will understand the importance of checklist usage and how to perform the listed takeoff and landing tasks, risk management aspects, common errors, and ACS completion standards.

GROUND LESSON 5

TEXT REFERENCE:

FAA-H-8083-3C, Airplane Flying Handbook, Chapter 10: Performance Maneuvers; Chapter 7, “Ground Reference Maneuvers,” Chapter 10, “Performance Maneuvers”

Airman Certification Standards (ACS) Commercial Pilot Airplane, Section V: “Performance and Ground Reference Maneuvers”

University of Oklahoma Supplementary Information for Flight Students, Section X, “Performance Maneuvers”
Section XI, “Ground Reference Maneuvers”

LESSON OBJECTIVE: Gain the knowledge required to perform the listed ground reference and performance maneuvers. This includes the objective, knowledge of how to execute the maneuvers, risk management aspects of the maneuvers, common errors associated with the maneuvers and minimum ACS completion standards for the maneuvers.

CONTENT:

Safe and Efficient Operation of Aircraft – Importance of Clearing Turns

Eights-On-Pylons

Steep Turns

Steep Spiral

Chandelles

Lazy Eights

COMPLETION STANDARDS:

Through oral quizzing and/or discussion, the student will demonstrate an understanding of how to perform the listed maneuvers, risk management aspects, common errors, and ACS completion standards.



GROUND LESSON 6

TEXT REFERENCE:

FAA-H-8083-3C, Airplane Flying Handbook, Chapter 5: “Maintaining Aircraft Control: Upset Prevention and Recovery Training”

Airman Certification Standards (ACS) Commercial Pilot Airplane, Section VII: “Slow Flight and Stalls”

University of Oklahoma Supplementary Information for Flight Students, Section IX, “Slow Flight, Stalls and Spins”

LESSON OBJECTIVE: Gain the knowledge required to perform the listed slow flight and stall maneuvers. This includes the objective, knowledge of how to execute the maneuvers, risk management aspects of the maneuvers, common errors associated with the maneuvers and minimum ACS completion standards for the maneuvers.

CONTENT:

Safe and Efficient Operation of Aircraft – Importance of Clearing Turns

Maneuvering During Slow Flight

Power-Off Stalls

Power-On Stalls

Accelerated Stalls

COMPLETION STANDARDS:

Through oral quizzing and/or discussion, the student will demonstrate an understanding of how to perform the listed maneuvers as well risk management aspects, common errors, and ACS completion standards prior.



GROUND LESSON 7

TEXT REFERENCE:

Instrument Commercial Manual – Chapter 13, Section A, "Emergency Procedures"
FAA-H-8083-3C, Airplane Flying Handbook, Chapter 18: "Emergency Procedures"
University of Oklahoma Supplementary Information for Flight Students, Section VIII: "Emergencies"

LESSON OBJECTIVE: Gain knowledge of emergencies and systems/equipment malfunctions, required actions in response to these situations. Appreciate the importance of checklist usage when dealing with systems and equipment malfunctions and emergencies.

CONTENT:

Safe and Efficient Operation of Aircraft – Use of Checklists to Address Systems and Equipment Malfunctions and Emergency Situations – Bold Face/Memorization Items and "Clean Up" Checklists

Partial Power Loss

Systems and Equipment Malfunctions

- Electrical System
- Vacuum System/Gyroscopic Instruments
- Pitot-Static System
- Electronic Flight Deck Display
- Flaps
- Landing Gear
- Loss of Elevator Control
- Inoperative Trim
- Oxygen System

Inadvertent Icing Encounter

Inadvertent Door Opening in Flight

Smoke and Fire

Emergency Descent

Emergency Approach and Landing

- Engine Failure after Takeoff
- Landing after an Engine Failure

Emergency Equipment and Survival Gear

COMPLETION STANDARDS:

Through oral quizzing and/or discussion the student will appreciate the importance of checklist usage and demonstrate understanding of how to recognize and actions to be taken in response to Systems and Equipment Malfunctions and emergency situations, procedures for executing an emergency descent and emergency approach and landing and appropriate emergency equipment.

GROUND LESSON 8

TEXT REFERENCE: Instrument Commercial Manual - Chapter 1, Section C, "Aviation Physiology," Aeronautical Information Manual, Section 8 "Medical Facts for Pilots"

LESSON OBJECTIVE: Gain knowledge of the human factors involved in flying an airplane and learn methods for determining fitness for flight.

CONTENT:

Vision in Flight

Visual Illusions

- Autokinesis
- False Horizons
- Landing Illusions
- Flicker Vertigo
- Empty Field Myopia

Scanning for Other Aircraft

Spatial Disorientation

- Vestibular System
- Coriolis Illusion
- Graveyard Spiral
- Leans
- Somatogravic Illusion
- Inversion Illusion

Motion Sickness

Hypoxia

- Hypoxic
- Hypemic
- Stagnant
- Histotoxic
- Prevention of Hypoxia and Supplemental Oxygen

Ear and Sinus Block

Decompression Sickness

Hyperventilation



GROUND LESSON 8 (continued)

Fitness for Flight – IMSAFE

- Illness
- Medication
- Stress
- Alcohol and Drugs
- Fatigue
- Emotion

COMPLETION STANDARDS:

Through oral quizzing and/or discussion, the student will demonstrate an understanding of human factors and determining fitness for flight.

GROUND LESSON 9

TEXT REFERENCE: Instrument Commercial Manual - Chapter 1, Section CD "SRM Concepts," FAA-H-8083-2A – "Risk Management Handbook"

LESSON OBJECTIVE: Refine knowledge and appreciation of SRM, ADM, Hazardous Attitudes, Risk Management and considerations for using Automated Systems.

CONTENT:

Single-Pilot Resource Management (SRM)

Aeronautical Decision-Making (ADM) Process

- Recognize a Change
- Define the Problem
- Choose a Course of Action
- Implement Your Decision
- Evaluate the Outcome

Self-Assessment

Hazardous Attitudes

- Anti-Authority
- Impulsivity
- Invulnerability
- Macho
- Resignation

Self-Critique

Risk Management

- Detect a Hazard Potential
- Determine Likelihood of Occurrence
- Determine Severity if the Hazard Occurs
- Determine Appropriate Actions: Eliminate, Mitigate, Transfer, Accept

Risk Management Checklists

- PAVE (Pilot Aircraft, environment External Pressures)
- 5P's (Pilot, Passengers, Plane, Programming, Plan)
- OU Flight Risk Analysis Tool – FRAT

Task Management

Planning and Prioritizing

Resource Use

Use of Checklists

GROUND LESSON 9 (continued)

Situational Awareness and Obstacles to Maintaining Situational Awareness

Briefings

Automation Management

- Managing Workload
- Mode of Operation
- Automation Considerations

COMPLETION STANDARDS:

Through oral quizzing and/or discussion, the student will demonstrate an understanding of SRM, ADM, Hazardous Attitudes, Risk Management and considerations for using Automated Systems.



GROUND LESSON 10

LESSON OBJECTIVE: The exam administered during this lesson evaluates the student's comprehension of the material presented in Stage I of this course.

CONTENT:

Principles and Functions of Aircraft Systems

Determining Aircraft Performance

Determining Aircraft Weight and Balance

Takeoffs, Landings and Go-Arounds

Performance and Ground Reference Maneuvers

Slow Flight, Stalls and Spin Awareness

Systems/Equipment Malfunctions and Emergency Procedures

Human Factors

Single Pilot Resource Management, Aeronautical Decision Making and Risk Management.

COMPLETION STANDARDS:

This lesson is complete when the student has completed the exam with a minimum passing score of 70%.



GROUND LESSON 11

LESSON OBJECTIVE: Review Questions missed on the Stage I Exam

CONTENT:

The instructor will review questions missed on the Stage I Exam

COMPLETION STANDARDS:

Through oral quizzing and/or discussion the student will demonstrate satisfactory knowledge of the questions missed on the Stage I exam. The student may then progress to Stage II.



STAGE II

STAGE OBJECTIVE

The following topics will be covered during this stage:

Airports and Airport Operations

Controlled, Uncontrolled and Special Use Airspace

Aeronautical Charts, Chart Supplements, NOTAM's and Pilotage/Dead Reckoning Procedures

Air Navigation Facilities and Air Traffic Control Services

Weather Factors

Recognitions of Critical Weather Situations and Windshear Recognitions and Avoidance

Printed Weather Observations and Forecasts

Graphic Weather Observation, Analysis and Forecast Products

Preflight and Inflight Weather Sources

STAGE COMPLETION STANDARD

This stage is complete when the student has completed all lessons in the stage, taken the Stage II Examination and the instructor has reviewed each incorrect response to ensure complete student understanding before the student progresses to Stage III.

GROUND LESSON 12

TEXT REFERENCE: Instrument Commercial Manual - Chapter 3, Section A, "Airports, Airspace, and Flight Information," Aeronautical Information Manual, Chapter 2, "Aeronautical Lighting and Other Airport Visual Aids," Aeronautical Information Manual, Chapter, Chapter 3, Section 3, "Airport Operations"

LESSON OBJECTIVE: Expand knowledge of airports and airport operations.

CONTENT:

The Airport Environment

- Runway Markings
- Taxiway Markings
- Additional Markings
- Airport Signs

Runway Incursion Avoidance

Lighting Systems

- Approach Light System
- Visual Glide Slope Indicators
- Runway Lighting

Airport Beacon and Obstruction Lights

Airport Operations

- Airports with an Operating Control Tower
- Traffic Patterns and Traffic Pattern Operations
- Visual Indicators at Airports Without an Operating Tower
- Land and Hold Short Operations
- Low Level Wind Shear/Microburst Detection Systems
- Runway Condition Reports
- Intersection Takeoffs
- Traffic Control Light Signals
- Communications
- Taxiing
- Taxiing During Low Visibility
- Exiting the Runway after Landing
- Use of Aircraft Lights
- Hand Signals
- Operations at Uncontrolled Airports with ASOS/AWOS

Airport Security

COMPLETION STANDARDS:

Through oral quizzing and/or discussion, the student will demonstrate an understanding of airports and airport operations.

GROUND LESSON 13

TEXT REFERENCE: Instrument Commercial Manual - Chapter 3, Section A, "Airports, Airspace, and Flight Information," Aeronautical Information Manual, Chapter 3, "Airspace"

LESSON OBJECTIVE: Expand knowledge of controlled, uncontrolled and special use airspace. Understand procedures for operating in the national airspace system, including the location, dimensions, (how the airspace is depicted on VFR sectional charts) pilot qualifications and weather minimums and airspeed limitations as appropriate for the various classes of controlled, uncontrolled and special use airspace.

CONTENT:

Uncontrolled Airspace: Glass G

Controlled Airspace

- Class A
- Class B
- Class C
- Class D
- Class E

Special Use Airspace

- Alert Areas
- Military Operations Areas
- Warning Areas
- Restricted Areas
- Controlled Firing Areas
- National Security Areas
- Military Training Routes
- Temporary Flight Restrictions
- Parachute Jump Areas
- Published VFR Routes
- Airport Advisory/Information Services (Alaska)
- Terminal Radar Service Area (TRSA)
- Special Air Traffic Routes (SATR)
- Special Flight Rules Area (SFRA)
- Weather Reconnaissance Area (WRA)
- Air Defense Identification Zone (ADIZ)

Obtaining Special Use Airspace Status

Intercept Procedures

COMPLETION STANDARDS:

Through oral quizzing and/or discussion, the student will demonstrate an understanding of controlled, uncontrolled and special use airspace and intercept procedures.

GROUND LESSON 14

TEXT REFERENCE: Instrument Commercial Manual - Chapter 3, Section A, "Airports, Airspace, and Flight Information,"

Aeronautical Information Manual, Chapter 5-1-3, "Notice to Air Missions," and Chapter 9, "Aeronautical Charts and Related Publications"

FAA-H-8083-25, Pilot's Handbook of Aeronautical Knowledge, Chapter 16, "Navigation"

LESSON OBJECTIVE: Gain knowledge and understanding of Flight Information Publications, including the Chart Supplement, Aeronautical Charts and Notices to Air Missions (NOTAM's). Review procedures for using a magnetic compass for pilotage and dead reckoning.

Aeronautical Charts VFR

- Sectional Charts
- Terminal Area Charts (TAC)
- Class B VFR Flyway Planning Chart

Aeronautical Charts IFR

- Low Altitude Enroute Chart
- High Altitude Enroute Chart

Chart Supplements

- Airport Facility Directory Legend
- Airport Facility Directory
- Notices
- Associated Data
- Airport Diagrams

Notices to Air Missions (NOTAMs)

- NOTAM (D)
 - Aerodrome Activity and Conditions
 - Airspace (CARF, SUA, General Airspace Activity)
 - Visual and Radio Navigational Aids
 - Pointer NOTAMs
- FDC NOTAMs
 - Amendments to Published IAP's and Aeronautical Chart
 - TFR's
 - High Barometric Pressure Warning
 - Laser Light Activity
 - ADS-B, TIS-B, FIS-B Service Availability
 - Satellite-Based Systems i.e. GPS/WAAS
- International NOTAMs
- Military NOTAMs



GROUND LESSON 14 (continued)

Using a Magnetic Compass for Pilotage and Dead Reckoning

- Determining True Course
- Applying Wind Direction/Speed to Determine True Heading and Ground Speed
- Applying Variation to Determine Magnetic Heading
- Applying Deviation to Determine Compass Heading
- Pilotage: Selection of Check Points
- Computation of Time Enroute and Fuel Usage
- Completion of a Navigation Log
- Magnetic Compass Errors

COMPLETION STANDARDS:

Through oral quizzing and/or discussion, the student will demonstrate an understanding of Aeronautical Charts, Chart Supplements and NOTAMs and review the procedures for pilotage and dead reckoning.

GROUND LESSON 15

TEXT REFERENCE: Instrument Commercial Manual - Chapter 3, Section B, "ATC Services," Aeronautical Information Manual, Chapter 4, "Air Traffic Control"

LESSON OBJECTIVE: Gain knowledge of how the air traffic control system functions, including the use and limitations of radar and transponders.

CONTENT:

Air Navigation Facilities

- VHF Omnidirectional Range (VOR)
- Global Positioning System/Wide Area Augmentation System (GPS/WAAS)
 - Performance Based Navigation (PBN)
 - Required Navigation Performance (RNP)
- Global Positioning System/Ground Based Augmentation System (GPS/GBAS)

Automatic Dependent Surveillance-Broadcast (ADS-B) System

- ADS-B Services
- ADS-B Data Links

Air Route Traffic Control Center

- ARTCC Traffic Separation
- Processing the IFR Flight Plan
- Air Route Surveillance Radar
- Maintaining Separation
- Pilot Responsibilities
- Additional ARTCC Services
- Separation from VFR Traffic
- Weather Avoidance
- Safety Alerts
- Emergency Assistance

Terminal Facilities

- Terminal Radar Approach Control (TRACON)
- Control Tower
 - ATIS
 - Clearance Delivery

ATC Services for VFR Aircraft

- Pilot Responsibilities
- Interpreting Traffic Advisories

Flight Service Stations (Alaska Only)



GROUND LESSON 15 (continued)

High-Altitude Operations - Reduced Vertical Separation Minimum (RVSM) Procedures

- Flight Level Orientation Scheme
- Requirements to Operate at RVSM Altitudes

COMPLETION STANDARDS:

Through oral quizzing and/or discussion, the student will demonstrate an understanding of Air Traffic Control Services.

GROUND LESSON 16

TEXT REFERENCE: Instrument Commercial Manual - Chapter 9, Section A, "Weather Factors"

LESSON OBJECTIVE: Gain knowledge of the fundamentals of atmospheric composition, types of airmasses and frontal systems as well as high altitude weather.

CONTENT:

The Atmosphere

- Vertical Structure
- Circulation
 - Pressure Gradient
 - Coriolis Force
- Pressure and Wind Patterns
 - Low Pressure Systems and Troughs
 - High Pressure Systems and Ridges

Moisture, Precipitation, & Stability

- Dewpoint
- Precipitation
- Latent Heat of Water
- Stability

Clouds

- Low Clouds
- Middle Clouds
- High Clouds
- Clouds with Vertical Development

Airmasses

- Polar – Continental and Maritime
- Tropical – Continental and Maritime

Fronts

- Cold Fronts – Fast and Slow Moving
- Warm Fronts
- Stationary Fronts
- Occluded Fronts
- Dry Lines

High-Altitude Operations - High Altitude Weather

- Tropopause Altitudes – Tropical, Subtropical, Polar
- Jet Stream – Subtropical, Polar

COMPLETION STANDARDS:

Through oral quizzing and/or discussion, the student will demonstrate an understanding of weather factors.

GROUND LESSON 17

TEXT REFERENCE: Instrument Commercial Manual - Chapter 9, Section B, "Weather Hazards," Aeronautical Information Manual – Chapter 7, Section 1: "Meteorology" and Section 4: "Wake Turbulence"

LESSON OBJECTIVE: Gain knowledge on how to recognize critical weather situations, as well as windshear recognition and avoidance.

CONTENT:

Thunderstorms

- Requirement for Formation: Unstable Atmosphere and a Trigger
- Stages: Cumulus, Mature, Dissipating
- Airmass versus Frontal
- Associated Hazards: Winds, Turbulence, Hail, Lighting
- Thunderstorm Avoidance

Turbulence

- Mechanical
- Frontal
- Clear Air Turbulence (CAT)
- Mountain Wave Turbulence
- Intensity: Light, Moderate, Severe
- Wake Turbulence
 - Airplanes
 - Helicopters

Windshear

Microbursts

- Effect on Aircraft Performance
- In-Flight Visual Conditions
- Warning Systems

Restrictions to Visibility

- Fog: Radiation, Advection, Precipitation-Induced, Steam
- Haze
- Smoke
- Dust
- Precipitation
- Volcanic Ash



GROUND LESSON 17 (continued)

Icing

- Induction
- Structural: Rime, Clear, Mixed
- Icing Intensity: Light, Moderate, Severe
- Ice-Control Systems – De-Ice and Anti-Ice
- Autopilot Use During Icing Conditions

- Hydroplaning

COMPLETION STANDARDS:

Through oral quizzing and/or discussion, the student will demonstrate an understanding of critical weather situations as well as windshear recognition and avoidance.



GROUND LESSON 18

TEXT REFERENCE: Instrument Commercial Manual - Chapter 9, Section C, "Aviation Weather Reports and Forecasts," Aeronautical Information Manual Chapter 7, Section 1 "Meteorology"

LESSON OBJECTIVE: Gain knowledge of the printed reports and forecasts that are available as an aid in commercial flight planning.

CONTENT:

Observations

- Aviation Routine Weather Report (METAR)
- Pilot Weather Reports (PIREP)

Forecasts

- Terminal Aerodrome Forecast (TAF)
- Wind and Temperature Aloft Forecast (FB)
- AIRMETS
- SIGMETS
- CONVECTIVE SIGMET
- Hurricane Advisory
- Convective Outlook
- Severe Weather Watch Bulletin

COMPLETION STANDARDS:

Through oral quizzing and/or discussion, the student will demonstrate an understanding of printed reports and forecasts.



GROUND LESSON 19

TEXT REFERENCE: Instrument Commercial Manual - Chapter 9, Section D, "Graphic Weather Products,"
Aeronautical Information Manual – Chapter 7, Section 1, "Meteorology"

LESSON OBJECTIVE: Gain knowledge of the graphic weather charts that are available as an aid in commercial flight planning.

CONTENT:

Observations

- Radar
- Satellite Imagery
- Graphical Depiction of METARs

Analysis

- Surface Analysis Chart
- Ceiling and Visibility Analysis
- Upper Air – Constant Pressure Analysis Charts – 850MB, 700MB, 500MN, 300MB, 200MB

Forecasts

- Aviation Forecasts
 - Cloud Forecasts
 - Surface Forecasts
- Short-Range Surface Prognostic Charts
- U.S. Low-Level Significant Weather (SIGWX) Chart
- U.S. Mid and High-Level SIGWX Charts
- Wind and Temperature Aloft Forecast
- Freezing-Level Graphics
- Icing Products
- Turbulence Products
- Convective Outlook Chart
- Graphical – G AIRMETS
- Convective Outlook Chart

COMPLETION STANDARDS:

Through oral quizzing and/or discussion the student will demonstrate an understanding of graphic weather products available.



GROUND LESSON 20

TEXT REFERENCE: Instrument Commercial Manual - Chapter 9, Section E, "Sources of Weather Information," Aeronautical Information Manual – Chapter 7, Section 1 “Meteorology”

LESSON OBJECTIVE: Learn the sources of weather information available as an aid in commercial flight planning.

CONTENT:

Preflight Weather Sources

- Flight Service (Phone: 1-800-WX-BRIEF, Internet: 1800wxbrief.com)
 - Standard Briefing
 - Abbreviated Briefing
 - Outlook Briefing
 - Adverse Conditions Alerting Service (ACAS)
- National Weather Service – Aviation Weather Center
- Private Industry Sources - Electronic Flight Bag (EFB)/Internet

In-Flight Weather Sources

- Flight Service
- Center Weather Advisories
- Automated Weather Reporting Systems (AWOS, ASOS, AWSS)
- Data Link Weather
 - Commercial Vendors
 - FAA Flight Information Service – FIS-B Transmitted Via ADS-B In
 - Limitations
 - Not Designed to Replace Pilot/FSS Communication
 - Radar Depictions Have Time Lag: Use for Strategic, Not Tactical Weather Decision Making
- Airborne Weather Radar
- Lightning Detection Equipment

COMPLETION STANDARDS:

Through oral quizzing and/or discussion, the student will demonstrate an understanding of the weather sources available.



GROUND LESSON 21

STAGE II - REVIEW AND EXAM

LESSON OBJECTIVE: The exam administered during this lesson evaluates the student's comprehension of the material presented in Stage II of this course.

CONTENT:

Airports and Airport Operations

Controlled, Uncontrolled and Special Use Airspace

Aeronautical Charts, Chart Supplements, NOTAM's and Pilotage/Dead Reckoning Procedures

Air Navigation Facilities and Air Traffic Control Services

Weather Factors

Recognitions of Critical Weather Situations and Windshear Recognitions and Avoidance

Printed Weather Observations and Forecasts

Graphic Weather Observation, Analysis and Forecast Products

Preflight and Inflight Weather Sources

COMPLETION STANDARDS:

This lesson is complete when the student has completed the exam with a minimum passing score of 70%.



GROUND LESSON 22

LESSON OBJECTIVE: Review Questions missed on the Stage II Exam

CONTENT:

The instructor will review questions missed on the Stage II Exam

COMPLETION STANDARDS:

Through oral quizzing and/or discussion the student will demonstrate satisfactory knowledge of the questions missed on the Stage II exam. After completion of the review the student may progress to Stage III.

STAGE III

STAGE OBJECTIVE

The following topics will be covered during this stage:

Hight Performance Engines, Constant Speed Propeller and Retractable Landing Gear Systems
Supplemental Oxygen and Cabin Pressurization Systems
Basic Aerodynamics and the Principles of Flight
Night Operations
Airworthiness Requirements
Commercial Pilot Privileges, Limitations and Flight Operations and NTSB Accident Reporting

STAGE COMPLETION STANDARD

This stage is complete when the student has completed all lessons in the stage, taken the Stage III Examination and the instructor has reviewed each incorrect response to ensure complete student understanding.

GROUND LESSON 23

TEXT REFERENCE: Instrument Commercial Manual - Chapter 11, Section A, "High-Performance Powerplants"

LESSON OBJECTIVE: Learn the function and use of high-performance engines, constant speed propellers and retractable landing gear systems.

CONTENT:

Fuel Injection Systems

- Advantages Over Carburetor Systems
- Design – Mixture Control and Fuel Pumps
- Operating Procedures
 - Normal, Hot and Flood Starts
 - After Start Procedures
 - Engine Monitoring – Oil Temperature/Pressure, Exhaust Gas Temperature (EGT), Cylinder Head Temperature (CHT)
 - Engine Shutdown
- Abnormal Combustion – Detonation, Preignition
- Induction Icing

Turbocharging Systems

- Principles
- System Operation
- High Altitude Performance

Constant-Speed Propellers

- Propeller Principles
- Operation
 - Propeller Governor
 - Governing Range
- Controls
 - Throttle/Manifold Pressure Guage
 - Prop Control/RPM Guage
 - Full Authority Digital Engine Control (FADEC)

GROUND LESSON 23 (Continued)

Retractable Landing Gear

- Landing Gear Systems
 - Electrical
 - Hydraulic
- System Safety
 - Position Indicators
 - Warning Horn/Annunciator Light
 - Safety Switches
- Airspeed Limitations
- Operating Procedures
- System Malfunctions
- Emergency Extension
 - Hand Crank
 - Hydraulic Pump
 - Freefall
 - Compressed Gas

COMPLETION STANDARDS:

Through oral quizzing and/or discussion, the student will demonstrate an understanding of high performance engines, constant speed propellers and retractable landing gear systems.



GROUND LESSON 24

TEXT REFERENCE: Instrument Commercial Manual - Chapter 11, Section B, "Supplemental Oxygen and Pressurization", Section C, "Retractable Landing Gear" 14 CFR Section 91.212(b) "Supplemental Oxygen Pressurized Cabin Aircraft"

LESSON OBJECTIVE: Learn the function and use supplemental oxygen and pressurization systems as they relate to high altitude operations.

CONTENT:

High-Altitude Operations - Oxygen Systems

- Regulator Types
 - Continuous Flow
 - Diluter Demand
 - Pressure Demand
 - Pulse Demand
- Oxygen Storage
- Oxygen Servicing

High-Altitude Operations - Cabin Pressurization

- Pressurization Principles
 - Cabin Pressure Altitude
 - Cabin Pressure Differential
- Pressurization Components
 - Turbocharger/compressor
 - Heat Exchanger
 - Pressure Vessel
 - Outflow and Safety/Dump Valves
- Pressurization Instruments
 - Cabin Altitude and Pressure Differential Gauge
 - Cabin Rate of Climb Indicator
- Pressurization Controller
 - Setting Altitude for Climb
 - Setting Altitude Prior to Descent
- Pressurization Emergencies
 - Explosive Decompression
 - Rapid Decompression
 - Gradual Decompression
 - Supplemental Oxygen Requirements for Pressurized Cabin Aircraft

COMPLETION STANDARDS:

Through oral quizzing and/or discussion, the student will demonstrate an understanding of supplemental oxygen and cabin pressurization systems.

GROUND LESSON 25

TEXT REFERENCE: Instrument Commercial Manual - Chapter 12, Section A, "Advanced Aerodynamics"

LESSON OBJECTIVE: Learn basic aerodynamics and the principles of flight to ensure an understanding of the factors affecting airplane flight characteristics.

CONTENT:

Lift

- Newton's Third Law of Motion and Bernoulli's Equation
- Relative Wind, Angle of Attack, Angle of Incidence
- Lift Equation
- Controlling Lift
- Aerodynamic Stalls
- High Lift Devices
 - Trailing Edge Flaps – Plain, Split, Slotted, Fowler
 - Leading-Edge Devices – Slats, Leading-Edge Flaps

Drag

- Parasite
 - Skin Friction, Form and Interference
 - Factors that Increase/Decrease Parasite Drag
- Induced
 - Cause of Induced Drag
 - Factors that Increase/Decrease Induced Drag
- Total Drag
- High Drag Devices
 - Spoilers
 - Speed Brakes

Wing Planforms

- Aspect Ratio
 - High: Impact on Parasite and Induced Drag
 - Low: Impact on Parasite and Induced Drag
- Oval, Rectangular, Tapered, Swept Back

Thrust

- Propeller Efficiency
 - Fixed Pitch Versus Variable Pitch (Constant Speed)
 - P-Factor
- Performance: Power Available in Relation to Power Required at Different Airspeeds

Weight and Load Factor

- Design Maneuvering Speed
- V-G Diagram

GROUND LESSON 25 (continued)

Aircraft Stability

- Static Stability
- Dynamic Stability
- Longitudinal Stability Around the Lateral Axis
- Lateral Stability Around the Longitudinal Axis
- Directional Stability Around the Vertical Axis
- Interaction of Lateral and Directional Stability
 - Dutch Roll
 - Spiral Instability

Maneuvering Flight

- Straight and Level Flight
- Climbs – Factors Affecting Climb Performance
- Glides – Factors Affecting Glide Distance
- Turns
 - Load Factor in Turns
 - Radius and Rate of Turns
 - Coordination in Turns

Stall Awareness

- Critical Angle of Attack
- Types of Stalls
 - Power-On
 - Power-Off
 - Accelerated
 - Cross-Control
 - Elevator Trim
- Stall Recognition and Recovery

Spins

- Primary Causes
- Phases of a Spin
- Weight and Balance Impact on Spin Vulnerability
- Spin Recovery

High Altitude Operations - High Speed Flight

- Subsonic Versus Supersonic Flow
- Speed Ranges
- Critical Mach Number
- Shock Waves
- Maximum Operating Speed
- Increasing Critical Mach Number
- Vortex Generators
- Sweepback

COMPLETION STANDARDS:

Through oral quizzing and/or discussion, the student will demonstrate an understanding of basic aerodynamics and the principles of flight.



GROUND LESSON 26

TEXT REFERENCE: FAA-H-8083-3, Airplane Flying Handbook, Chapter 11 “Night Operations”

LESSON OBJECTIVE: Learn about operating an aircraft at night.

CONTENT:

Night Vision

- Anatomy of the Eye
- Factors Affecting Vision
- Night Illusions

Pilot Equipment

Airplane Equipment and Lighting

Airport and Navigation Lighting Aids

Preparation and Preflight

Starting Taxiing and Run-Up

Takeoff and Climb

Orientation and Navigation

Approaches and Landings

Night Emergencies

COMPLETION STANDARDS:

Through oral quizzing and/or discussion, the student will demonstrate an understanding of Night Operations.

GROUND LESSON 27

TEXT REFERENCE: Instrument Commercial Manual - Chapter 1, Section B, "Commercial Pilot Requirements"

LESSON OBJECTIVE: Understand Aircraft Airworthiness Requirements

CONTENT:

Airworthiness Requirements – Required Documents

Required Maintenance and Inspections

Maintenance Records

Airworthiness Directives

Aircraft Equipment Requirements

Kinds of Operation Equipment Lists (KOEL)

Inoperative Instruments and Equipment

Minimum Equipment list (MEL)

Special Flight Permit

COMPLETION STANDARDS:

Through oral quizzing and/or discussion, the student will demonstrate an understanding aircraft airworthiness requirements.

GROUND LESSON 28

TEXT REFERENCE:

14 CFR Sections 61, 91, 119.1, 135, 830 and FAA Advisory Circular AC 91-37B

LESSON OBJECTIVE: Gain an understanding of federal aviation regulations that apply to commercial pilot privileges, limitations and flight operations. Gain an understanding of accident reporting requirements of the National Transportation Safety Board.

CONTENT:

Medical Certificates: Requirement and Duration – 61.23

Second-In-Command Qualifications – 61.55

Flight Review – 61.56

Recent Flight Experience: Pilot in Command – 61.57

Commercial Pilot Privileges and Limitations – 61.133

Fractional Ownership Operations

- Applicability – 91.1001
- Program Operating Manual Contents – 91.1025
- Large Transport Category and Turbine Powered Airplanes Limitations, Destination and Alternate Airports – 91.1037
- IFR Takeoff, Approach and Landing Minimums – 91.1039
- Crewmember Experience – 91.1053
- Crewmember Flight, Duty and Rest Time Requirements – 91.1057

Truth-In-Leasing (Legal Dry Lease versus Illegal Wet Lease) – 91.23 and AC 91-37B

Other Operations for Compensation or Hire – 119.1(e)

- Student Instruction
- Nonstop Commercial Air Tours
- Ferry or Training Flights
- Aerial Work Operations
 - Crop Dusting, Seeding, Spraying, Bird Chasing
 - Banner Towing
 - Aerial Photography or Survey
 - Fire Fighting
 - Powerline or Pipeline Patrol
- Intentional Parachute Operations

GROUND LESSON 28 (continued)

Commuter and On Demand Operations

- Applicability – 135.1
- Manual Contents – 135.23
- Pilot Requirements, Use of Oxygen – 135.89
- IFR: Operating Limitations – 135.215
- IFR: Takeoff Limitations
- IFR: Destination Airport Weather Minimums
- IFR: Alternate Airport Requirements – 135.223
- Pilot in Command Qualifications – 135.243
- Second in Command Qualifications – 135.245

NTSB Accident Reporting Requirements – 14 CFR Part 830

- Definitions – 830.2
- Accidents/Incidents Requiring Immediate Notification – 830.5
- Information to be Given in Notification – 830.6
- Preservation of Aircraft Wreckage, Mail, Cargo, and Records – 830.10
- Reports and Statements to be Filed – 830.15

COMPLETION STANDARDS:

Through oral quizzing and/or discussion the student will demonstrate understanding of commercial pilot privileges, limitations and flight operations as defined in 14 CFR Sections 61, 91, 119.1 and 135. The student will also demonstrate an understanding of NTSB accident reporting requirements.

GROUND LESSON 29

STAGE III - EXAM

LESSON OBJECTIVE: The exam administered during this lesson evaluates the student's comprehension of the material presented in Stage II of this course.

CONTENT:

Hight Performance Engines, Constant Speed Propeller and Retractable Landing Gear Systems
Supplemental Oxygen and Cabin Pressurization Systems
Advanced Aerodynamics and the Principles of Flight
Night Operations
Airworthiness Requirements
Commercial Pilot Privileges, Limitations and Flight Operations and NTSB Accident Reporting

COMPLETION STANDARDS:

This lesson is complete when the student has completed the exam with a minimum passing score of 70%.



GROUND LESSON 30

LESSON OBJECTIVE: Review Questions missed on the Stage III Exam

CONTENT:

The instructor will review questions missed on the Stage III Exam.

COMPLETION STANDARDS:

Through oral quizzing and/or discussion the student will demonstrate satisfactory knowledge of the questions missed on the Stage III exam.