

Syllabus Instrument Ground School 2015

STAGE I

Objective: Learn about the principles of instrument flight, including the operation, use, and limitations of flight instruments and instrument navigation systems, and how the air traffic control system functions. Stage I also emphasizes advanced human factors and physiological factors directly related to instrument flight.
Stage I classroom duration 22 hours.

Ground Lessons (1&2) 4 hours

Advanced Human Factors

1. Aeronautical Decision Making (ADM)

A. Decision Making Models (2)

- (i) DECIDE Model
 - (a) Detect the problem
 - (b) Estimate impact and need to react
 - (c) Choose a course of action
 - (d) Identify solutions
 - (e) Do the necessary action
 - (f) Evaluate the effect of the action. If unsatisfactory, repeat from (c)
- (ii) 3Ps Model
 - (a) Perceive
 - (b) Process
 - (c) Perform

B. Pilot-in-command responsibility

C. Hazardous attitudes

D. Stress management

2. Risk Management (RM)

Risk elements (2 classifications)

A. PAVE

- (i) Pilot
 - (a) I'M SAFE
 - (b) Personal Minimums
- (ii) Aircraft
- (iii) Environment
- (iv) External pressures

1. 5Ps

- (i) Plan
- (ii) Plane
- (iii) Pilot
 - (a) I'M SAFE
 - (b) Personal Minimums

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- (iv) Passengers
 - (iv) Programming
3. Task Management (TM)
 - A. Planning and Prioritizing
 - B. Timing of completion of tasks
 - C. Resource Utilization
 - (i) Internal
 - (a) Checklists
 - (b) Flow patterns
 - (ii) External
 4. Situational Awareness (SA)
 - A. Regular evaluation of 5Ps (all phases of flight)
 - B. Use of standard operating procedures (SOPs)
 - C. Workload management
 - (i) Managing distractions
 - (ii) Avoiding fixation
 - D. Communications
 - (i) Sterile cockpit
 - (ii) Crew coordination (CRM)
 - (iii) Radio procedures
 5. Controlled Flight Into Terrain (CTIF) Awareness
 - A. Flight Planning
 - B. Analysis of terrain and obstacle hazards along intended route
 - C. Understanding and interpreting terrain displays
 - D. Planning of departures to avoid terrain
 - E. Adjusting route to avoid terrain
 - F. Considering of terrain during diversions
 - G. Aircraft performance limitations and CTIF risk
 6. Automation Management
 - A. Skillful operations of autopilot and FMS under normal conditions
 - B. Recognition of operating modes and mode changes (arm/engage)
 - C. Anticipation of next operation mode
 - D. Recognition and correction of unanticipated mod changes
 - E. Automation Levels. Reduction of automation use, including “hand flying”.
 - F. Maintaining “hand flying” skills.
 7. Advanced Human Factors
 - A. Disorientation and the physiology of vertigo
 - B. Respiratory physiology, Hypoxia and Hyperventilation, O² requirements at altitude
 - C. Judgment and other impairment factors of stresses, fatigue, alcohol, & drugs.
 - D. Visual impairment and Interpreting Flight Displays

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- E. SCUBA risks to aviation physiology
- F. IM SAFE
- G. Advanced Preflight

Ground Lessons (3&4) 4 hours

Instrumentation

1. Analog Instruments
2. Gyroscopic Instrument
 - System overview
 - Attitude Indicator
 - Heading Indicator
 - Turn Coordinator
3. Magnetic Compass
4. Pitot Static Instruments
 - PS System Overview
 - Airspeed Indicator
 - Altimeter
 - Vertical Speed Indicator
5. Digital Flight Instruments
 - Integrated Flight Displays
 - Attitude and Heading Instruments
 - Air Data Computer Instruments
 - Power Failures

Ground Lesson (5) 2 hours

Attitude Instrument Flying

1. Three Fundamental Skills
 - Cross-Check
 - Interpretation
 - Aircraft Control
2. Scan Errors
 - Fixation
 - Omission
 - Emphasis
3. Primary and Supporting Instrument Concept
4. Straight and Level Constant Airspeed Flight
5. Constant Airspeed Climbs and Descents
6. Constant Rate Climbs and Descents
7. Instrument Failures and Partial-Panel Flying
8. Turns Using the Magnetic Compass
9. Unusual Attitudes Recovery, Nose High/Low.

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10. Stall Recovery
11. Control and Performance Concept

Ground Lesson (6) 4 hours

Navigation

1. VOR Navigation.
 - Components
 - Interpretation
 - Intercepts
2. ADF Navigation
 - Components
 - Interpretation
 - Visualizations
3. Distance Measuring Equipment (DME)
4. RNAV
5. Inertial Navigation
6. GPS
7. Navigation System Checks

Ground Lesson (7) 3 hours

Airports, Airspace, and Sources of Flight Information

- The Airport Environment
 - Airport Visual Aids
 - Airport Lighting Systems
 - Runway Incursion Avoidance
 - Land And Hold Short Operations
- Airspace Review
 - G parameters and equipment
 - E parameters and equipment
 - D parameters and equipment
 - C parameters and equipment
 - B parameters and equipment
 - A parameters and equipment
 - Special Use Airspace
- Sources of Information
 - AIM
 - AF/D
 - FSS
 - Internet Sources

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Ground Lessons (8&9) 4 hours

Air Traffic Control System and Clearances

- ATC Overview and components
 - ATIS
 - Clearance Delivery
 - Ground Control
 - A/D Control
 - ARTCC
- Enroute IFR ATC Services
- Terminal Services
- ATC Clearances
 - Clearance Overview
 - IFR Flight Plan
 - Initial IFR Clearance
 - Types of IFR Clearances
 - Clearance *Limits*

Ground Lesson 10. Stage I Exam, 1 hour

Completion Standard.

Minimum required score of 80%, retest to assure minimum proficiency of 80% if required. Incorrect answers reviewed with instructor as required.

Test Content Topics

- Advanced Human Factors
- Analog Flight Instruments
- Digital Flight Instruments
- Attitude Instrument Flying
- Instrument Navigation
- Airports, Airspace and Sources of Flight Information
- ATC System and Clearances

STAGE II

Objective: Learn how to use instrument flight charts for IFR planning and flight. Also learn the procedures used to execute various types of instrument approaches as well as IFR departure, enroute, and arrival operations.

Stage II classroom duration 16 hours.

Ground Lesson (11) 2 hour

Departure Charts and Procedures

- Departure Standards
- Pilot and vectored DPs
- Indicating use of DPs on flight plan
- DP minimum text description, climb rates, preferred routes, visibility, RVR
- U.S. Terminal Procedures for Departures
- Sample Standard Departures Charts and Procedures

Ground Lesson (12) 2 hour

Enroute Charts

- Key Features
- Enroute Chart Features
 - Navigation Aid Depiction
 - Victor Airway Depiction
 - IFR Altitude Depiction
 - RNAV Depiction
 - Communications Depiction
 - Airport and Airspace Depiction

Ground Lesson (13) 1 hour

Enroute Procedures

- Communications
- Enroute Radar
- Navigation by GPS
- IFR Course and Cruise Altitudes
- Descending from the Enroute Segment

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Ground Lesson (14) 1 hour

Holding Procedures

- Holding Pattern Characteristics
- ATC Holding Pattern Instructions
- Entering the Holding Pattern
- Flying the Holding Pattern

Ground Lesson (15) 1 hour

Arrival Charts and Procedures

- Key Features
- Arrival Chart Features
- Arrival Procedures

Ground Lesson (16) 1 hour

Approach Considerations

- Approach Planning
- Anatomy of an Instrument Approach
- Types of Instrument Approaches
- NDB and VOR Technology
- ILS Technology
- GPS Technology

Ground Lesson (17) 1 hour

Approach Charts

- Key Features
- Heading, Briefing, and Communications Information
- Plan View and Minimum Safe Altitude
- Profile and Missed Approach Icons
- Time and Speed Table
- Landing Minimums
- Airport Sketch and Airport Diagram
- Alternate Airports

Ground Lesson (18) 1 hour

Approach Procedures

- Preparing for the Approach
- Approach Procedure Definitions
- Using ATC Radar for Approaches
- Course Reversals
- Timed Approaches from a Holding Fix
- Final Approach
- Circling Approach and Sidestep Maneuver
- Missed Approach Procedures
- Visual and Contact Approaches

Ground Lesson (19) 1 hour

GPS Approach Procedures

- GPS Approach Consideration
- Preparation for GPS Approach
- Performing a GPS Approach
 - Requirements
 - Alternates
 - RAIM
 - Chart Layout and Symbology
 - Terminating an Approach
 - Visual Descent Points (VDP), published and computed
 - Missed Approaches

Ground Lesson (20) 1 hour

ILS Approach Procedures

- Chart layout and Symbology
- DME arcs to the final approach course
- DA and MDS for straight-in approaches
- Preparing for a Straight-In ILS Approach
- Performing a Straight-In ILS Approach
- ILS Approaches to Parallel Runways
- Localizer Approaches
- LDA and SDF Approaches

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Ground Lesson (21) 1 hour

VOR and VOR/DME Approach Procedures

- Required equipment
- On-Off Airport VORs
- Charted final approach fix (FAF) vs. noncharted FAF
- Chart layout and symbology
- Visual Descent Points (VDP)
- Descending below the MDA
- Missed Approaches
- Preparing for a VOR/DME Approach
- Performing a VOR/DME Approach

Ground Lesson (22) 2 hour

NDB Approach Procedures

- Preparing and executing an NDB Approach with a course reversal
- Required equipment
- On-Off Airport NDBs
- Charted FAF vs. noncharted final approach point (FAP)
- Chart Layout and symbology
- Visual descent points (VDP)
- Descent below MDA
- Missed Approaches

Ground Lesson 23. Stage II Exam, 1 hour

Completion Standard.

Minimum required score of 80%, retest to assure minimum proficiency of 80% if required. Incorrect answers reviewed with instructor as required.

Test Content Topics

- Departure Charts and Procedures
- Enroute Charts and Procedures
- Holding Procedures
- Arrival Charts and Procedures
- Approach Considerations, Charts and Procedures
- GPS Approach Procedures
- ILS Approach Procedures
- VOR Approach Procedures
- NDB Approach Procedures

STAGE III

Objective: Learn the procedures necessary for IFR cross-country operations. Learn how to analyze weather data and make Go/NoGo decisions, as well as obtain an understanding of the physiological factors that can affect both pilot and passengers during instrument flight. Stage III classroom duration is 11 hours followed by a 2 hour end of course examination.

Ground Lesson (24) 3 hours

Weather Factors and Hazards

- Basic Weather Factors and Theory
- Thunderstorms
- Turbulence
- Icing, definitions, characteristics and encounters
- Icing Protection Systems
 - Pneumatic deicing boots
 - Electro-Thermal
 - Bleed Air
 - Electro-Mechanical
 - TKS Ice Protections
 - Passive
 - Rotary-surface icing
 - Engine-inlet icing
 - Icephobic materials
- Wind Shear
- Hydroplaning

Ground Lesson (25) 3 hours

Analyzing Weather Data

- Weather Products and Symbology (written and graphic)
 - METAR
 - TAF
 - Winds Aloft
 - Area Forecasts
 - Convection Forecasts
 - Surface Analyses
 - Prognostic Charts
 - Etc.
- Adverse weather conditions
- Nonadverse Weather Conditions
- Interpreting Weather information and practice exercises

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Ground Lesson (26) 1 hours

IFR Decision Making

- Decision Making Process
- Review of SPRM
- Risk Elements Reactive and Proactive IFR
- Personal Minimums
- Resources, Prioritizing, Visualization
- Positional Awareness

Ground Lesson (27) 2 hours

IFR Flight Planning

- Flight Overview
- Weather Considerations
- Completion of Navigation Log and Flight Plan
 - Practice class exercise

Ground Lesson (28) 1 hours

IFR Emergencies

- Declaring an Emergency
- Malfunction Reports
- Types of Emergencies
- Radar Approaches

Ground Lesson 29. Stage III Exam, 1 hour

Completion Standard.

Minimum required score of 80%, retest to assure minimum proficiency of 80% if required. Incorrect answers reviewed with instructor as required.

Test Content Topics

- Weather Factors and Hazards
- Analyzing Weather Data
- IFR Single-Pilot Resource Management
- IFR Flight Planning
- IFR Emergencies

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In-Class End of Course Exam, 2 hour

This event is designed to demonstrate that the student is prepared to pass the FAA Instrument Knowledge test by passing the test that shows comprehension of the material presented in lessons 1-29, and chapters 1-10 in the Instrument Commercial Textbook.

Completions Standard

A minimum score of 80 percent will be achieved by each student. Failure to do so will require a review with the instructor and retests until the student can meet the completion standard. Meeting the standard will allow endorsement of the student logbook to authorize that student to take the FAA Instrument Knowledge examination at a testing center.

INSTRUMENT GROUND SCHOOL STUDENT COURSE DURATION

Total classroom instruction Time	44
Total Section Examinations Time	3
Total Final Examination Time	2
Instrument Ground School Total Time	49