Objectives	▪ The student should develop knowledge of the elements related to the FARs related to IFR certification as well as IFR flight. The student also will become familiar with publications useful to IFR flight.
Key Elements	▪ Instrument Rating Requirements ▪ Part 91 IFR Regs ▪ Useful Publications
Elements	▪ 14 CFR Part 61 ▪ 14 CFR Part 91 ▪ Instrument Flying Handbook ▪ AIM ▪ ACS/PTS ▪ Chart Supplement ▪ En Route Charts ▪ Terminal Procedures Publication (TPP) ▪ Standard Departures/ Terminal Arrivals ▪ Standard Instrument Approaches
Schedule	▪ Review lesson objectives ▪ Review lesson material ▪ Conclusion & Review
Equipment	▪ White Board / Markers ▪ References
CFI Actions	▪ Present lesson ▪ Use teaching aids ▪ Ask/ answer questions
Student Actions	▪ Participate in discussion ▪ Take notes ▪ Ask / answer questions
Completion Standards	▪ The student understands the requirements and rules for IFR flight and has a basic understanding of the publications available to assist in flight and in learning.

Additional Notes: _____
_____
_____

CE = Common Error

Introduction

Overview

Review objectives / Elements

What

An overview and introduction to the various FARs governing the issuance of the instrument rating as well as the rules required for IFR flight. Furthermore, the lesson will introduce the student to a variety of publications necessary for IFR flight and learning.

Why

This lesson introduces everything that is instrument flying; the basis of how one obtains the instrument rating and how one must operate in the IFR world. It also is important to know what publications are available and necessary to comfortably operate with an instrument rating.

How

14 CFR Part 61 – Certification: Pilots, Flight Instructors, and Ground Instructors

Purpose/General Content

- The requirements for issuing pilot, flight instructor, and ground instructor certificates and ratings
- The conditions under which those certificates and ratings are necessary
- Privileges and limitations of those certificates and ratings

Subparts

- Aircraft Ratings and Pilot Authorization
  - FAR 61.57 - Recent Flight Experience: PIC
  - FAR 61.65 - Instrument Rating Requirements (Specifics are Below)
- Student Pilots
- Recreational Pilots
- Private Pilots
- Commercial Pilots
- Airline Transport Pilots
- Flight Instructors
  - FAR 61.183(c)(2)(iv) – Eligibility Requirements
  - FAR 61.187(b)(7) – Areas of Operation
  - FAR 61.191 – Additional Flight Instructor Ratings
- Ground Instructors
- Sport Pilots

Part 61 and IFR Pilots

- FAR 61.65(a) - Instrument Rating Requirements
  - A person who applies for an instrument rating must:
    - Hold at least a current PPL with an airplane rating suitable to the Instrument Rating sought
    - Be able to read, speak, write, and understand the English language
    - Receive and log ground training from an authorized instructor or accomplish a home-study course on the aeronautical knowledge areas that apply to the instr. rating sought
    - Receive a logbook or training record endorsement from an authorized instructor certifying that the person is prepared to take the required knowledge test;
    - Receive and log training on the areas of operation from an authorized instructor in an aircraft, flight simulator, or flight training device
    - Receive a logbook or training record endorsement from an authorized instructor certifying that the person is prepared to take the required practical test
    - Pass the required knowledge test on the aeronautical knowledge areas
    - Pass the required practical test on the areas of operation necessary
- FAR 61.65(b) - Aeronautical Knowledge
- FAR 61.65(c) - Flight Proficiency
- FAR 61.65(d) - Aeronautical Experience
  - Must have logged the following:
    - At least 50 hours of X-country flight time as PIC, at least 10 hours must be in airplanes
    - 40 hours of actual or simulated instrument time on the areas of operation, to include:
      - At least 15 hours of instrument flight training from an authorized instructor in the aircraft category for which the instrument rating is sought
      - At least 3 hours of instrument training in preparation for the practical test within 2 calendar months preceding the date of the test
    - Instrument training on X-country flight procedures specific to airplanes that includes at least one X-country flight performed under IFR, and consists of—
      - A distance of at least 250 nautical miles along airways or ATC-directed routing
      - An instrument approach at each airport
      - Three different kinds of approaches with the use of navigation systems
- FAR 61.65(h) - Use of Flight Simulators or FTDs
- FAR 61.65(i) - Use of an aviation training device
- FAR 61.57(c) - Recent Flight Experience: Pilot in Command
  - Within the last 6 months must have performed and logged under actual or simulated conditions:
    - At least 6 instrument approaches
    - Holding procedures
    - Intercepting and tracking courses through the use of navigation systems

14 CFR Part 91 – General Operating and Flight Rules

Purpose/General Content

- Describes rules governing the operation of aircraft

Subparts

- **A - General**
- **B - Flight Rules**
  - General - FAR 91.101
    - Preflight Action - FAR 91.103
    - Flight Instruction; Simulated Instrument Flight… - FAR 91.109
  - Visual - FAR 91.151
  - Instrument - FAR 91.167 up to Subpart C
- **C - Equipment, Instrument, and Certificate Requirements**
  - Instrument Flight Rules - FAR 91.205(d)
- **D - Special Flight Operations**
- **E - Maintenance, Preventive Maintenance, and Alterations**
  - Inspection Requirements - FAR 91.411
- **F - Large and Turbine Powered Multiengine Airplanes and Fractional Ownership Program Aircraft**
- **G - Additional Equipment and Operating Requirements for Large and Transport Category Aircraft**
- **H - Foreign Aircraft Operations and operations of US Registry Civil Aircraft Outside of the US; and rules Governing Persons on Board Such Aircraft**
  - Operating Noise Limits
  - Waivers
  - Fractional Ownership Operations

Part 91 and IFR Pilots

- **Can the Airplane Fly IFR?**
  - FAR 91.205(d) - IFR Required Instruments and Equipment
    - VFR Day Instruments (TOMATOFFLAMES)
    - VFR Night Instruments (FLAPS)
    - IFR Instruments (GRABCARD)
      - Generator/Alternator of adequate capacity
      - Radio (Two way) and Nav. Equipment appropriate to the route
      - Altimeter (Sensitive)
      - Ball (of Turn Coordinator)
      - Clock (w/second hand)
      - Attitude Indicator
      - Rate of Turn Indicator
      - Directional Gyro (DG)

- FAR 91.411 - Altimeter and Altitude Reporting Equipment Tests and Inspections
  - Within the preceding 24 months:
    - Each static pressure system
    - Each altimeter instrument
    - Each automatic pressure altitude reporting system
- FAR 91.171 - VOR Equipment Check for IFR Operations
  - The VOR must have been operationally checked within the preceding 30 days
    - VOT: Maximum bearing error is ± 4°
      - VOR should read 180o TO or 360/0o FROM
    - Designated as a VOR system checkpoint: Maximum bearing error is ± 4°
    - Airborne checkpoint: Maximum bearing error is ± 6° degrees
    - If no check signal/point available, select a VOR radial on the centerline of a VOR airway
      - Select a prominent ground point along the radial and maneuver directly over it
      - Note the VOR bearing indicated; it must be ± 6o of the published radial
    - Dual system VOR: Maximum bearing error is +/- 4° of each other
      - Ground checkpoint: ± 4o
    - Airborne Checkpoint: ± 6o

- **IFR Preflight**
  - FAR 91.103 - Preflight Actions
    - IFR Specific:
      - Weather reports and forecasts
      - Fuel requirements
      - Alternatives available if the planned flight cannot be completed
      - Any known traffic delays which the PIC has been advised by ATC
      - For any flight… runway lengths, T/O and LDG distances, etc.
  - FAR 91. 169 - IFR Alternate Requirements
    - An alternate is not required when:
      - At least 1 hour before/1 hour after the ETA the ceiling is ≥ 2,000' AND visibility is ≥ 3 SM
        - If ceiling is forecast < 2,000' OR visibility is forecast < 3 SM an alternate is needed
    - An airport cannot be an alternate unless at the ETA, the ceiling/visibility are at/above:
      - For a Precision Approach: 600' and 2 SM
      - For a Non-Precision Approach: 800' and 2 SM
      - No Approach: Ceiling/visibility must allow descent from MEA, Approach, LDG under VFR
  - FAR 91.167 - Fuel Requirements
    - Must carry enough fuel to:
      - Complete the flight to the first airport of intended landing
      - Fly from that airport to the alternate airport (if required)

        - Fly for an additional 45 minutes at normal cruising speed
- **IFR Departure**
    - FAR 91.173 - ATC Clearance and Flight Plan Required
        - You may not operate in controlled airspace under IFR unless you have:
            - Filed an IFR flight plan
            - Received an appropriate ATC clearance
    - FAR 91.175 - Takeoff and Landing Under IFR
        - 0/0 takeoffs are legal under part 91
            - Recommended to use published T/O minimums or approach minimums (if no T/O) as a guideline
- **IFR En Route**
    - FAR 91.177 - Minimum Altitudes for IFR Operations
        - Except for T/O's and LDGs, you may not operate below:
            - The applicable minimum altitudes prescribed in parts 95 and 97
            - However, if no minimum is prescribed:
                - Mountainous Area: 2,000' above the highest obstacle w/in 4 nm of the course flown
                - Non-Mountainous: 1,000' above the highest obstacle w/in 4 nm of the course flown
        - If an MEA and MOCA are prescribed, you may operate below the MEA, but not below the MOCA, when w/in 22 NM of the VOR concerned
        - Climb to a higher minimum IFR altitude immediately after passing the point beyond which that minimum altitude applies
            - Except when ground obstructions intervene, the point shall be crossed at or above the applicable MCA
    - FAR 91.179 - IFR Cruising Altitude or Flight Level
        - Controlled Airspace: Maintain the altitude of FL assigned by ATC
            - If cleared for VFR on top, maintain altitude based on FAR 91.159
        - Uncontrolled Airspace: Below 18,000' MSL, and
            - On a magnetic course of 0o through 179o: Any ODD Thousand-foot MSL altitude
            - On a magnetic course of 180o through 359o: Any EVEN Thousand-foot MSL altitude
    - FAR 91.181 - Course to be Flown
        - You must:
            - Be on an ATS route, along the centerline of that airway
            - On any other route, along the direct course between nav aids or fixes defining the route
                - Doesn't prohibit maneuvering to pass well clear of other aircraft/clearing flight path
    - FAR 91.183 - IFR Communications
        - You must report the following as soon as possible
            - The time/altitude of passing each designated reporting point or those desired by ATC

        - Except while under radar control: Report those specifically requested by ATC
      - Any unforecast weather conditions encountered
      - Any other information relating to the safety of the flight
  - FAR 91.185 - IFR Operations: Two-Way Radio Communications Failure
    - VFR Conditions: Continue the flight under VFR and land as soon as practicable
    - IFR Conditions: Continue the flight according to the following rules:
      - Route - AVE F (In order of importance; if one is absent move to the next)
        - **A**ssigned - By the route assigned in the last ATC clearance received
        - **V**ectored - By the direct route from the point of failure to where being vectored
        - **E**xpect - By the route ATC has advised may be expected in a further clearance
        - **F**iled - By the route filed in the flight plan
      - Altitude - MEA (The highest of the following altitudes)
        - **M**inimum Altitude – The minimum altitude prescribed for IFR operations (MEA)
        - **E**xpected - The altitude ATC has advised may be expected in a further clearance
        - **A**ssigned - The altitude assigned in the last ATC clearance received
      - Leaving a Clearance Limit
        - If the limit is a fix from which an approach begins:
          - Commence descent as close as possible to the expect further clearance time
            - If one has not been received, leave as close as possible to the ETA filed
        - If the limit is not a fix from which an approach begins:
          - Leave the limit at the expect further clearance time
            - If one has not been received, leave upon arrival over the clearance limit and proceed to a fix from which an approach begins and commence descent as close as possible to the ETA filed
  - FAR 91.187 - Operations Under IFR in Controlled Airspace: Malfunction Reports
    - The PIC shall report as soon as practical to ATC any malfunctions of:
      - Nav Equipment
      - Approach Equipment
      - Communication Equipment
    - In each report, include:
      - Aircraft Identification
      - Equipment Affected
      - Degree to which the capability of the pilot to operate IFR under ATC is impaired
      - Nature and extent of assistance desired from ATC
- **IFR Approaches**
  - FAR 91.175(a)(c) - Takeoff and Landing Under IFR
    - When an instrument approach is necessary, must use one given in part 97 for that airport
    - May not operate below the authorized MDA or continue below the DA/DH unless:
      - The aircraft is continuously in a position from which a descent to a landing on the intended runway can be made at a normal rate of descent using normal maneuvers
      - The flight visibility is not less than that prescribed in the approach being used

- At least one visual reference for the intended runway is distinctly visible/identifiable:
  - The approach light system
    - May not descend below 100' above TD zone elevation using the approach lights unless the red terminating bars or red side row bars are visible/identifiable
  - The Threshold
  - The Threshold Lights
  - The Runway End Identifier Lights
  - The Visual Approach Slope Indicator
  - The Touchdown Zone or TD Zone Markings
  - The TD Zone Lights
  - The Runway or Runway Markings
  - The Runway Lights

- FAR 91.175(k) - ILS Components
  - The following means may be used to substitute for an OM
    - Compass Locator
    - Precision Approach Radar or Airport Surveillance Radar
    - DME, VOR, or NDB fixes authorized in the standard instrument approach procedures
    - Suitable RNAV system in conjunction with a fix identified in the approach procedures
- FAR 91.175(d) - Landing
    - May not land if the flight visibility is less than the visibility prescribed in the approach being used
- FAR 91.175(e) - Missed Approach Procedures
    - Immediately execute a missed approach when either of the following conditions exist:
      - When operating under paragraph (c) and the requirements aren't met when:
        - The aircraft is being operated below MDA
        - Upon arrival at the missed approach point, including a DA/DH where a DA/DH is specified and its use is required, and at any time after that until touchdown
      - Whenever an identifiable part of the airport is not distinctly visible during a circling maneuver at or above MDA
- FAR 91.175(j) - Limitations on Procedure Turns
  - No pilot may make a procedure turn (unless cleared to do so) in the case of:
    - A radar vector to a final approach course or a fix
    - A timed approach from a holding fix
    - An approach for which the procedure specifies "No PT"

Part 95 - IFR Altitudes

- Prescribes altitudes governing the operation of aircraft under IFR on ATS routes, or other direct routes for which an MEA is designated in this part
  - In addition, it designates mountainous areas and changeover points
- Subparts
  - General
  - Designated Mountainous Areas
  - En Route IFR Altitudes Over Particular Routes and Intersections
  - Changeover Points

Part 97 - Standard instrument Procedures

- Subparts
  - General
  - Procedures
  - TERPS Procedures

Instrument Flying Handbook

Purpose

- Designed for use by instrument flight instructors and pilots preparing for instrument rating tests
  - The discussion and explanations reflect the most commonly used practices and principles
- All of the aeronautical knowledge and skills required to operate in IMC are detailed

General Content

- Human/Aerodynamic Factors in Instr. Flight
- The Flight Instruments
- Attitude Instrument Flying for Airplanes
- Basic Flight Maneuvers used in IMC
- Attitude Instrument Flying for Helicopters
- Navigation Systems
- The National Airspace System (NAS)
- The Air Traffic Control (ATC) system
- IFR Flight Procedures
- IFR Emergencies

- **Revised occasionally by the FAA to update the latest practices**

Aeronautical Information Manual (AIM)

- Provides pilots with a vast amount of basic flight info and ATC procedures in the US
- The AIM has a comprehensive and useful index to help find topics of interest

ACS/PTS

- **FARS specify areas in which knowledge/skill must be shown before the issuance of a certificate**
  - FARS permit the FAA to publish PTS/ACS containing the tasks a pilot must show skill in
- **Current PTS**
  - Sport, Recreational, Flight Instructor
- **Current ACS**
  - Slowly replacing the PTS
  - Published for the Private Pilot, Instrument, Commercial, and ATP and Type Rating

Chart Supplement

- A civil information publication published / distributed every 8 weeks by NACO
  - NACO = National Aeronautical Charting Office, a division of the FAA
- Directory of all airports, seaplane bases, and heliports open to the public; communication data; navigation facilities; and certain special notices and procedures
- A directory is published for each of seven geographical districts (NW, SW, NC, SC, EC, NE, SE)
- The chart supplement is a vital publication of cross country planning
  - All pertinent info regarding airports, FSS contact info, VOTs, etc. is contained in it

En Route Charts

- Aeronautical charts for en route IFR navigation in the low stratum (below 18,000' MSL)

Purpose

- The equivalent of the VFR sectional chart
- Allows one to effectively depart and navigate en route under instrument conditions

General Content

- Airport Information
- Charted IFR Altitudes
  - MEA – Minimum En Route Altitude
  - MOCA – Minimum Obstacle Clearance Altitude
  - MRA – Minimum Reception Altitude
  - MCA – Minimum Crossing Altitude
  - MAA – Maximum Authorized Altitude
- Navigation Features
  - NAVAIDS
  - Airways and Intersections
  - Other Route Information
  - Weather Information and Communication Features
  - RCO
- Revised every 56 days

Terminal Procedures Publication

- Published by NATO
- Includes IAP, Arrival and departure procedures, and airport diagrams by region

Standard Departures/ Terminal Arrivals

Departure Procedures

- Preplanned IFR ATC departure/obstacle avoidance procedures - text and graphic format
- Textual DPs are listed by airport in the IFR T/O Mins and Departure Procedures section (C) of the TPP
- Graphic DPs are included after the respective airport's IAP
- Purpose
  - Provide obstacle clearance protection, while reducing communications and departure delays
  - They provide a way to depart the airport and transition to the en route phase safely

- General Content
  - Both textual and graphical
  - Provide clearance provided the aircraft clears the end of the runway at least 35' AGL, climbs to 400' above airport elevation before turning, and climbs at least 200' per NM
    - Unless a higher climb gradient is specified
- Revisions every 56 days

Standard Terminal Arrival Routes (STARs)

- Preplanned IFR ATC arrival procedures, published for use in textual and graphic format
- STARs are shown by airport in the Standard Terminal Arrival Charts section (P) of the TPP
- Purpose
  - Transition from the en route structure to a terminal area fix, where an approach can be made
- General Content
  - Graphical with textual description
- Revisions every 56 days

Standard Instrument Approach Procedure Charts

- Purpose
  - Provide the method to descend and land safely in low visibility conditions
- General Content
  - Maneuvers, including alt changes, course corrections, other limitations are prescribed in the IAPs
  - Main Sections
  - Margin Identification
    - Top and bottom areas on an IAP that depict info about the procedure including airport location and procedure identification
  - Plan View
    - Overhead view of approach procedure on IAP chart
  - Profile View
    - Side view of an approach procedure on an IAP chart illustrating the vertical approach path altitudes, headings, distances, and fixes
  - Landing Minimums (and notes)
    - Displays the lowest altitude and visibility requirements for the approach
  - Airport Diagram
    - Shows a detailed diagram of the airport; includes surface features/airport configuration info
- Revisions every 56 days

Conclusion & Review

Conclusion:

Brief review of the main points

PTS Requirements:

1. 14 CFR parts 61, 71, 91, 95, and 97.
2. FAA-H-8083-15, Instrument Flying Handbook.
3. Aeronautical Information Manual.
4. Practical Test Standards.
5. Airport Facility Directory.
6. Standard Instrument Departures/Terminal Arrivals.
7. En Route Charts.
8. Standard Instrument Approach Procedure Charts.