

# Lesson Plans

Certified Flight Instructor, Instrument



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2025

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# Flight Instruments

**Allotted Time:** 1 Hr

- Objective:** The client understands inner workings of instruments and can incorporate ADM to diagnose instrument malfunctions.

**References:** Instrument Flying Handbook chapter 5, PHAK chapter 8

**Materials:** Whiteboard, Marker. Instrument cases if possible. Diagram of systems (POH!)

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## Content

- Magnetic compass
  - Pitot-static system
    - Airspeed Indicator {3% or 5kts}
    - Altimeter {field elev. 75ft}
    - V.S.I. {"neutral"}
    - Slips & skids
  - Vacuum system
    - Attitude indicator {5° within 5 minutes}
    - Heading indicator {15° decay per hour} 360/24=15
  - Electrical system
    - Turn coordinator {Wings dip in, ball swings out}
  - Engine instruments
  - ANTI ICE
- 

## Instructor Actions

- Explain and relate content to client
  - Describe interpretation of instruments
  - Describe operating principles behind instruments and their systems
  - Describe normal and abnormal indications
  - Incorporate trouble-shooting techniques into lesson
  - Ask questions frequently to engage client
  - Answer questions from client
  - Present abnormal indication scenarios to client
- 

## Client Actions

- Listen and take notes
  - Answer questions and ask questions
  - Apply ADM to overcome abnormal indication scenarios given by instructor
- 

## Completion standards

- At the end of the lesson, Client is able to explain operating principles behind each instrument and can diagnose abnormal indications and apply ADM to come up with a solution.

# Navigation Equipment

**Allotted Time:** 1 Hr

- Objective:** The client understands basic operating principles and instrument interpretation of relevant navigation systems.

**References:** [Radio Navigation - ADF & NDB](#), [The Technical Wizardry of VORs](#)

**Materials:** whiteboard, EFB

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## Content

- VOR
    - System / Service Volumes
    - CDI & Errors
  - DME
    - System / Service Volumes “Slant Range”
    - Indicator (Supplementation)
  - ILS (vis, guide, range)
  - ADF & NDB
    - Automatic Direction Finding
    - Non-directional Beacon
    - General use, Age, Pro’s/cons
  - transponder
    - Alt encoding
  - GPS
    - Sat Network
    - Differentiate between “RNAV”
    - Indicators & XTRACK
    - RAIM, WAAS, intro to legal req’s
- 

## Instructor Actions

- Explain and relate content to client
  - Ask questions to engage client and answer clients’ questions
- 

## Client Actions

- Listen and take notes
  - Ask and answer questions
- 

## Completion standards

- At the end of the lesson, Client can explain operation of relevant navigation systems and can identify strengths and weaknesses in each.

# Regulations and Publications for IFR

**Allotted Time:** 1 Hr

- Objective:** Introduce Client to regulations and resources that govern and guide IFR flight.

**References:** 91.167 through 91.201, [LOI lost-comm Clearance limit?](#), *TPPS*

**Materials:** IFR low enr chart, approach chart, departure proc. AFD

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## Content

- 14 CFR parts 61, 71, 91, 95, and 97.
  - FAA-H-8083-15, Instrument Flying Handbook.
  - Aeronautical Information Manual.
  - Practical Test Standards.
  - Chart Supplement.
  - Standard Instrument Departures/Terminal Arrivals.
  - En Route Charts.
  - Standard Instrument Approach Procedure Charts.
- 

## Instructor Actions

- Describe the purpose for each document
  - Summarize key elements of each document
  - Ask questions and answer questions to engage client
  - Review Written test deficiencies with client
- 

## Client Actions

- Listen and take notes
  - Ask and answer questions
  - Discuss written test deficiencies with instructor
- 

## Completion standards

- At the end of the lesson, Client is well acquainted with regulations and prepared to further study.

# Logbook Entries

**Allotted Time:** 1 Hr

- Objective:** The client understands differences between logging time under VFR and IFR

**References:** [Logging IAPs: InFO15012](#), logging ifr: 91.51(g),

**Materials:** whiteboard, FAR/AIM, EFB

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## Content

- Logbook entries
    - When to log instrument time?
    - When to log an approach?
    - How to log instrument time and approaches?
  - IFR Currency vs proficiency
  - Endorsements for checkride
  - Aeronautical experience for checkride
  - IPC Requirements
  - Required flight instructor records.
- 

## Instructor Actions

- Explain and relate content to client
  - Tailor endorsements and aeronautical experience to clients' situation
  - Give required endorsements to client as needed
- 

## Client Actions

- Listen and take notes
  - Secure endorsements in logbook
- 

## Completion standards

- Client understands logbook entry requirements and risk management associated with proficiency

# Cross-Country Flight Planning

**Allotted Time:** 1 Hr

- Objective:** Client familiarization with the differences between VFR and IFR XC planning and the special considerations needed.

**References:** 91.167 (fuel), AIM, PHAK

**Materials:** EFB, ifr low enroute chart, A/F/D, E6B, Nav Log

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## Content

- Airspace IFR Regulatory requirements preferred routing
  - XC Computations (no more mag var!)
  - Selection and interpretation of correct procedures (DEP, STAR, IAP...)
  - Review NOTAMs (FDC!!!)
  - Complete IFR flight plan
  - Alternates (1,2,3 + npap800/2 or pap600/2)
  - In-flight route change (Direct?)
  - Icing consideration planning
  - Icing consideration in flight (systems)
- 

## Instructor Actions

- Explain and relate content to client
  - Review relevant fundamentals of XC planning with client
  - Ask client questions to engage throughout lesson
  - Assign client to prepare IFR XC nav log before next flight
- 

## Client Actions

- Listen and take notes
  - Ask questions and answer questions from instructor
  - Compare and contrast IFR flight planning with prior knowledge of VFR flight planning
  - Prepare IFR XC Nav log for next flight
- 

## Completion standards

- At the end of the lesson, client is able to prepare IFR nav logs and consider unique challenges of IFR flight planning, such as Icing and procedure planning.

# Instrument Flight deck Check

**Allotted Time:** 0.5 Hr

- Objective:** The client will deeply understand taxi and runup instrument checks.

**References:** Cessna 172 checklist, FAR/AIM

**Materials:** Cessna 172 checklist, 172 Instrument panel image

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## Content

- Taxi Check
    - GPS Database (up 2 date)
    - Comms/CRAFT (ground call?)
    - Turn coordinator (wings dip in)
    - Inclinometer (ball swings out)
    - Attitude indicator (level)
    - Compass (“Known Headings”)
    - Heading indicator (correct/compass aligned)
  - Runup Check
    - Airspeed (stationary)
    - Attitude indicator (within 5 degrees)
    - Altimeter (set & within 75 ft)
    - Turn Coordinator (agree with attitude indicator)
    - Heading indicator (align with compass)
    - VSI (Neutral)
    - CDI VOR checks “VODGA”
    - Clock (tick tick tick)
    - Suction gauge / electrical system (below standards during taxi??)
    - OAT probe
    - FMS (GPS) WAAS/RAIM, Flight plan, proc’s frequencies...
- 

## Instructor Actions

- Explain and relate content to client.
  - Reference previous lessons to connect with checklist usage and ADM and system knowledge.
- 

## Client Actions

- Ask and answer questions from instructor. Practice instrument checks while chairflying
- 

## Completion standards

- At the end of the lesson, Client will have a firm grasp on the instrument checks and understand the significance of each check. Client is equipped to mitigate risks through methodical use of checklist.

# Air Traffic Control Clearances

**Allotted Time:** 0.75 Hr

- Objective:** Client introduction to ATC clearances in the IFR system. Client is prepared to listen and practice radio calls in aircraft.

**References:** P/C Glossary, Aim ch 4 & 5

**Materials:** Whiteboard, EFB

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## Content

- Pilot and controller responsibilities
    - Standard phraseology?
    - Request Clarification?
    - “Unable”?
    - Bravo and introduce Clearance Limit
  - Navigation Programming in compliance with ATC instruction
  - EACH PHASE OF FLIGHT
    - CRAFT
    - Taxi (ILS hold short!)
    - Takeoff (runway heading or SID/ODP?)
    - Frequency changes
    - Rerouting en route? *“How will approach terminate?”*
    - Radar vectors
    - “Intercept final approach course” vs “Cleared for approach”
    - Closing IFR flight plan
- 

## Instructor Actions

- Describe and relate clearances relevant in the IFR system, for each phase of flight
  - Roleplay with client radio clearance exchanges
  - Ask client to use ADM to solve a realistic scenario involving clearances
- 

## Client Actions

- Listen and take notes
  - Ask questions to instructor
  - Answer questions from instructor
  - Participate actively in ATC clearance rollplay
  - Apply ADM to scenarios given by instructor
- 

## Completion standards

- At the end of the lesson, client is familiar with and ready to respond to clearances in the airplane under IFR.

# Departure, En Route, and Arrival Procedures

**Allotted Time:** 2 Hrs

- Objective:** The client understands basic chart symbology and briefing procedures to apply to each plate.

**References:** ODP, SID, AFD, IAP, IFR LOW charts & TPPS

**Materials:** EFB, Charts, whiteboard

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## Content

- A.M.O: This is IFR flying!!
  - Briefing each plate
  - Top Down / acronym (WIRE)...
  - SID, ODP, En route (nav log), STAR, IAPs
  - “Course and Morse”
  - 5 T’s (Turn, Time, Twist, Throttle, Talk)
  - ATC alt/heading guidance
  - Pilot’s responsibility to be on course (protected areas [holds])
  - Lost COMM! (AVEF,MEA)
  - How do we use the GPS as an aide not a crutch?
- 

## Instructor Actions

- Explain and relate chart symbology to clients previous VFR experience
  - Roleplay, Tell-do, and use scenarios to teach briefing procedures
  - Ask client to brief plates to the class/ to instructor to practice briefing
- 

## Client Actions

- Listen and take notes
  - Roleplay briefing and flying approaches
- 

## Completion standards

- At the end of the lesson, Client is familiar with briefing procedures and chart symbology, and ready to practice flying procedures in the airplane.

## 4 Fundamentals & Unusual Attitudes

Allotted Time: 1.5 Hrs

- Objective:** The client

**References:** IFR [A Pattern](#) and [B Pattern](#)

**Materials:** A & B Pattern, instrument panel image

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### Content

- Differences from VFR:
    - Lead turns/level offs
    - Visual scan SPEED
    - SMALL power/trim changes/descent rate
  - Scanning!! *<- relate to playing music!*
    - Rectangular
    - Radial
    - Inverted V
  - Which scan for which fundamental maneuver/phase of flight?
    - Straight and level
    - Straight and level accelerate/decelerate
    - Straight and level climbs/descents
    - Climbing turns - Airspeed / Vspeed
    - Descending turns - Airspeed / Vspeed
  - “Primary and supporting” instruments
  - Why standard rate? (Timed turns!)
  - Compass turns - UNOS! 30,20,10,0,10,20,30 degrees
  - Steep turns -> FAST SCAN
  - Unusual attitudes: What do we want to prevent Overspeed or stall
    - Nose down: Overspeed! - Power Idle, wings level, Pull up!
    - Nose up: Stall! - Reduce AOA to prevent stall, Power full, roll level
- 

### Instructor Actions

- Explain and relate content to client. Emphasizing the conversion from VFR to IFR scanning
- 

### Client Actions

- Listen and take notes, answer and ask questions from and to the instructor
- 

### Completion standards

- At the end of the lesson, Client is ready to practice IFR scanning in flight.

# Tracking Navigational Systems and DME Arcs

**Allotted Time:** 0.75 Hr

- Objective:** The client understands ground based navigation tracking (VOR/DME) and understands the steps to fly a DME.

**References:** Instrument flying handbook ch 9, [DME Arcs: Boldmethod Live](#), [VOR Technical Wizardry](#)

**Materials:** Whiteboard, simulator app, [SLIDESHOW](#)

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## Content

- Intercepting and Tracking
    - Define
    - Review CDI indications
    - Review difference between Course and Radial
    - Review Tuning procedures “Freq, Course, Morse” *what if no morse?*
  - DME Arcs
    - Purpose
    - Overview
    - How can we make a circle out of a VOR? (spokes on a wheel)
    - How do we perform in flight?
    - Off course? + winds
    - Common Errors
- 

## Instructor Actions

- Explain and relate content to client
  - Demonstrate course intercept on VOR simulator App
  - Use Tell-do method in VOR simulator app to intercept and “fly” DME Arc
- 

## Client Actions

- Listen and take notes
  - Practice “flying” DME arc on Vor simulator app on instructors IPAD (Tell-do)
- 

## Completion standards

- At the end of the lesson, Client is will versed in course intercept and tracking procedures and is ready to perform DME arcs under the hood in the airplane.

# Holding Procedures

**Allotted Time:** 1 Hr

- Objective:** The client understands holding procedures, entries and wind correction.

**References:** [UND Holding pattern](#), [Holding Pattern Entries](#), [Holding Pattern Wind Correction](#),

**Materials:** White board, simulator app, AIM 5-3-2, SLIDESHOW

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## Content

- Why hold?
  - What will ATC tell us?
  - How do we comply?
  - Racetrack. How do we measure it? *The 5 T's!*
  - What does it look like in the airplane?
    - Practice on simulator
  - Wind scenarios? x3hdg rule, +/- time rule
    - Practice winds on sim
  - Protected area
  - Entries
    - The first lap is a “trial”
    - Practice entries on sim
- 

## Instructor Actions

- Explain each aspect of holds
  - Answer client questions
  - Tell-Do method with VOR simulator app
  - Roleplay ATC calls involved in holds
- 

## Client Actions

- Listen and take notes
  - Practice VOR holds, entries, and wind corrections in instructors' VOR simulator app
  - Roleplay ATC calls
- 

## Completion standards

- At the end of the lesson, Client is familiar with holds and ready to practice in airplane. Client is able to determine entry to holds and has memorized the 5 T's and knows how to apply each T.

# Instrument Approaches

**Allotted Time:** 1.5 Hr

- Objective:** The client understands all chart symbology relevant to approach plates.

**References:** [How to Brief IAP](#), [Fly8MA IAP briefing](#)

**Materials:** EFB (VOR, ILS, RNAV), TPPS, Whiteboard

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## Content

- Define: Non precision Approach vs precision, vs “APV”
  - Define: Fix vs Point. DA vs MDA
  - Compare and contrast PAP vs NPAP
  - In general: choosing an approach...?
  - Chart Symbology (VOR, ILS, RNAV)
  - Comms & Nav: what's being said & ident
  - Airplane configuration
  - Inop equipment minimums adjustments (Altimeter, als...)
  - Draw out descent and track in conjunction with ATC communications
  - Circle, Straight-in, or Missed? Below minimums: (13 things)
- 

## Instructor Actions

- Explain and relate information to client
  - Explain each item on both types of apr. plate
  - Ask client to brief each plate
  - Ask client to draw descent path and ground track while roleplaying radio communications
  - Discuss descent below DA/MDA and introduce circle to land
- 

## Client Actions

- Listen and take notes
  - Ask questions
  - Brief approach plate chosen by instructor
  - Draw descent path whilst roleplaying radio communications
- 

## Completion standards

- At the end of the lesson, Client is proficient in briefing both precision and non-precision approach plates. Client is able to illustrate approach path and altitudes.

# Missed Approach

**Allotted Time:** 0.5 Hr

- Objective:** The client gets acquainted with missed approach procedures and will practice briefing missed approach procedures with each approach.

**References:** [https://www.youtube.com/watch?v=cpl\\_RDVKKfQ&t=7s](https://www.youtube.com/watch?v=cpl_RDVKKfQ&t=7s), Instrument proc. handbook

**Materials:** EFB, Approach plate, whiteboard

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## Content

- Chart Symbolology - brief the missed
  - When go missed?
  - Missed -> Go around but in IMC
  - Communications -> Tower vs Non Tower
  - Compliance with published or alternate missed approach procedure
  - Notification if aircraft is unable to comply with clearance, instruction, restriction, or climb gradient
  - What checklist to run?
  - Importance of positive aircraft control
  - Common errors
    - Chart interpretation
    - Hold common errors (entry, reverse sensing...)
    - Radio calls
    - MDA busting'
- 

## Instructor Actions

- Explain and relate content to client - go around!
  - Brief and "Fly" a missed approach with client using a model
  - Ask client to brief and "fly" missed approach with a model
- 

## Client Actions

- Listen and take notes
  - Ask questions
  - Brief and "fly" a missed approach from a IAP chart with a model
- 

## Completion standards

- At the end of the lesson, Client will be well versed in chart symbology regarding missed approaches and ready to execute a missed approach excellently.

# Circling Approach

**Allotted Time:** 0.75 Hr

- Objective:** The client understands and is ready to practice circling approaches in-the-air

**References:** AIM 5-4-20

**Materials:** EFB, whiteboard, TPPS, Approach chart

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## Content

- selection of the appropriate circling approach maneuver considering the maneuvering capabilities of the aircraft.
  - Circling approach minimums on the selected instrument approach chart.
  - compliance with advisories, clearance instructions, and/or restrictions.
  - Importance of flying a circling approach pattern that does not exceed the published visibility criteria.
  - maintenance of an altitude no lower than the circling MDA until in a position from which a descent to a normal landing can be made.
  - COMMON ERRORS:
    - MDA Management!!
    - Chart Symbolology (whats the C?)
    - Circling maneuver (distance!)
- 

## Instructor Actions

- Explain and walk through a circling approach
  - Brief approach plate with client
  - Discuss appropriate ways to circle around a runway
  - Discuss chart symbology and applicable FAA Regulation / TPPS content
- 

## Client Actions

- Listen and take notes
  - Brief approach plate
  - Model flying a circle to land
- 

## Completion standards

- At the end of the lesson, Client is able to identify risks involved with circle to land and can exercise judgment to mitigate risks. Client understands the technique of circling to land.

# Landing From a Straight-In Approach

**Allotted Time:** 0.25 Hr

- Objective:** The client understands the intricacies of straight-in-approaches.

**References:** <https://www.youtube.com/watch?v=XD9G3siTpuY>,

**Materials:** EFB, Approach chart, Whiteboard

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## Content

- effect of specific environmental, operational, and meteorological factors
  - transition to, and maintenance of, a visual flight condition
  - adherence to ATC advisories, such as NOTAMS, wind shear, wake turbulence, runway surface, and braking conditions
  - completion of appropriate checklist items
  - maintenance of positive aircraft control
  - Common Errors
    - Transition from IMC to VMC
    - Final course interception
    - Xwind correction
    - Speed management / unsafe landing
- 

## Instructor Actions

- Explain and relate content to client
  - Walk through with client each leg of straight-in
  - Review each line item and soft-quiz client on each
- 

## Client Actions

- Listen and take notes
  - Ask questions
  - Answer review questions from instructor
- 

## Completion standards

- At the end of the lesson, client is proficient in approach charts and briefing. Client is able to confidently determine missed or descent below DA/MDA.

# Lost Comm

**Allotted Time:** 0.5 Hr

- Objective:** The client

**References:** <https://www.youtube.com/watch?v=DjyxkN-8ALU&t=290s>, 91.185, **AIM 6-4-2**

**Materials:** Whiteboard, EFB, Approach chart, STAR chart, IFR low ENR. chart, AIM

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## Content

- Recognition of loss of communications
    - DUMMY CHECKS!
  - When to continue with flight plan as filed or when to deviate
  - How to determine the time to begin an approach at destination
- 

## Instructor Actions

- Explain and relate information to client
  - Differentiate legal instructions with practical advice
  - Run through scenarios with client given various approach /STARS/En-route charts
- 

## Client Actions

- Listen and take notes
  - Ask questions
  - Answer questions from instructor
  - Apply ADM in a scenario given by the instructor to determine appropriate course-of-action
- 

## Completion standards

- At the end of the lesson, client is well versed in lost com procedures. Client can correctly identify course-of-action in event of lost-comm in a scenario given by instructor.

# Partial Panel Approach

**Allotted Time:** 0.25 Hr

- Objective:** The client understands the differences between normal and partial panel flying.

**References:** Instrument flying handbook

**Materials:** EFB, approach chart, Whiteboard, 6-pack pannel image.

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## Content

- recognition of inaccurate or inoperative primary instrument indicators and advising ATC and the evaluator.
  - notification of ATC or evaluator anytime that the aircraft is unable to comply with an ATC clearance or whether able to continue the flight.
  - importance of utilizing navigation equipment in an emergency situation and demonstrating nonprecision approach without the use of primary flight instruments
  - Common errors:
    - Scan speed
    - Being behind the aircraft
    - Poor ATC resource management
- 

## Instructor Actions

- Explain and relate content to client
  - Ask questions to engage client
  - Give scenarios to client to encourage ADM (ATC assistance, etc)
- 

## Client Actions

- Listen and take notes
  - Answer and ask questions to and from instructor
  - Apply ADM in scenario given by instructor
- 

## Completion standards

- At the end of the lesson, client understands scanning and ADM elements relevant to partial panel scenarios.