Flight Instructor Instrument Syllabus

CFII candidates and their instructors will use the following syllabus as their course of instruction.

Candidates will pay their instructors through their flight accounts. Candidates who are on the Louisiana Tech University staff are not charged for their FTD time; these candidates are only charged Oral during their FTDs. Flights and orals are charged at normal Tech rates. Flight time charges and DPE fees for the practical test are over and above what is listed here. Candidates must have not less than $800 in their flight accounts on the day of their practical test.

Expected totals (excluding checkride):

10.0 hours oral 5.2 hours FTD 1.4 hours C-172S

Introduction (1.0 oral)

1. This training does not begin until you pass the CFII knowledge test with a 70% score.
2. The intent is for the CFII candidate to lead the discussions.
3. Candidates should be very familiar with the AIM.
4. When is an Instrument Rating Necessary?
5. Instrument Rating Requirements (Part 61)
6. Required Pilot Documents
7. Recency of Experience (VFR)
8. Recency of Experience (IFR)
9. Required Aircraft Documents
10. Required Instruments (VFR Day)
11. Required Instruments (VFR Night)
12. Required Instruments (IFR)
13. Inoperative Equipment and MEL
14. Required Aircraft Inspections

Human Factors (1.0 oral)

1. Illusions Leading to Spatial Disorientation
    a. The Leans
    b. Coriolis Illusion
    c. Graveyard Spiral
    d. Somatogravic Illusion
    e. Inversion Illusion
    f. Elevator Illusion
    g. Visual Illusions
    h. False Horizon
    i. Autokinesis

2. Demonstration of Spatial Disorientation
    a. Climbing While Accelerating
    b. Climbing While Turning
    c. Diving While Turning
    d. Tilting to Right or Left
    e. Reversal of Motion
    f. Diving or Rolling Beyond the Vertical Plane
3. Optical Illusions
    a. Runway Width Illusion
    b. Runway and Terrain Slopes Illusions
    c. Featureless Terrain Illusion
    d. Water Refraction
    e. Haze
    f. Fog
    g. Ground Lighting Illusions
4. IMSAFE Checklist
5. Physiological
    a. Hypoxia
    b. Hyperventilation
    c. Middle ear and sinus problems
    d. Motion sickness
    e. Alcohol and drugs
    f. Carbon monoxide poisoning
    g. Evolved gases from scuba diving
    h. Stress and fatigue

Flight Instruments (1.0 oral)

1. Pitot/Static System
2. Airspeed Indicator
3. Altimeter
4. Vertical Speed Indicator
5. Magnetic Compass
    a. Variation
    b. Deviation
    c. Magnetic Dip
    d. Oscillation
    e. Northerly Turning Error
    f. Acceleration/Deceleration Error
6. Vacuum System
7. Attitude Indicator
8. Heading Indicator
9. Turn and Slip Indicator
10. Turn Coordinator

Instrument Cockpit Check (0.5 oral)

1. After Engine Start
2. Taxi Check
3. Before Take-off Check

Adverse Weather Equipment (0.5 oral)

1. Anti-ice/de-icing equipment
    a. airframe.
    b. propeller or rotor.
    c. air intake.
    d. fuel system.
    e. pitot-static system.
2. Weather radar and lightning detection systems

Airplane Attitude Instrument Flying (0.5 oral)

1. Learning Methods
2. Control and Performance
3. Primary and Supporting
4. Control Instruments
5. Performance Instruments
6. Navigation Instruments
7. Procedural Steps in Using the Control and Performance Method
8. Fundamental Skills
9. Instrument Cross-check
10. Instrument Interpretation
11. Types of Cross-checks
12. Selected Radial
13. Inverted-V
14. Rectangular
15. Common Cross-check Errors
16. Fixation
17. Omission

Basic Flight Maneuvers (0.5 oral)

1. Rules of Thumb
2. Attitude Indicator
3. Altimeter
4. Vertical Speed Indicator
5. Heading Indicator
6. Trim Technique
7. Climbs
8. Leveling Off

9. Descents
10. Turns
11. Airspeed Changes
12. Steep Turns
13. Recovery From Unusual Attitudes
14. Instrument Takeoff

Navigation Systems and Equipment (1.5 oral)

1. Non-directional Radio Beacon
2. Tracking vs. Homing
3. Very High Frequency Omnidirectional Range
4. Tracking
5. Bracketing
6. Course Interception
7. VOR Accuracy Checks
8. Global Positioning System to include detailed information on the KLN-94 from the C-172S manual.

Pilots should practice GPS approaches under visual meteorological conditions until thoroughly proficient with all aspects of their equipment prior to attempting flight by IFR in instrument meteorological conditions. Some of the areas which the pilot should practice are:

- Utilizing the RAIM prediction function.
- Inserting a DP into the flight plan, including setting terminal CDI sensitivity, if required, and the conditions under which terminal RAIM is available for departure.
- Programming the destination airport.
- Programming and flying overlay approaches (especially procedure turns and arcs). (May not be applicable; overly approaches are no longer common, since most GPS approaches "stand alone".)
- Changing to another approach after selecting an approach.
- Programming and flying missed approaches.
- Entering, flying, and exiting holding patterns, particularly on overlay approaches with a second waypoint in the holding pattern. (May not be applicable.)
- Programming and flying a route from a holding pattern.
- Programming and flying an approach with radar vectors to the intermediate segment.
- Indications and actions required for RAIM failure both before and after the FAWP.
- Programming a radial and distance from a VOR (often used in departure instructions).
- Instrument Approach System
- CFIIs should be able to answer the questions addressed at the following website:

http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/navservices/gnss/faq/waas/#22

9. ILS
10. SDF
11. LDA
12. MLS
13. RNP
14. Distance measuring equipment (DME)
15. Marker beacon receiver/indicators
16. Automatic direction finder (ADF)
17. HSI and RMI

The National Airspace System (1.5 oral)

1. IFR Enroute Charts
2. Terminal Procedures Publications
3. Departure Procedures (Diverse, SIDs, and ODPs)
4. Standard Terminal Arrival Routes
5. Preferred Routes
6. Instrument Approach Procedure Charts

IFR Cross-country Flight Planning (1.0 oral)

1. Weather Services/Sources of weather—
    a. AWOS, ASOS, and ATIS reports.
    b. PATWAS AND TIBS.
    c. TWEB
    d. Weather reports and charts—
    e. METAR, TAF, FA, and radar reports.
    f. inflight weather advisories.
    g. surface analysis, weather depiction, and radar summary charts.
    h. significant weather prognostic charts.
    i. winds and temperatures aloft charts.
2. Regulatory requirements for instrument flight within various types of airspace
3. Computation of estimated time en route and total fuel
4. Selection and correct interpretation of the current and applicable en route charts, DPs, STARs, and standard instrument approach procedure charts
5. Procurement and interpretation of applicable NOTAMs.
6. Preparation and filing of an actual or simulated IFR flight plan, to include writing the route line correctly
7. Enroute procedures
8. Position reports, required calls, and cancelling IFR

When radar is not available, ATC depends on position reports from pilots to ensure separation between aircraft. At each compulsory reporting point, or at any point requested by ATC, provide the controller the following:

- Identification.
- Position.
- Time.
- Altitude (state actual altitude when VFR-on-top).
- ETA and name of next reporting point.
- The name of the succeeding reporting point.
- Pertinent remarks.

If ATC advises "radar contact," further position reports are no longer required. Resume normal position reporting only if the controller states "radar contact lost" or "radar service terminated."

The following reports must be made at all times however.

- Vacating an assigned altitude for a newly-assigned one.
- Any altitude change when operating on a VFR-on-top clearance.
- Unable to climb or descend at least 500 feet per minute.
- A missed approach.
- Change in true airspeed of five percent or ten knots, whichever is greater, from that filed in the flight plan.
- Time and altitude reaching a holding fix or clearance limit.
- Leaving an assigned holding fix.
- Any loss of navigation or communication capability.
- Any hazardous weather encountered during flight.
- Any information relating to the safety of flight.

When not in radar contact, make these additional reports:

- Leaving the final approach fix inbound on an instrument approach.
- A corrected ETA if it becomes apparent a previous ETA is in error by more than three minutes.

Canceling the IFR Flight Plan

Your IFR flight plan is automatically canceled by the control tower upon landing at your destination. When landing at an airport not being served by an operating control tower, the pilot must close the flight plan. This can be done while airborne by radio directly with ATC if weather conditions permit you to continue under VFR. If you cannot maintain VFR cloud separation or do not have the required visibility for VFR you must wait until after landing and then contact the nearest FSS or ATC facility by radio or telephone as soon as possible. You may cancel your IFR flight plan anytime you are flying in VFR conditions (except in Class A airspace).

Holding Procedures (0.5 oral)

1. Holding Instructions

There are four basic parts to a holding clearance:

   a. the fix at which to hold,
   b. the course on which to hold,
   c. a direction that identifies the course and
   d. a time to expect further clearance.

2. Standard Entry Procedures
3. Correcting for Wind

Emergency Procedures (0.5 oral)

1. Unforecast Adverse Weather
2. Aircraft System Malfunctions
3. Communication Failure—AVEFAME comes after the pilot accomplishes the following:

If anytime during a flight in IMC you are unable to contact a controller:

- Go back to the last assigned frequency--if no contact,
- Go to the FSS frequency--if no contact,
- Go to 121.5 MHz--if no contact,
- Listen on the appropriate NAV frequency (your NAV radios may work even when your COM radios don't)--if no contact, continue to broadcast your intentions in the blind on 121.5 (you may still be able to transmit even though you cannot receive).

Make sure that the audio panel is set up correctly. Also, make sure you do not have a stuck microphone. A stuck mic will mute the receive function of the transmitters. If you are using the speaker, plug in a headset. It operates on a different circuit than the speaker and may solve the problem. If you are using a headset, try the speaker function. Once you have definitely established that you have a total communications failure, adjust your transponder to code 7600.

If VFR conditions are encountered en route, remain VFR, land as soon as practical, and notify ATC once on the ground. While in IFR conditions you must proceed on to your destination based on the AVEFAME priorities for route and altitude respectively.

Flight Syllabus for CFII (5.2 hours FTD, 1.4 hours flight)

1. Flight Training Device: 5.2 hours estimated
    a. Ride 1: Right seat familiarization, basic attitudes, steep turns, unusual attitudes, and partial panel work.
    b. Ride 2: Approach work and holding.
    c. Ride 3: Approach work and holding.
    d. Ride 4: Approach work and holding.
2. C-172S: 1.4 hours estimated
    a. Confirmation/endorsement ride: CFII candidate demonstrates the following from the right seat: Unusual attitudes, holding, ILS, non-precision approach, non-precision approach with partial panel, missed approach procedure, and circling approach.