



A DIVISION OF THE
AOPA FOUNDATION



VFR INTO IMC

A syllabus designed to help protect pilots against GA's most fatal type of weather-related accident: VFR into IMC. Recommended for use by flight instructors and schools.

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AVOIDING IMC

The best defense against flying under visual flight rules (VFR) into instrument meteorological conditions (IMC) is to avoid entering them in the first place. Keeping the big weather picture in mind before a trip, and then frequently checking weather observations during a flight can support a safe outcome. After all, weather is what you find, not necessarily what's being forecast. If conditions worsen after takeoff, diverting early or getting the airplane on the ground before nearing IMC is the safest choice.

USING THIS SYLLABUS

This syllabus is designed to help recognize the dangers of inadvertent VFR flight into IMC and to recommend safe exit practices. It is not intended for training toward an instrument rating, and should be used by flight schools and instructors as an integral part of existing lesson plans, syllabi, or curricula for both ground and flight. Some lessons may be divided up at the instructor's discretion to match each pilot's learning pace. Proficiency can be maintained by using this syllabus during flight reviews, checkouts, and flights with a qualified safety pilot.

Introduction



VFR pilots should regard clouds as plumes of violent, poisonous gas. This is because clouds (and all other visibility-limiting weather phenomena) are associated with one of general aviation's deadliest problems: operating by visual flight rules into instrument meteorological conditions, otherwise known as VFR into IMC. In fact, VFR flight into IMC is the most fatal type of weather-related accident, claiming as many lives as thunderstorm and icing encounters combined. Despite the inherent lethality of such a dangerous activity, pilots continue to roll the dice and lose. Most surprising of all is that one-third of all pilots caught in VFR into IMC accidents actually hold instrument ratings.

The Air Safety Institute (ASI) designed this syllabus to help instructors and flight schools teach pilots how to recognize the dangers of inadvertent VFR flight into IMC. Pilots will learn how to spot IMC during the planning phase of each flight and while airborne. They will also learn how to safely escape IMC should visual references be lost.

We recommend this syllabus be followed under the direction and supervision of a qualified flight instructor who's experienced in teaching instrument flying skills. For your reference, a suggested checklist for escaping IMC is available at the end of this syllabus.

Bruce Landsberg
Bruce Landsberg
President, AOPA Foundation

Ground Lesson 1

LESSON OBJECTIVES

- Learn what IMC is, how it develops, how to recognize it, and how to avoid it

- Review the spatial disorientation risks that can occur even in visual meteorological conditions (VMC) (e.g., moonless nights over water, haze, flying on top of an overcast layer)

- Reduce the risks by learning to identify conditions that cause low ceilings and visibility by completing the Air Safety Institute's ***Weather Wise: Ceiling and Visibility*** online course (www.airsafetyinstitute.org/courses)

- Gain a better understanding of the hazards associated with VFR into IMC and the consequences of making poor decisions by viewing ***Accident Case Study: VFR into IMC and Accident Case Study: In Too Deep*** (www.airsafetyinstitute.org/acs)

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Ground Lesson 1—Continued

DISCUSSION

- Weather patterns and trends that develop into IMC
- What constitutes marginal VFR (MVFR) conditions
- How moisture affects ceiling and visibility (including significance of temperature/dewpoint and development of fog)
- Weather products that indicate deteriorating weather, IMC, and associated risks
- Diverting to an alternate due to adverse weather (including communications with air traffic control and use of GPS)
- Weather information and services provided by Flight Service
- Weather information and advisories provided by ATC
- How Flight Service and ATC can help you find VMC
- How to get an updated in-flight weather briefing
- Psychological pressures that lure pilots to press on into IMC
- Use of autopilot if IMC is encountered

COMPLETION STANDARDS

Completion of all lesson objectives, the ability to explain all discussion points including psychological pressures that influence decision making, and what appropriate actions pilots should take to avoid IMC encounters.

Date completed: _____

Instructor's signature: _____

Flight/Simulator Lesson 1

Basic instrument flying, maneuvers, and emergency situations.

LESSON OBJECTIVES

- Perform full-panel, instrument-flying basics using an appropriate flight simulator or in flight under simulated or actual IMC, including instrument scan
- Perform slow flight and unusual attitude recovery (optional: full-panel stall recovery)
- Practice 180-degree turns in simulated or actual conditions with and without the autopilot

MAXIMIZING THE LEARNING EXPERIENCE

Flying in actual IMC can be one of the best learning environments for new and experienced instrument and VFR-only pilots, whereas flight simulators and flight training devices (FTDs) offer the benefit of added safety, lower costs, and the ability to stop at any point for further instruction and critique. More often than not, a combination of flight simulation and actual flight can maximize the learning experience.

If using this lesson in flight, coordinate with ATC beforehand to find out whether they can assist with practice VFR into IMC encounters, simulated emergencies, weather diversions (radar vectors), and instrument approach procedures to an airport when the pilot doesn't have approach charts.

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Flight/Simulator Lesson 1—Continued

IN FLIGHT

- Straight and level
- Constant airspeed climbs and descents
- Maneuvering during slow flight (optional: stalls)
- Unusual attitude recovery during a turn
- Standard-rate turns
- 180-degree turn out of simulated or actual IMC with emphasis on lateral control (i.e., maintaining altitude)

COMPLETION STANDARDS

Completion of all lesson objectives and flight maneuvers, the ability to recognize the onset of unusual attitudes and perform safe recoveries, maintaining at least private pilot test standards where appropriate.

Date completed: _____

Instructor's signature: _____

Ground Lesson 2

Decision making, instrument flying, using the autopilot, and IMC exit strategies.

LESSON OBJECTIVES

- ☐ Complete the Air Safety Institute's ***Do the Right Thing: Decision Making for Pilots*** online course (www.airsafetyinstitute.org/dtrt)
- ☐ Learn how aeronautical decision making and personal minimums can be used to avoid and safely escape an inadvertent encounter into IMC
- ☐ View the Air Safety Institute's Ask ATC videos, specifically ***Weather Deviating, Precipitation Intensity, Flight Following, When to Ask for Flight Following,*** and ***VFR on Top*** (www.airsafetyinstitute.org/askatc)
- ☐ Understand the risks associated with your next flight by using the ***ASI Flight Risk Evaluator*** during your preflight planning and discussing results with instructor (www.airsafetyinstitute.org/flightrisk)
- ☐ Proficient use of GPS (or PFD/MFD) to help find nearest airport or VMC
- ☐ Knowledge of aircraft information manual/POH supplement for instructions on how to use the autopilot. Sample steps:
 - Turn autopilot ON
 - Set HDG bug to current heading
 - Select HDG mode
 - Select ALT mode or maintain altitude
 - Rotate heading bug to turn aircraft toward nearest VMC

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Ground Lesson 2—Continued

IN FLIGHT

- How to develop personal minimums
- Developing a “Plan B” on the ground or in flight
- The Air Safety Institute’s “golden hour” (at least one hour of fuel reserves upon landing)
- Declaring an emergency to ATC
- Performing a 180-degree turn out of IMC
- Use of autopilot after encountering IMC
- ATC radar services and limitations
- GPS (or PFD/MFD) basics to help navigate to nearest airport or VMC
- Instrument approach basics (e.g., inbound course, frequencies, minimum altitudes)
- The importance of listening on frequency
- Minimum safe altitudes and a terrain avoidance plan (www.aopa.org/asf/publications/tap.pdf)
- Landing off-airport if there’s no other alternative
- Taking a tour of the nearest ATC facility

COMPLETION STANDARDS

Completion of all lesson objectives, the ability to explain all discussion points, development of personal minimums, knowing how to safely escape IMC (including use of the autopilot and GPS, if equipped), and understanding ATC radar services and limitations.

Date completed: _____

Instructor’s signature: _____

Flight Lesson 2

Flight into simulated or actual IMC and use of ATC services.

LESSON OBJECTIVES

- Review 180-degree turns in simulated or actual conditions with and without the autopilot
- Declaring an emergency to ATC and soliciting their aid in escaping IMC, diverting to nearest visual conditions, and landing safely at an airport (or, if necessary, making a safe landing off-airport)
- Use of GPS, PFD, or MFD to find nearest airport or VMC

USING SCENARIOS

Instructors may want to use the following common VFR into IMC scenarios during this lesson:

- Marginal VFR encounter as visibility and ground reference slowly deteriorate
- Partly cloudy skies slowly turn into lowered ceilings with overcast conditions as terrain below rises
- Heavy precipitation reduces visibility to zero
- A routine VFR night flight is met with unexpected cloud conditions invisible to the naked eye
- Flight over large unlit areas such as lakes, oceans, forests, or unpopulated areas

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Flight Lesson 2—Continued

IN FLIGHT

- Review 180-degree turn out of simulated or actual IMC
- Declare an emergency to ATC (simulated with instructor acting as ATC)
- Receive radar vectors to nearest VFR conditions and/or airport (simulated or actual)
- Use of GPS, PFD, or MFD to find nearest airport or VMC
- Divert to an alternate airport
- Intercept and tracking courses
- Optional: Receive ATC vectors to fly an instrument approach without IFR charts (simulated or actual)

COMPLETION STANDARDS

Completion of all lesson objectives and flight maneuvers while demonstrating proficiency in safely performing 180-degree turns with and without the autopilot, clear communications with ATC (actual or simulated) when declaring an emergency, compliance with ATC radar vectors, and landing safely at an airport.

Date completed: _____

Instructor's signature: _____

IMC Escape Procedures

CONTROL THE AIRCRAFT Maintain trim, power setting, and airplane configuration. The airplane should be trimmed to level flight. There's no reason to upset that trim while you extricate yourself from IMC.

AUTOPILOT ENGAGED If one is available. Use the Altitude Hold and Heading Hold modes.

STANDARD RATE, 180-DEGREE TURN To point in the direction from where you came (assuming that conditions are better behind you). Maintain a shallow bank angle (no more than 15°) making it less likely you will lose control in the turn.

TALK Notify ATC immediately and declare an emergency. State that you have entered IMC. If you haven't already made a 180-degree turn, consider asking for vectors to the nearest visual meteorological conditions (VMC). Although ATC can only see precipitation on their scopes, they can quickly scan weather conditions for nearby airports.

RELAX Don't succumb to spatial disorientation or hyperventilation. Keep cool and scan your instruments. Make minor adjustments and ensure you are not departing controlled flight.

EXIT Maintain aircraft control solely by instruments until visual references are regained. After you leave IMC, ensure you do not reenter it. If the weather conditions continue to deteriorate, consider an off-airport landing. If you are able to maintain VFR, terminate the flight as soon as possible at the nearest airport to take a "breather"—chances are you are no longer in a state of mind that permits the flight to safely continue, even if the weather conditions are improving.

OBSERVE the situation; are conditions getting better or worse? Is there VMC closer by? What else do you need from ATC? How much fuel do you have left? Will you have enough fuel to escape VMC or will you need to make an off-airport landing?