Learning to Fly

1. Pre-flight Aircraft with Instructor
2. Learn to recognize and control aircraft attitude
3. Learn to take off and land

Now you know how to fly a working airplane or helicopter. Typically takes 5-10 hours (people used to solo at 4-8 hours!).

Not adequate for an FAA certificate because what if you’re the only pilot on board and the aircraft breaks? Or you get lost? Add another 40 hours.
A good trainer airplane

- Not too light (unstable)
- Not too heavy (inertia necessitates thinking ahead)
- Not too fast
- Not too much power (transition from 0 to 310 HP can be tough to manage)
- Reluctant to spin
- Tends to recover from stalls/spins if pilot lets go

Ideal examples: Diamond DA-40, Cessna 172, Piper Warrior. Okay example: Cirrus SR20. Marginal operating cost $100-150 per hour.

Glider: a better trainer airplane?

- Join a club
- Pay $50 per tow and $0-50/hour
- Stay up all day (ridge lift out West) or for 15 minutes (Sterling, Massachusetts)
- Solo at age 14
- Captain Sully-style hero on every landing!
A good trainer helicopter

• Not too light (unstable)
• Reasonable rotor inertia for autorotations
• Rugged skids
• Reasonable operating cost

The only practical option: Robinson R-44.
Marginal operating cost $225-250 per hour.

Getting an FAA Pilot Certificate

• Pre Solo
• Solo
• Cross Country
• Checkride Preparation
• Private Pilot Certificate

Minimum 40 hours flight time
Private Pilot Certificate

- Carry friends, family, and colleagues in US-registered plane to any country on Earth
- Fly in reasonably clear weather
- Fly at night
- Fly to any public-use airport
- Fly for fun (without being paid)
- Fly what you learned in, e.g., a single-engine propeller-driven airplane, a helicopter, or a hot-air balloon

Congress, the FAA, and the Web

- Congress passes laws to create and fund the FAA
- The FAA creates regulations that determine what is necessary to earn a certificate. Published in the Code of Federal Regulations, Title 14 (the “FARs”) and then divided into parts (FAR 61 for pilots).
- Someone brags about pilot skills at a party? Look ‘em up in the online “airmen registry.” Shows you a picture of the family Gulfstream? Type the tail number into Google!
Categories and Classes

- With respect to certification of AIRMEN
  - Category
    - Airplane
    - Rotorcraft
    - Glider
    - Lighter then Air
  - Class (of airplane category)
    - Single engine land
    - Single engine sea
    - Multi engine land
    - Multi engine sea

Certificate Types

Category & Class

<table>
<thead>
<tr>
<th>Category</th>
<th>Class</th>
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<tbody>
<tr>
<td>Airplane</td>
<td>Single-Engine Land</td>
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<tr>
<td>Glider</td>
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</tr>
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<td>Single-Engine Sea</td>
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<tr>
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<td>Weight Shift Control</td>
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<td>Balloon</td>
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Private Pilot Ground School
FAA Pilot and Instructor Certification

Pilot Certificates (in order of increasing privilege)

- Sport Pilot
- Recreational Pilot
- **Private Pilot (focus of this course)**
- Commercial Pilot
- Airline Transport Pilot (ATP)

To the core certificate are added ratings, e.g.,

- Airplane Single Engine Land (fly a Cessna)
- Airplane Single Engine Sea (fly the Icon A5)
- Rotorcraft-Helicopter
- Glider
- Lighter than air
- Type ratings for heavy or turbojet-powered aircraft

Flight Instructor is a separate certificate with its own ratings:

- Single engine airplane ("CFI")
- Instrument airplane ("CFII")
- Multi Engine Airplane ("MEI")
- Rotorcraft-Helicopter ("CFI-H")
- Instrument Helicopter

Also: A “Remote Pilot” certificate with “Small Unmanned Aircraft System” Rating.

Note: There is nothing special about the "single engine land" rating, though this is where most people start.

Categories and Classes

- **With respect to certification of AIRCRAFT**

  - **Category**
    - Normal (+3.8/-1.52g)
    - Utility (+4.4/-1.76g)
    - Acrobatic (+6/-3g)
    - Commuter and Transport
  
  - **Class**
    - Airplane
    - Rotorcraft
    - Glider
    - Balloon
    - Powered Lift
The Mother of All Bureaucracies

Department of Transportation Act of 1966

Federal Aviation Act of 1956

Established 1967

Structure of regulations

Code of Federal Regulations

http://www.ecfr.gov

Title 14 – Aeronautics and Space

Most relevant parts:
- Part 1 – Definitions and Abbreviations
- Part 39 – Airworthiness Directives
- Part 43 – Maintenance
- Part 61 – Pilot Certification
- Part 67 – Medical Certification
- Part 91 – General Operating Rules

Title 49 – Transportation

Part 830 – Notification and Reporting of Accidents

e.g. 14 CFR 61.56
Fun knowledge: Extra FARs

- Air Carrier: FAR 119
- Charter: FAR 119+135
- Airline: FAR 119+121
- Certify a four-seater or small bizjet: FAR 23
- Certify a big bizjet or airliner: FAR 25
- Certify a small helicopter: FAR 27
- Certify a monster helicopter: FAR 29
- Sling load from helicopter: FAR 133
- Cropdust: FAR 137
- Your own airport: FAR 139
- Certify a flight school: FAR 141
- Certify a sim center: FAR 142
- Certify a repair station: FAR 145

14 CFR Part 61

- Title: “Certification: Pilots, Flight Instructors, and Ground Instructors”
- Meaning:
  - How to get a certificate
  - How to maintain a certificate
- This will be on the test!
- Sensible minimum standards, e.g., flight review every two years.
Certificate Types
Ratings and Add’l Training

• Instrument rating (14 CFR 61.65)
• Type ratings and add’l training (14 CFR 61.31)
  – Receive and log specific training
  – Aircraft-specific type ratings
    • Jets, MTOW > 12,500 lbs., or “other designated a/c”
  – High-performance airplanes
    • Engine with greater than 200 HP
  – Complex airplanes
    • Flaps, retractable gear, & adjustable pitch propeller
    – etc.

61.3 - Documents

• Fly with the following:
  – Pilot certificate
  – Medical certificate (except BasicMed)
  – Photo ID (driver’s license, passport, etc.)

• Documents can be inspected (not confiscated!) by:
  – The Administrator (the FAA)
  – NTSB
  – Federal, State, or local law enforcement
  – TSA
61.15 & 61.16
Drugs & Alcohol

- **Drugs (and alcohol) are bad**
  - Grounds for denial up to 1 year, revocation, or suspension
  - This includes **motor vehicle violations**
    - Must be reported to FAA
  - Also includes refusing alcohol test
  - Same standards for 20-year-old and 60-year-old
  - Marijuana: questions on BasicMed and standard Medical forms

61.19 - Cert. Duration

- Remote Pilot: two years
- Flight Instructor: two years
- Everything else: *never* expire
61.23 - Medical Cert.

- Medical Certificates
  - Third class - for most private operations (Valid for 60 calendar months if under 40 on exam date; 24 months if over 40)
  - Second and First class for commercial and airline pilots
  - Sport pilot and Glider: not required
  - BasicMed: start with Third Class and then go to doc every 48 months (61.113(i) limits operations)

61.35 & 61.37

- Need endorsement from instructor to take tests (61.35)
- Do not cheat on tests! (61.37)
  - Barred from taking any test for 1 year
61.43, 61.45, & 61.49
Testing

• Applicant provides working aircraft
• Three possible outcomes:
  – Pass
  – Discontinue (weather, mechanical)
  – Fail
• Retake failed test after additional instruction (areas at examiner discretion)

61.51 - Logbook

• Must log flight time to show
  – test requirements
  – currency requirements
• Usually log all time
  – lower insurance premiums
  – establish business use for taxes
  – the memories!
61.53 - Medical Deficiency

• Don’t fly if you’re sick or wouldn’t meet medical certificate requirements

61.56 - Flight Review

• FAA: Every 24 calendar months...
  – 1 hour ground and 1 hour flight lesson with instructor (at a minimum)

  or

  – Pass a test for a pilot certificate

• Insurance for complex aircraft: Training every 12 months.
61.57 - Recent Experience

- To carry passengers:
  - 3 Take-offs and landings in past 90 days
    • As “sole manipulator” of the controls
    • If tailwheel airplane, to a full stop
- To carry passengers at night:
  - Must meet requirement at night (1 hour after sunset to 1 hour before sunrise)
  - Landings to a full stop
- In category, class, and type (if applicable)

61.60 - Change of Address

- Notify FAA in writing within 30 days
- After that, pilot privileges suspended until you find a stamp.
Part 61 Subpart C – Student Pilots

61.87 - Solo Requirements

- Pass a written test (given by CFI)
  - Rules, airport, and aircraft characteristics
- Receive training on certain maneuvers
- CFI will sign-off for solo flight
  - Required every 90 days
  - Night flight is a separate sign-off
61.89 – Solo Limitations

- No passengers
- For training only
- Must have visual contact with surface
  - Can’t go above broken or overcast layer
- CFI can add additional limitations

61.93 - Solo Cross-Country

- Demonstrate proficiency on navigation and additional maneuvers
  - CFI sign-off
- Generally require sign-off for each flight
  - CFI checks flight plan and weather
  - Good weather only
61.95 – Solo next to A320s

- Require training and sign-off for flight in Class B airspace (e.g., Logan’s airspace)
- Require training and sign-off for flight to Class B airport (e.g., Salt Lake City)
- No student operations at some Class B airports, e.g., Logan. See FAR 91 Appendix D

Part 61 Subpart E – Private Pilots
61.103 - Eligibility

- 17 years old (except gliders & balloons: 16)
- Read, speak, write, and understand English
- Take the knowledge test
- CFI sign-off to take the practical test
- Meet experience requirements
61.107 - Flight Proficiency

- Read regulation to see what maneuvers you need to do, e.g., for ASEL:
  - (viii) Slow flight and stalls;
  - (ix) Basic instrument maneuvers;
- More detail available in Airman Certification Standards (formerly “Practical Test Standards” or “PTS”)

61.109 - Aeronautical Experience

- 40 Hours minimum
  - 20 hours of training from CFI
  - 10 hours of solo practice

(55 hours typical for young/serious students)
61.109 - Aeronautical Experience:
Training Requirements

• 20 Hours of Training from CFI
  – 3 hours cross-country training
  – 3 hours night flight
    • 100 NM cross-country flight
    • 10 takeoffs and landings to a full stop
  – 3 hours instrument training
  – 3 hours test prep within 2 calendar months of test

61.109 - Aeronautical Experience:
Solo Flight Requirements

• 10 Hours of Solo Flight
  – 5 hours cross-country
  – 1 cross-country flight of 150 NM with one leg of 50 NM
  – 3 takeoffs and landings to a full stop at an airport with an operating control tower
61.113 - Privileges and Limitations

“Private” flying only

– No operations for compensation or hire
  • Except if incidental to, and in furtherance of, a business

– Must pay pro-rata share of flight costs
  • Fuel, oil, airport expenditures, rental fee

– Can tow a glider!

– Can fly for charity (see also 91.146)

Regulation versus Insurance

• What would it look like to replace the entire system with one line: “It is illegal to fly without insurance”? 
What did you learn?

• FAR 61 Badge system, like Boy/Girl Scouts (FAR 91 is about day-to-day flying)
• Everything except drones hangs off Pilot and CFI certificates
• Minimums: 20 hours dual; 10 hours solo; 10 hours either
• Stay FAA-current by flying every quarter and with an instructor every two years

Questions?
MIT OpenCourseWare
https://ocw.mit.edu/

16.687 Private Pilot Ground School
IAP 2019

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