Canvas Course

Visit BadgerAviators.org and navigate to the ground school page to find a link to enroll in the online course from ERAU.
Introduction Video from ERAU

https://learn.canvas.net/courses/716/pages/1-dot-2-lesson?module_item_id=131849
Control Surfaces

1. Ailerons
2. Elevator
3. Rudder
4. Flaps
Control Surfaces
Aircraft Controls

1. Yoke
2. Control Stick
3. Rudder Pedals
4. Flap Lever or Switch
Control Surfaces

Disclaimer: Don’t try this at home
The Engine

1. Come in many varieties
   a. Radial
   b. In-Line
   c. Horizontally Opposed
   d. 4-stroke or 2-stroke
   e. Air or Liquid Cooled
Cylinders

1. Location of engine combustion
2. Consist of:
   a. 2 valves
   b. 2 spark plugs/magnetos
   c. Piston
   d. Crankshaft
The Engine: Four-stroke cycle

1. Intake
2. Compression
3. Ignition/Power
4. Exhaust
Ignition System

1. Spark plugs are key in the functioning of engine cycles
2. Magnetos provide the electricity to the spark plugs
3. Why are there two spark plugs and two magnetos per cylinder?
The Mixture

1. Controls the **fuel-air mixture ratio**
2. As we climb, air is less dense and requires less fuel
3. So we lean with altitude and enrich in a descent
The Engine: Detonation

1. Characterized by the rough running of the engine
2. Caused by:
   a. Running the engine with a lean mixture
   b. Using a lower grade fuel
   c. Insufficient cooling
The Engine: Detonation

Why does it make sense that detonation is most likely to occur during a descent?

What should be done in the event of detonation?
The Engine: Pre-Ignition

1. Occurs when a cylinder prematurely enters the ignition/power stroke
2. Caused by a hot spot in the cylinder
Engine Cooling

1. Most engines are air cooled
2. Generally works well
3. When doesn’t air cooling work?
Fixed Pitch Propeller

1. Not a constant-speed propeller
2. As throttle is increased RPM increases and thrust is increased
Fixed Pitch Propeller

Why do you think the pitch of the blade decreases towards the tip?
Fixed Pitch Propeller

1. As distance from the center increases, the speed at that point does as well
2. The twist of the propeller creates constant thrust across all parts of the propeller
3. Why is this important to the design of the propeller?
Constant Speed Propeller

1. Maintains constant RPM set by the pilot
2. Blade pitch changes to maintain that given RPM
3. Gives the ability to choose between performance and efficiency
Carburetors

1. Common among most pre-2000 aircraft
2. Fuel moves from high to low pressure into the combustion chambers
Carburetor Icing

1. Air cools rapidly while moving from high to low pressure
2. In presence of condensation this can form ice
3. Carburetor Heat (Carb Heat) is used to melt away the ice
Fuel Injection

1. Allows for more efficient fuel consumption
2. Is not susceptible to icing
3. Startup procedures are more difficult
Starters

1. Airplanes used to be hand propped
2. Electronic starters increase ease and safety
3. The starter engages onto gears on the crankshaft
Fuel Systems: Gravity-fed

1. Commonly found in high wing aircraft
2. Gravity pulls fuel into engine
3. Fuel selector valve allows you to choose which fuel tank to use
Fuel Systems: Fuel-pump

1. Commonly found in low wing aircraft
2. Requires fuel pumps to draw fuel from the tanks to the engine
Fuel Selector

1. Allows pilot to choose which tank to draw fuel from
2. Often operated on Both
Aviation Fuel

1. Different grades of fuel
2. **Always** follow engine’s specifications
Preflight

1. Before every flight we want to check that the aircraft is airworthy
2. 91.3(a) The pilot in command of an aircraft is directly responsible for, and is the final authority as to, the operation of that aircraft.
3. Why is a preflight important?
1. Airworthiness Certificate
2. Registration
3. Radio Operator’s Permit (For international travel)
5. Weight & Balance
1. Follow a specified pattern around the entire airplane
2. **Use a checklist for your specific airplane**
3. Always be looking for dents, holes, scratches, and anything unusual
Preflight: Important Items

1. Hangar rash
2. Birds nests
3. Brake fluid
4. Loose/missing rivets and bolts
5. Water in fuel tanks
Questions?
Next Time

1. Stick around if you want to complete the paperwork for your student pilot certificate
2. Tuesday, October 10th @ 6:00 p.m.
3. Topic: Aerodynamics