Course Syllabus
Private Pilot Ground School
A Curricular Outline for Students in Grades 10-12

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I. COURSE DESCRIPTION:
This detailed comprehensive 84 hour course will thoroughly prepare the student to satisfy the mandatory requirement of passing the Federal Aviation Administration (FAA) written examination and oral exam.

The FAA written and oral exams are two (2) of three (3) mandatory requirements necessary to obtain the private pilots certificate. This Beginning Ground Course and Private Pilot Certificate are mandatory for a career in aviation.

The specific requirements for obtaining a Private Pilots License are:

1. Pass the FAA Private Pilot written exam with a minimum passing score of 70% (This 84 hour course prepare the student for this requirement)

2. Pass an oral exam with a designated FAA examiner. (This course adequately Prepares the student to easily pass this requirement)

3. Pass a flight exam with a designated FAA examiner. (This requirement is completed with the student and his/her individual flight instructor in an aircraft)

II. OBJECTIVE
Successful completion will authorize and prepare the student to take the Federal Aviation Administration's (FAA) written examination with a mandatory minimum passing score of 70%.

Prepares individual applicant for a beginning career in aviation, and provides a comprehensive background for the pleasure private pilot.

III. LENGTH OF COURSE
Lecture 6 Hours per week for approximately 14 weeks

IV. PREREQUISITE
At least 16 years of age and have an interest in aviation, but not yet a licensed pilot.

COURSE OUTLINE

1. Orientation and Registration 3 hours (3 hr)
    a. Course Goals/Requirements
    b. Outline
    c. Registration
    d. Ordering Text Material

2. The Airplane and its Components 3 hours (6 hr)
    a. Varieties of Aircraft
        i. Lighter than air
        ii. Gliders
        iii. Rotorcraft
        iv. Airplane
            1. Category
            2. Class
            3. Type
    b. Airplane Components
        i. Wings
            1. Type
            2. Basic Construction (Aileron Flaps)
            3. Location and Purpose
        ii. Fuselage
            1. Type
            2. Purpose
            3. Location
        iii. Empennage
            1. Type
            2. Construction
            3. Location and Purpose
        iv. Trim Tabs
            1. Location
            2. Purpose
        v. Landing Gear
            1. Type
            2. Construction
            3. Location and Purpose
        vi. Breaks
            1. Type

2. Location
3. Purpose

c. Power plant
   i. Type
   ii. Location
   iii. Purpose
d. Propellers
   i. Type
   ii. Location
   iii. Purpose

3. <u>Aerodynamics 3 Hours (9hr)</u>
   a. Bernoulli's Principle
   b. Airfoils
   c. Four Forces of Flight
      i. Lift
      ii. Thrust
      iii. Weight
      iv. Drag
   d. Stalls and their causes
      i. Angle of Attack
      ii. Factors Affecting
      iii. Flaps
      iv. Angle of bank
   e. Center of Gravity
   f. Load Factors
   g. Frost/Ice/Snow
   h. Turbulence
   i. Misconceptions Regarding Stalls
      1. Design of Wing
      2. Platform
      3. Angle of incidence
      4. Center of lift location
      5. Wash-out or twist
      6. Stall strips
      7. Spanwise Airfoil Variation
   j. Stall Recovery
   k. Gravity
   l. Thrust

m. Drag
n. Ground Effect
o. Lift to Drag Ratio

4. <u>The Three Axes 3 Hours (12hr)</u>
    a. The Three Axes
        i. Roll Longitudinal
        ii. Pitch Lateral
        iii. Yaw Vertical
    b. Aircraft Stability
    c. Longitudinal Stability
    d. Lateral Stability
    e. Directional Stability
    f. Turning Effects
        i. Torque
        ii. Precession
        iii. Asymmetrical Thrust
        iv. Spiraling Slipstream
        v. How Aircraft turn

5. <u>Basic Aircraft Performance 3 Hours (15)</u>
    a. Effects of Temperature and Altitude
    b. Density Altitude and AC performance
    c. Density Altitude Computation
    d. Take-off Performance and Effects
        i. Density Altitude
        ii. Pressure
        iii. Temperature
        iv. Wind
        v. Aircraft Weight
        vi. Runway Gradient
        vii. Turbulence
        viii. Humidity

6. <u>Performance Charts 3 Hours (18hr)</u>
    a. Take-off Performance
        i. Tables
        ii. Graphs
        iii. Interpolation

iv. Cross Wind Component Chart

b. Climb Performance
    i. Best Rate
    ii. Angle
    iii. Normal
    iv. Performance Chart (Graph-Tables)
    v. Interpolation
    vi. Misconceptions Regarding Wind/Climb performance
c. Cruise Performance
    i. Tables
    ii. Graphs
    iii. Interpolation
d. Landing Performance
    i. Approach Speed
    ii. Weight and Configurations
    iii. Tables
    iv. Graphs
    v. Interpolations
    vi. Wind Components Chart
e. Wake Turbulence
    i. Types
        1. Jet Blast
        2. Terrain Features
        3. Heavy Aircraft Ops
    ii. Avoidance of Wake Turbulence

7. <u>Aircraft Flight Instruments 3 Hours (21 Hrs)</u>
    a. Magnetic Compass
        i. Principle of Operation
        ii. Construction
        iii. Deviation
        iv. Magnetic Dip
        v. Turning Effects
            1. Northerly
            2. Southerly
            3. Easterly
            4. Westerly
        vi. Acceleration/Deceleration Errors
        vii. Turns to heading

b. Outside Air Temperature Gauge
c. Pitot Static System
    i. Construction
    ii. Purpose
    iii. Instruments Requires
        1. Airspeed
        2. Altimeter
        3. VSI

8. <u>Aircraft Flight Instruments 3 Hours (24 Hrs)</u>
    a. Airspeed Indicator
        i. Source of Power
        ii. Basic operation
        iii. Definitions
            1. Indicated
            2. Calibrated
            3. True
        iv. Color Coding
        v. Maneuvering Speed
        vi. Errors
    b. Altimeter
        i. Construction
        ii. Setting Altimeter
        iii. Types
            1. Pressure
            2. Indicated
            3. True
            4. Absolute
        iv. Reading Indications
        v. Power Source and Operation
    c. Vertical Speed Indicator
        i. Construction
        ii. Operation
        iii. Reading Indications
    d. Gyro Instruments
        i. Principle of Operation
        ii. Turn and Sleep Indicator
            1. Types
            2. Indications

3. Principle of Operations

iii. Turn Coordinator

1. Indications
2. Principles of Operation

e. Attitude Indicator

i. Construction
ii. Principle of Operations
iii. Errors

f. Heading Indicator

i. Construction
ii. Principle Operation

g. Gyro Principles

i. Precession
ii. Power sources
iii. Vacuum Operation
iv. Venturi
v. Electrical
vi. Rotors
vii. Using all Instruments at Once

9. <u>Reciprocation Engine and Related Systems 3 Hours (27 Hrs)</u>

a. Basic Reciprocating Engine

i. Construction
ii. Operation
iii. Cooling
iv. Detonation
v. Pre-Ignition
vi. Ignition Systems
vii. Magnitoes
viii. Throttle
ix. Engine Gauges

1. Oil Temp
2. Cylinder Head
3. Pressure
4. Fuel Pressure

x. Tachometer
xi. Manifold Pressure

b. Aircraft Propellers

i. Fixed Pitched

1. Climb
2. Pitch
3. Combination

ii. Constant Speed

1. Climb
2. Pitch
3. Combination
4. Prop Control
5. Manifold Pressure vs. RPM

10. Reciprocating Engines and Systems 3 Hours (30 Hrs)

a. Fuel System
   i. Type of System
   ii. Type of Fuel
   iii. System Operation
   iv. Straining
   v. Tank Selection
   vi. Pressure Systems (Injected)
   vii. Primer
   viii. Mixture Control
b. Carburetor
   i. Operation
   ii. Heat
   iii. Ice
c. Electrical System
   i. General Aircraft Diagram
   ii. Alternators
   iii. Generators
   iv. Ammeter
   v. Master Switch
   vi. Fuses
   vii. Batteries
d. Pre-Flight of AC

11. Airports 3 Hours(33 Hrs)

a. Runways
   i. Number
   ii. Markings
      1. VFR

2. IFR
3. Grass

iii. Active
iv. Closed

b. Threshold
i. Displaces
ii. Normal

c. Stabilized or Descriptive Areas
d. Over-Run – Stopway Area
e. Taxiway
f. Parking Ramps
g. Wind Indicators
i. Sock
ii. Tetrahedron
iii. Wind Tee

h. Segmented Circle
i. Lighting
i. Threshold
ii. Runway
iii. Taxiway
iv. Centerline
v. Approach
vi. VASI
vii. Beacons

j. Airport Traffic
i. Take-off/upwind
ii. Crosswind
iii. Downwind
iv. Base
v. Final

k. Traffic Pattern Entry and Exit
i. Segmented Circle

12. <u>Radio Communications and Air Traffic Control 3 Hours (36 Hrs)</u>
a. Equipment
i. Basic Radio
1. VHF
2. UHF
3. COMM

4. NAV
5. Tuning
6. Using Microphone
7. Phonetic
8. Phraseology
    a. Numbers
    b. Letter

b. Unicom
c. Ground
d. Clearance
e. Tower
f. Enroute
g. ATIS
h. Light Gun Signals
i. FSS
j. Emergency Procedures
    i. DF
    ii. 121.5
    iii. No Radio

13. Weight and Balance 3 Hours (39 Hrs)
    a. Importance
        i. Safety
        ii. Regulations
    b. Load Factors
    c. Position of Weight and Effects
    d. Aircraft Balance
    e. Center of Lift
    f. Center of Gravity
        i. Forward
        ii. Aft
        iii. Out of limits (extreme forward or aft)

14. Weather Theory 3 Hours (42 Hrs)
    a. Basic Atmosphere
    b. Temperature
    c. Wind
    d. Coriolis Effect
    e. Air Mass

f. Air Mass Source Region
g. Air Mass Modification

15. Pressure and Wind 3 Hours (45 Hrs)
    a. Station Pressure
    b. Types of Pressure Systems
        i. Isobars
        ii. Low
        iii. High
        iv. Trough
        v. Ridge
        vi. Col.
    c. Pressure Gradient Force
    d. Friction Effect
    e. Local Wind Systems
    f. Land and Sea Breeze
    g. Effects of Weather Elements
        i. Fog
            1. Causes and Conditions
            2. Types
                a. Advection
                b. Radiation
                c. Stream
                d. Upslope
    h. Haze
    i. Smoke
    j. Visibility Restriction Due to Wind
    k. Sky Conditions
    l. Front
        i. Definitions
        ii. How Formed
        iii. Types
            1. Cold
            2. Warm
            3. Occluded
            4. Stationary
        iv. Weather associated with each
    m. Thunderstorms
        i. Causes

ii. Effects
iii. Stages

n. Mountain Weather
    i. Mountain Waves
    ii. Low level wind shear
    iii. Icing
        1. Structure
            a. Rime
            b. Clear

16. Weather Reports and Forecasts 3 Hours (48 Hours)
    a. Weather Service Outline and Structure
    b. Sequence Reports (SA)
    c. Terminal Forecast (FT)
    d. Area Forecast (FA)
    e. Wind and Temperature Aloft (FD)
    f. Inflight Advisories
        i. Airmet
        ii. Sigmets
        iii. PIREPS
        iv. Convective Sigmets
        v. Severe Weather Watch
            1. Hurricane
            2. Thunderstorms
            3. Squall Lines
            4.

17. Weather Chart and Briefing 3 Hours (51Hrs)]
    a. Surface Analysis
    b. Weather Depiction
    c. Radar Summary
    d. Prog Chart 12-24, 36-48
    e. How to obtain a good weather briefing

18. Federal Aviation Regulations 3 Hours (54 hrs)
    a. Part 1 Glossary
    b. Part 61: Requirements for Pilot Certification Process

19. Federal Aviation Regulations 3 Hours (57 Hours)
    a. Part 91: General Operating Rules

b. NTSB 830 Accident Reporting

20. Aeronautical Charts 3 Hours (60 Hrs)
    a. Latitude
    b. Longitude
    c. Chart Symbol and Terminology

21. Air Space Utilization 3 Hours (63 Hrs)
    a. Uncontrolled
    b. Controlled
        i. Positive Controlled Area
        ii. Continental Controlled Area
        iii. VOR Federal Airways
        iv. Transition Areas
        v. Control Zones
        vi. Airport Traffic Areas
        vii. Airport Advisory Area
        viii. Terminal Control Area
            1. Group 1
            2. Group 2
            3. Group 3
    c. Special Use Airspace
        i. Prohibited Area
        ii. Restricted Area
        iii. Warning Area
        iv. Military Operation Area
        v. Low Level Military Operations
            1. VFR
            2. IFR
        vi. Collision Avoidance

22. Navigation 3 Hours (66 Hrs)
    a. Dead Reckoning
        i. Plotting Course
        ii. Measuring Distance
    b. Visual OMNI Range (VOR)
        i. Advantage
            1. Accuracy
            2. Reliability

ii. Disadvantage
    1. Line of Sight
iii. Equipment Required
    1. Ground
        a. Transmitter
        b. Receiver
    2. Airborne
        a. Receiver
        b. Indicator
            i. OMNI Bearing Selector
            ii. Left/Right Meter
            iii. To/From Indicator
iv. Navigation Procedures
v. VOR Indicators
vi. Reverse Sensing
vii. Intercepting Radials
viii. Tracking Outbound
ix. Orientation
x. Test Signals

23. <u>Navigation 3 Hours (69 Hrs)</u>
    a. Area Navigation
    b. ADF
        i. Equipment Required
        ii. Relative Bearing
        iii. Tracking
        iv. Homing
    c. Radar Navigation
        i. Terminal
            1. Stage 1
            2. Stage 2
            3. Stage 3
        ii. Enroute
    d. Transponders
        i. Phraseology
        ii. Codes
            1. VFR
            2. Discrete
            3. Emergency

24. Airmen's Information Manual 3 Hours (72 Hrs)
    a. Nav Aids
    b. Airspace
    c. Air Traffic Control
    d. Safety of Flight
    e. Good Operation Practices
    f. Pilot Controller Glossary
    g. Airport Facility Directory
    h. NOTAMs

25. E6B Flight Computer
    a. Calculator Side
        i. True Airspeed
        ii. True Altitude
        iii. Time
        iv. Distance
        v. Fuel Consumption
        vi. Density Altitude

26. E6B Flight Computer
    a. Wind Side
        i. True Heading
        ii. Ground Speed
        iii. Wind Speed
        iv. Wind Direction
        v. Wind Correction Angle

27. Medical Facts For Pilots 3 Hours (81 Hrs)
    a. Hypoxia
    b. Carbon Dioxide
    c. Hyperventilation
    d. Vertigo
    e. Night Vision
    f. Drug and Alcohol
    g. Psychological Considerations
        i. Anxiety
        ii. Stress

28. Reviews 3 Hours (84 Hrs)
    a. Instructions FAA Test
    b. Scheduling FAA Test
    c. Question/Answer Section