Degree Applicable

Glendale Community College
October 2012

COURSE OUTLINE
Aviation and Transportation 135
Commercial Pilot Ground School

I. Catalog Statement

Aviation and Transportation 135 prepares students for the Federal Aviation Administration Commercial Pilot Knowledge Examination. Topics addressed include: advanced aerodynamics, advanced aircraft weight and balance computations, advanced meteorology, advanced aerospace physiology; operation of complex and high-performance aircraft including use of constant-speed propellers, retractable landing gear, anti-icing/de-icing, oxygen, and cabin pressurization systems; Federal Aviation Regulations Parts 61, 91, and 135; maximum performance takeoffs and landings, steep turns, chandelles, lazy eights, and eights on pylons.

Units – 3.0
Lecture Hours – 3.0

Prerequisites: AT-120 or equivalent

II. Course Entry Expectations

Skill Level Ranges: Reading 5; Writing 5; Listening 5; Speaking 5; Mathematics 3.

Prior to enrolling in the course, the student should be able to:
1. list and explain the four aerodynamic forces
2. decode Federal Aviation Administration (FAA) weather observations and forecasts
3. understand routine Weather Report (METAR) and Terminal Area Forecast (TAF)
4. plan multi-leg visual flight rule flights
5. solve basic aircraft weight and balance problems

III. Course Exit Standards

Upon successful completion of required coursework, the student will be able to:

1. explain complex aerodynamic concepts;
2. decode complex FAA weather observations and forecasts;
3. plan complex multi-leg visual flight rule flights;
4. solve complex aircraft weight and balance problems;
5. explain pertinent regulations contained within 14 Code of Federal Regulations (CFR), Parts 61, 91 and 135;
6. explain complex aerospace physiology concepts;
7. list and explain procedures for maximum performance takeoffs and landings in complex aircraft;

8. list and explain the prerequisites and minimum flight time requirements for the FAA Commercial Pilot Certificate;
9. list and explain procedures for steep turns in complex aircraft;
10. list and explain procedures for chandelles;
11. list and explain procedures for eight's on pylons.

IV. Course Outline

A. Complex and high performance aircraft systems 6 hours
   1. Fuel injection
   2. System nomenclature
   3. Starting procedures
   4. Cold start vs. hot start
   5. Leaning procedures
   6. Abnormal combustion
   7. Detonation
   8. Pre-ignition
   9. Induction icing

B. Turbochargers and constant-speed propellers
   1. Systems nomenclatures
   2. Systems theory and operations

C. Oxygen systems
   1. Continuous flow
   2. Dilutor-demand
   3. Pressure-demand

D. Cabin pressurization systems
   1. System nomenclature
   2. System theory and operation

E. Ice control systems
   1. De-icing boots
   2. Thermal anti-ice
   3. Liquid anti-ice

F. Retractable landing gear
   1. Electric retraction systems
   2. Hydraulic retraction systems
   3. General system nomenclature
   4. Retraction system safety
   5. Vle and Vlo speeds
   6. Squat switches

7. Gear warning horns and lights
8. Automatic extension systems
9. Icy runway operations

G. Retraction system malfunctions
1. Hand crank systems (hydraulic and non-hydraulic)
2. Carbon dioxide pressurized systems
3. Free fall systems

H. Aerodynamics 6 hours
1. Aircraft axis: vertical, longitudinal, and lateral
2. Lift concept and terms
3. Bernoulli's Principle and Newton's 3rd Law
4. Airfoil
5. Relative wind
6. Angle of attack
7. Angle of incidence
8. High lift devices
9. Flaps, slots, and slats
10. Leading edge flaps
11. Drag concepts and terms
12. Induced drag vs. parasite drag
13. Form
14. Interference
15. Skin friction
16. Lift/drag curve
17. High drag devices
18. Spoilers, speed brakes, and chutes
19. Thrust
20. Weight

I. Aircraft stability 1 hour
1. Static stability
2. Dynamic stability
3. Longitudinal stability
4. Lateral stability
5. Directional stability

J. Stalls and spins 3 hours
1. Stall aerodynamics (development/effects of weight and balance (W&B)
2. Stall recoveries: power-off stalls, power-on stalls
3. Spin aerodynamics

4. Spin recovery: power, ailerons, rudder, elevator

K. Aircraft performance factors and predictors 3 hours
1. Density altitude
2. Surface winds (headwinds, tailwinds, crosswinds)
3. Weight
4. Runway conditions
5. Takeoff and landing distance charts
6. Climb and cruise performance charts
7. Descent charts
8. Distance charts
9. Stall speed charts

L. Weight and balance 8 hours
1. Datum, station, arm, moment
2. Formula: W x A = M (Weight x Arrow = Movement)
3. Maximum ramp, takeoff, and landing weight
4. Weight and balance documents
5. Weight and balance report (ARROW)
6. Equipment list: required vs. optional equipment
7. Weight and balance calculations

M. Effects of center of gravity
1. Forward center of gravity (CG)
2. Increased stability (force arm)
3. Decreased controllability (force arm)
4. Rearward center of gravity (CG)
5. Increased true air speed (TAS)
6. Increased controllability
7. Decreased fuel usage
8. Decreased stability
9. Computation, graph, and table methods

N. Meteorology/ Weather factors 9 hours
1. Five atmospheric levels
2. Circulation: highs/lows
3. Coriolis force
4. Local convective circulation
5. Moisture: dew point and relative humidity
6. Atmospheric stability: characteristics of stable/unstable air
7. Dry adiabatic lapse rate
8. Clouds: low, middle, and high clouds

9. Clouds with extensive vertical development
10. Air masses: tropical vs. arctic
11. Frontal activity (cold, warm, stationary, occluded)
12. Weather hazards and restrictions to visibility
13. Thunderstorms
14. Turbulence
15. Icing
16. Hydroplaning
17. Cold/hot weather operations

O. Federal Aviation Regulations 6 hours
1. Part 61
2. Part 91
3. Part 135

P. Maximum performance takeoffs and landings 1 hour
1. Short field landings and takeoffs
2. Soft field landings and takeoffs

Q. Performance maneuvers 2 hours
1. Chandelles
2. Lazy eights
3. Ground reference maneuver
4. Eights on-pylons

R. Emergency procedures 3 hours
1. Engine failure
2. Fire
3. Radio failure

V. Methods of Presentation

The following instructional methodologies may be used in the course:

1. Classroom lecture and demonstration.
2. Film viewings
3. Demonstrations
4. Peer learning
5. Guest speakers

VI . Assignments and Methods of Evaluation

1. Students complete bi-weekly quizzes.
2. Students complete a written mid-term examination.

3. Students complete a written final examination.

VII. Textbooks

Instrument and Commercial Manual. Denver, CO: Jeppesen Sanderson, 1999.
10th Grade Reading Level ISBN: 0-88487-252-1

Instrument and Commercial Knowledge Test Study Guide. Denver, CO: Jeppesen Sanderson, 2000.
10th Grade Reading Level ISBN: 0-88487-252-1

VIII. Student Learning Outcomes:

1. Student will have a dynamic understanding of Aerodynamics, and of aircraft stability.
2. Student will know how meteorology affects flight and the major concepts that prevent safe flying.
3. Student will know about the aircraft's performance, balance with regards to weight, and their applications in aviation.
4. Student will understand the FAA rules of regulation, how to perform various maneuvers, and the importance of practicing emergency procedures.