AVIA 3581
MULTI-ENGINE FLYING
UNIVERSITY OF OKLAHOMA

_________________________________    _____, 20_____

I, ________________________________, have acquired and have in my possession a copy of
the training course outline, training syllabus, and safety procedures and practices for AVIA 3581, Multi-Engine
Flying.

_________________________________
Student Signature

_________________________________
Flight Instructor Signature

_________________________________
Chief Flight Instructor Signature
This course fulfills the requirements of 14 CFR, Section 141, Appendix I to add a multi-engine rating to a commercial pilot certificate (with airplane category and single engine land class and instrument airplane rating).

**COURSE OBJECTIVE:** The student will obtain the knowledge, skill, and aeronautical experience necessary to meet the requirements for the addition of an airplane multi-engine land class rating (with instrument privileges) to a commercial pilot certificate with airplane category and single engine land and instrument airplane ratings.

**COURSE COMPLETION STANDARD:** The student will demonstrate through written tests, oral tests, flight tests, and show through appropriate records that the knowledge, skill, and experience requirements necessary to add a multi-engine rating to an existing pilot certificate have been met. The specific requirements for each test and stage check are described in the appropriate syllabus lesson. At the completion of the ground school the student will pass the end of course test with a score of 70%. At the completion of flight training the student will pass the practical test for addition of a multi-engine land class rating with instrument privileges, based on the current Commercial Pilot Practical Test Standards (PTS).

**AIRPORT:** Max Westheimer Airport is the operations base for training in this course. Max Westheimer Airport has a hard surface runway and meets the requirements of 14 CFR, Section 141.38 for day and night operation. Fuel is available from 7:00 A.M. to 10:00 P.M. daily. Maintenance is available from 6:30 A.M. to 3:00 P.M. Monday through Friday and at other times on call. Training will originate at Max Westheimer Airport.

**AIRCRAFT:** The aircraft to be used in this course of training are the PA44-180, PA34-200 and BE58. They meet the requirements of 14 CFR, Section 141.39. VFR airplanes are equipped for day and night VFR as specified in 14 CFR, Section 91.205. Airplanes used for instrument training are equipped for IFR as specified in 14 CFR, 91.205. Radio equipment will consist of at least one VHF transceiver and at least one VOR receiver. A Precision Flight Controls AATD is also available for conducting review lessons. It meets the requirements of 14CFR, Section 141.41.
UNIVERSITY OF OKLAHOMA
DEPARTMENT OF AVIATION
MULT-ENGINE RATING COURSE

CHIEF FLIGHT INSTRUCTOR: The Chief Flight Instructor will meet the requirements of 14 CFR, Section 141.35. (S)he must hold at least a commercial pilot certificate with an airplane category, multi-engine land class and airplane instrument rating. In addition, (s)he must hold a flight instructor/instrument certificate with an airplane category rating and a multi-engine class rating and have at least a second class medical certificate. See Appendix A of this Training Course Outline for Chief Flight Instructor designation.

ASSISTANT CHIEF FLIGHT INSTRUCTOR: The Assistant Chief Flight Instructor will meet the requirements of 14 CFR, Section 141.36. (S)he must hold at least a commercial pilot certificate with an airplane category, multi-engine land class and airplane instrument rating. In addition, (s)he must hold a flight instructor/instrument certificate with an airplane category rating and a multi-engine class rating and have at least a second class medical certificate. See Appendix A of this Training Course Outline for Assistant Chief Flight Instructor designation.

FLIGHT INSTRUCTORS: Each flight instructor must hold at least a commercial pilot certificate with an airplane category, multi-engine land class and airplane instrument rating. In addition, (s)he must hold a flight instructor/instrument certificate with an airplane category rating and a multi-engine class rating and have at least a second class medical certificate.

CHIEF GROUND INSTRUCTOR: The Chief Ground Instructor will meet the requirements of 14 CFR, Section 141.35(e). See Appendix A of this Training Course Outline for Chief Ground Instructor designation.

ASSISTANT CHIEF GROUND INSTRUCTOR: The Assistant Chief Ground Instructor will meet the requirements of 14 CFR, Section 141.36(e). See Appendix A of this Training Course Outline for Assistant Chief Ground Instructor designation.

GROUND INSTRUCTORS: Each instructor used for ground training must hold a flight instructor or advanced ground instructor certificate for this course of training.

OFFICE AND CLASSROOM FACILITIES USED FOR AVIATION STUDENTS: The office and classroom facilities used for the training of aviation students of the University of Oklahoma are described in Appendix D of this Training Course Outline.
COURSE ENROLLMENT: You must hold a commercial pilot certificate with an aircraft category and single engine land and instrument airplane rating and at least a third class medical certificate prior to enrolling in the flight portion of the commercial pilot certification course.

REQUIREMENTS FOR GRADUATION: To obtain add a multi-engine rating with instrument privileges to your commercial pilot certificate, you must be able to read, speak, and understand the English language and have a valid FAA third-class medical certificate and be at least 18 years of age at the completion of the course. You must complete the lessons in the syllabus and satisfy the requirements described in the Course Completion Standard on page 1.

LESSON DESCRIPTION AND STAGES OF TRAINING: Each lesson is fully described within the syllabus, including the objectives, standards, and measurable units of accomplishment and learning for each lesson. You are expected to complete the course within 90 days. The objectives and standards of each stage are described within the syllabus.

COURSE POLICY: The course policies for this course of training are outlined in Appendix B of this Training Course Outline.

TESTS AND CHECKS: The syllabus incorporates one end of course stage check in accordance with 14 CFR, Section 141, Appendix I. This check is given by the Chief, or designated Assistant Chief Flight Instructor. The student will complete the appropriate stage exams, pilot briefings, and final examinations that are described within the syllabus. The final stage check will be conducted by the Chief or Assistant Chief Flight Instructor and will be conducted in accordance with the current Commercial Pilot Practical Test Standards and will be at least equal in scope, depth, and difficulty to that practical test.
DISPATCH PROCEDURES - The provisions of 14 CFR, Section 91.103 will be met prior to aircraft dispatch. The instructor will provide a preflight briefing to the student. The instructor's signature on the syllabus sheet for that lesson constitutes permission to dispatch the aircraft. The student will check the scheduling clipboard to determine which aircraft is assigned for the flight and complete the information on the Aircraft Sign Out Sheet, the Plastic Flight Plan form and the Aircraft Information Sheet in the aircraft checklist binder. A flight plan will be filed with an Automated Flight Service Station for all cross country flights. Aircraft keys are kept in a lock box in the dispatch area and will be issued upon completion of the above procedures.

STARTING PROCEDURES - All aircraft will be started within the ramp area of the Department of Aviation unless otherwise designated by the Chief Flight Instructor or his designee. All starting procedures will comply with the procedures stated in the Pilots Operating Handbook for that aircraft.

TAXIING PROCEDURES - Taxi on yellow depicted taxi routes and at a slow and reasonable speed (use 10 miles per hour as a guide). Spacing between aircraft on taxi routes will be a minimum of two ship lengths. During the day, operate the anti-collision lights while taxiing. Use position lights and the landing light at night. To minimize the chance of runway incursion, read back taxi instructions, particularly hold short, position and hold, runway crossing and takeoff clearances. When obtaining complex taxi clearances at unfamiliar airports write down the clearance, have an airport diagram available and request progressive taxi if needed.

LANDINGS - All landings in multi-engine aircraft will be to a full stop. Takeoffs after a full stop landing will be accomplished by taxiing the aircraft back to the beginning of the runway.

FIRE PRECAUTIONS - During fueling operations the aircraft involved will be unoccupied. Fire extinguishers will be present when fueling is in progress. In the event of aircraft fire during engine start or taxiing, follow the emergency procedures in the aircraft POH. If there is any doubt about whether emergency procedures are working to extinguish the fire, evacuate the aircraft immediately.

REDISPATCH PROCEDURES – Given that all flight lessons have an instructor on board, in the event of a diversion and landing at an unscheduled destination, the instructor may continue the lesson without notification to the aviation department. The instructor will notify the aviation department at 405-325-7231 (Long Distance in-state toll free 1-800-522-0772, ext 7231) or the OU mobile phone 405-919-6319, if the unscheduled stop will delay the return of the aircraft to the point of impacting the flight schedule.
-aircraft_discrepancies: Upon noticing a discrepancy the pilot in command will take the following actions:

- Place the plastic "Maintenance Required" sign in the windshield of the aircraft (this sign is in a loose leaf binder in the aircraft).

- Complete Form OUAVMAIN #2 (copies of this form are in a loose leaf binder in the aircraft). When filling out the "Maintenance Problem" section, be as specific as possible. Provide the top copy to the mechanics in the hangar and place the yellow copy on the Aircraft Sign Out Sheet. If the mechanics are not available, place the top copy of the form in the maintenance in-box in the dispatch section. If the main office is closed, put both copies of the form in the envelope slot in the hangar door.

- Upon returning to the dispatch area, turn the plastic flight plan over so that the words "No Fly" are displayed.
  Note: If the main office is locked and this can't be done, the "Maintenance Required" sign in the aircraft serves as notification that the aircraft is not airworthy.

- Notify the director, the chief flight instructor or one of the assistant chief flight instructors as soon as possible.

approval_for_return_of_aircraft_to_service: The mechanics will take whatever corrective actions are required to return the aircraft to service. Upon returning the aircraft to service the mechanics will place the "Maintenance Required" sign back in the lose leaf notebook and notify the main office. At that time the plastic flight plan will be turned back over and the yellow copy of OUAVMAIN #2 placed in the mechanics in-box. If the discrepancy can't be corrected immediately, but the mechanics determine the aircraft is still airworthy, this information will be noted in the "Maintenance Performed" section along with any required operating limitations due to the discrepancy. Inoperative equipment will be removed or deactivated and placarded IAW 14 CFR, Section 91.213. The aircraft may then be returned to service and flown within any operating limitations noted.
SECURING AIRCRAFT - The pilot in command is responsible for securing aircraft on the ramp. Only aviation department personnel and contract personnel from the FBO may hangar aircraft. Students may assist in hangaring aircraft under the supervision of these personnel. All university aircraft will be secured with tie-down ropes or chocks while unattended on the Department of Aviation ramp. On cross country flights, the pilot in command will make tie-down arrangements with the local FBO for securing the aircraft. At no time will an aircraft be left unattended without it being secured by wheel chocks or tie-down ropes. When returning aircraft to the ramp in front of the terminal, solo students will not park the aircraft in the first row by the fence.

AIRCRAFT AVOIDANCE - No person may operate an aircraft so close to another aircraft as to create a collision hazard either on the ground or in the air. At all times, the Pilot-in-Command will be responsible for, and actively use "See and Avoid" procedures as described in the AIM, Chapter 7, Section 5 and comply with the right of way rules specified in 14 CFR, Section 91.113.

FUEL RESERVES - At no time will a department aircraft depart on a flight without the minimum fuel required by 14 CFR, Section 91.151 for VFR flights or 91.169 for IFR flights. Solo fuel reserves will be one hour remaining after the full stop landing on both local and cross-country flights.

MINIMUM ALTITUDES – Minimum altitudes for training with the exception of landing practice is 600’ AGL or higher if the minimum altitude applicable in 14 CFR, Section 91.119 is higher than 600’ AGL. Minimum altitudes for IFR operations will be in accordance with 14 CFR, Sections 91.175 and 91.177. Minimum altitude for failing an engine and feathering its propeller is 3000’ AGL. At altitudes lower than 3000’ AGL engine failures will be simulated by throttling the engine back to idle. Feathering the propeller will be simulated by establishing zero thrust.

PRACTICE AREAS - The University utilizes several practice areas for flight training. These areas are depicted in Appendix C of this Training Course Outline.

WEATHER MINIMUMS – Training under VFR will be in accordance with the basic VFR weather minimums in 14 CFR, Section 91.155. For IFR operations, minimum weather for landings will be in accordance with 14 CFR, Section 91.175. For takeoffs, the ceiling and visibility will be equal to or greater than the lowest Category B aircraft instrument approach minimums at the departure airport. If prevailing winds dictate a circling procedure, the lowest Category B circling minimums will apply. Determination of the requirement for an alternate airport will be in accordance with 14 CFR, Section 91.169.

WIND LIMITS:
Dual: Maximum 35 knots - Maximum 15 knots gust spread
Crosswind: Crosswind limits will not exceed those specified by the POH for the aircraft to be flown.

AIRCRAFT CHECKLIST/KEY TURN IN: After completing the flight and securing the aircraft, the student will record the hobbs time on the Aircraft Information Sheet and return the aircraft checklists and keys to the dispatch area. Give the keys to a staff member for return to the lock box and complete the information on the Aircraft Sign Out Sheet. Return the syllabus sheet to the instructor for further processing.

ATTENDANCE – TARDINESS – Students are expected to attend all scheduled ground and flight training lessons. In the event of sickness or accident, call the Aviation Department at 325-7231. Do not make a determination of attendance due to weather. If in doubt, call the Aviation Department. Excessive absences or tardiness, are grounds for removal from the course.
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**Total** | **13.5 Hours** | **2.0 Hours**
GROUND LESSON 1
3.0 HOURS

TEXT REFERENCE:
MULTI-ENGINE MANUAL Jeppesen Sanderson - Chapter 2-B & 2-C,
“Understanding Your Airplane”.
SEMINOLE AND BARON PILOT OPERATING MANUAL – Performance Charts;
Weight and Balance

LESSON OBJECTIVE:
During this lesson, the student will learn to compute and control weight and balance
conditions of multi-engine airplanes. The student also will review the factors
affecting airplane performance, and will learn to compute the expected performance
values accurately from multi-engine airplane performance charts.

CONTENT:
Section A – “Pre-Flight Preparations”
- Multi-Engine considerations
- Cross-country Planning

Section B - "Weight and Balance"
- Weight
- Balance

Section C - "Performance Charts"
- Performance Factors
- Performance Charts

COMPLETION STANDARDS:
The student will complete questions 1-8 in section 2-B and questions 1-11 in section
2-C with a minimum passing score of 80%, and the instructor will review each
incorrect response to ensure complete understanding before progressing to Ground
Lesson #2.

STUDENT NAME ___________________________ ID# __________________
INSTRUCTOR NAME ___________________________ CERT# __________________
AIRCRAFT # _______ GROUND STAGE # _______ ME _______ LESSON # _______
SAT _____% UNSAT _____% INCOMPLETE _____% CANCELLATION ______

HOMEWORK COMPLETE: Y / N (% grade is normally part of the lesson grade.)
Note:
1. Circle appropriate status/grade and put number (%) grade on line.
2. If cancellation state reason.
REMARKS: ____________________________________________________________
FOR I OR U: SUBJECTS THAT ARE NOT COMPLETE/INSTRUCTOR COMMENTS
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FOR XC FLIGHTS, LIST DESTINATIONS: _________________________________

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DATE: __________________

TIME: IN _______________ ENTERED BY __________________
OUT _______________ SYLL. LESSON _______________
TOTAL _______________ PROCESSED ON _______________

HOBBS: IN _______________ REMARKS: __________________
OUT _______________ __________________
TOTAL _______________ __________________

STUDENT SIGNATURE ___________________________

INSTRUCTOR SIGNATURE ________________________
GROUND LESSON 2
3.0 HOURS

TEXT REFERENCE:
MULTI-ENGINE MANUAL Jeppesen Sanderson - Chapter 2 Section A "Examining Systems"
SEMINOLE AND BARON PILOT OPERATING MANUAL – Description Airplane and Systems

VIDEO PRESENTATION:
Jeppesen Sanderson Multi-Engine Rating - Subject Area, "Multi-Engine Operations"

LESSON OBJECTIVE:
During this lesson the student is introduced to and learns multi-engine systems and operations in general and the specifics of each system in the Seminole and Baron

CONTENT:
"General Systems"
- Propeller Systems
- Fuel Systems
- Fuel Injection Systems
- Electrical Systems
- Landing Gear Systems
- Turbocharging
- Ice Control Equipment and Systems
- Environmental Controls (Air Conditioning, Heating, Pressurization)
- Flight Controls (Trim, Flaps, Leading Edge Devices, Spoilers)
- Power Plants - Oil Systems
- Hydraulic Systems
- Avionics

Use of Minimum Equipment List

COMPLETION STANDARDS:
The student will complete questions 1-25 in section 2-A with a minimum passing score of 80%, and the instructor will review each incorrect response to ensure complete understanding before progressing to Ground Lesson #3.
GROUND LESSON 3
1.5 HOURS

TEXT REFERENCE:
MULTI-ENGINE MANUAL Jeppesen Sanderson - Chapter 3-A “Introducing Multi-Engine Aerodynamics”, Chapter 4 “Performing Maneuvers and Procedures” sections A & B.
SEMINOLE AND BARON PILOT OPERATING MANUAL – Operating Instructions

VIDEO PRESENTATION:
Multi-Engine Rating - Subject Areas, "Multi-Engine Aerodynamics" and “Multi-Engine Manoeuvres”

LESSON OBJECTIVE:
During this lesson, the student will learn the principles of Multi-engine aerodynamics and the procedures and maneuvers relating to normal operations in multi-engine airplanes.

CONTENT:
Section A – “Multi-engine Aerodynamics”
  - Multi-Engine Aerodynamics
  - Multi-Engine V Speeds

Section B - "Procedures and Manoeuvres"
  - Multi-Engine Operations
  - Maximum Performance Take-Offs and Climbs
  - Maximum Performance Approach and Landings
  - Multi-Engine Flight Manoeuvres

COMPLETION STANDARDS:
The student will complete questions 1-7 in section 3-A, questions 1-8 in section 4-A, and questions 1-6 in section 4-B with a minimum passing score of 80%, and the instructor will review each incorrect response to ensure complete understanding before the student progresses to Ground Lesson #4.

UNIVERSITY OF OKLAHOMA

STUDENT NAME _______________________________ ID# _________________
INSTRUCTOR NAME ____________________________ CERT# ______________

AIRCRAFT #   GROUND   STAGE #   ME   LESSON #   3

SAT ____%  UNSAT ____%  INCOMPLETE ____%  CANCELLATION_____

HOMEWORK COMPLETE: Y / N  (% grade is normally part of the lesson grade.)
Note:
1. Circle appropriate status/grade and put number (%) grade on line.
2. If cancellation state reason.

REMARKS: _______________________________________________________

FOR I OR U: SUBJECTS THAT ARE NOT COMPLETE/INSTRUCTOR COMMENTS
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FOR XC FLIGHTS, LIST DESTINATIONS: _________________________________

DI  So  Dnt  Snt  Dxc  Sxc  Idl  Nldg  AATD  CA  PP  Gi

DATE: ____________________

TIME: IN _______________ ENTERED BY ____________
OUT _______________ SYLL. LESSON ____________
TOTAL _______________ PROCESSED ON _________

HOBBS: IN _______________ REMARKS: _______________
OUT _______________
TOTAL ___________________

STUDENT SIGNATURE _____________________________

INSTRUCTOR SIGNATURE __________________________
GROUND LESSON 4
1.0 HOUR

LEsson OBJECTIVE:
The exam administered during the lesson evaluates the student’s comprehension of
the material presented in ground lessons 1, 2, and 3.

CONTENT:
REVIEW AND EXAM OVER GROUND LESSONS 1, 2, AND 3

COMPLETION STANDARDS:
This lesson and stage are complete when the applicant has completed the exam with
a minimum passing score of 80% and the instructor has reviewed each incorrect
response to ensure complete understanding before the applicant progresses.
GROUND LESSON 5
3.0 HOURS

TEXT REFERENCE:

SEMINOLE AND BARON PILOT OPERATING MANUAL – Emergency Procedures

VIDEO PRESENTATION:
Multi-Engine Rating - Subject Area, "Engine-out Operations"

LESSON OBJECTIVE:
During this lesson, the student will learn the principles of engine-out aerodynamics and the procedures and maneuvers relating to engine-out operations in multi-engine airplanes.

CONTENT:
Section A - "Aerodynamics"
- Critical Engine
- Minimum Control Speed
- Engine-Out V Speeds
- Single-Engine Ceilings

Section B - "Procedures and Maneuvers"
- Engine Shutdown
- Engine-Out Maneuvers
- Engine Inoperative Loss of Directional Control Demo. (Vmc demo)

COMPLETION STANDARDS:
The student will complete questions 1-13 in section 3-B, questions 1-10 in section 5-A, and questions 1-9 in section 5-B with a minimum passing score of 80%, and the instructor will review each incorrect response to ensure complete understanding before the student progresses to Ground Lesson #6.

UNIVERSITY OF OKLAHOMA

STUDENT NAME ____________________________ ID# _______________
INSTRUCTOR NAME __________________________ CERT# ______________

AIRCRAFT # _GROUND_ STAGE # _ME_ LESSON # _5_

SAT _____% UNSAT _____% INCOMPLETE _____% CANCELLATION_____

HOMEWORK COMPLETE: Y / N (% grade is normally part of the lesson grade.)
Note:
1. Circle appropriate status/grade and put number (%) grade on line.
2. If cancellation state reason.

REMARKS: __________________________________________________________

FOR I OR U: SUBJECTS THAT ARE NOT COMPLETE/INSTRUCTOR COMMENTS
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FOR XC FLIGHTS, LIST DESTINATIONS: _________________________________

DI  SO  DNT  SNT  DXC  SXC  IDL  NLDG  AATD  CA  PP  GI

DATE: __________________
TIME: IN __________ ENTERED BY __________
OUT __________ SYLL. LESSON __________
TOTAL __________ PROCESSED ON __________

HOBBS: IN __________ REMARKS: __________
OUT __________ __________________________
TOTAL __________ __________________________

STUDENT SIGNATURE ____________________________________________
INSTRUCTOR SIGNATURE __________________________________________
GROUND LESSON 6
1.5 HOURS

TEXT REFERENCE:
AERONAUTICAL INFORMATION MANUAL, Chapter 8-1-6 and 8-1-2

VIDEO PRESENTATION:
Multi-Engine Rating - Subject Area, "Instrument Flight"

LESSON OBJECTIVE:
During this lesson, the student will acquire the knowledge of instrument procedures in the multi-engine airplane with both engines operating and with one engine inoperative.

CONTENT:
Section A - "Normal Procedures"
  - Aircraft Control
  - IFR Planning
  - Departure Procedures
  - Enroute Procedures
  - Arrival Procedures
Section B - "Instrument Procedures with One Engine Inoperative"
  - Engine Failure During Straight and Level Flight and Turns
  - Instrument Approach with One Engine Inoperative
  - Missed Approach with One Engine Inoperative
Section C - “Making Decisions”
  - PIC Responsibility
  - Communication
  - Workload Management
  - Situational Awareness
Night Operations
  - Currency Requirements
  - Night Vision
High Altitude Operations
  - Effects of Altitude
  - Requirements for High Altitude Endorsement

COMPLETION STANDARDS:
The student will complete questions 1-7 in section 5-C and questions 1-6 in section 5-D with a minimum passing score of 80%, and the instructor will review each incorrect response to ensure complete understanding before progressing to Ground Lesson #7.
GROUND LESSON 7
1.5 HOURS

TEXT REFERENCE:
14 CFR PART 91, SUBPART K: Fractional Ownership Operations
14 CFR PART 119.1: Air Carriers and Operators For Compensation or Hire
14 CFR PART 135: Operating Requirements: Commuter and On Demand Operations

LESSON OBJECTIVE:
During this lesson, the student will review their knowledge of applicable regulations issued by the Federal Aviation for commercial pilot privileges, limitations and flight operations.

CONTENT:
Fractional Ownership Operations
- Applicability – 91.1001
- Program Operating Manual Contents – 91.1025
- Large Transport Category and Turbine Powered Airplanes Limitations, Destination and Alternate Airports – 91.1037
- IFR Takeoff, Approach and Landing Minimums – 91.1039
- Crewmember Experience – 91.1053
- Crewmember Flight, Duty and Rest Time Requirements – 91.1057

Other Operations for Compensation or Hire – 119.1 (e)

Commuter and On Demand Operations
- Applicability – 135.1
- Manual Contents – 135.23
- Pilot Requirements, Use of Oxygen – 135.89
- IFR: Operating Limitations – 135.215
- IFR: Takeoff Limitations – 135.217
- IFR: IFR Destination Airport Weather Minimums – 135.219
- IFR: Alternate Airport Requirements – 135.223
- Pilot In Command Qualifications – 135.243
- Second In Command Qualifications – 135.245
- Crewmember Flight Time and Duty Periods Limitations and Rest Requirements – 135, Subpart F

COMPLETION STANDARDS:
Through classroom discussion and oral quizzing the student will demonstrate understanding of commercial pilot privileges, limitations and flight operations as defined in 14 CFR, Parts 91 (Subpart K), 119.1 and 135.
GROUND LESSON 8
1.0 HOUR

FINAL EXAM

LESSON OBJECTIVE:
This test session will evaluate the student's comprehension of the material in ground lessons 1-7.

CONTENT:
MULTI-ENGINE PILOT FINAL EXAM

COMPLETION STANDARDS:
The student will complete the multi-engine pilot final examination with a passing grade of 80% and the instructor will review each incorrect response to ensure complete understanding.

UNIVERSITY OF OKLAHOMA

STUDENT NAME _______________________________ ID# __________________
INSTRUCTOR NAME ____________________________ CERT# __________________

AIRCRAFT # GROUND STAGE # ME LESSON # 8
SAT _____% UNSAT _____% INCOMPLETE ____% CANCELLATION_______

HOMEWORK COMPLETE: Y / N (% grade is normally part of the lesson grade.)
Note:
1. Circle appropriate status/grade and put number (%) grade on line.
2. If cancellation state reason.

REMARKS: __________________________________________________________

FOR I OR U: SUBJECTS THAT ARE NOT COMPLETE/INSTRUCTOR COMMENTS
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FOR XC FLIGHTS, LIST DESTINATIONS: ____________________________________

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OUT ___________ SYLL. LESSON ___________
TOTAL ___________ PROCESSED ON __________

HOBBS: IN ___________ REMARKS: ___________
OUT ___________ __________________________
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STUDENT SIGNATURE _______________________________________________

INSTRUCTOR SIGNATURE _____________________________________________
## Multi-Engine Rating Course

### Lesson Time Allocation

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- **Dual** = Dual in PA44-180, BE58 or PA34-200
- **IDL** = Instrument dual in PA44-180, BE58 or PA34-200
- **DXC** = Dual Cross Country
- **DL NGT** = Dual Night
FLIGHT LESSON 1 – DUAL AIRPLANE

LESSON OBJECTIVE:
During this lesson, the student will become acquainted with the training airplane. The student will learn the attitude, power settings, and configurations required for the performance of the listed maneuvers and procedures.

CONTENT:
Lesson Introduction
Preflight Preparation
  - Certificates and Documents
  - Obtaining Weather Information
  - Operation of Airplane Systems
  - Determining Performance & Limitations
  - Risk Management
Preflight Procedures
  - Preflight Inspection
  - Cockpit Management
  - Engine Starting
  - Taxiing
  - Pre-Takeoff Check
  - Takeoff Briefing
Airport Operations
  - Radio Communications and ATC Light Signals
  - Airport, Taxiway, and Runway Signs, Markings & Lighting
Normal and Crosswind Takeoffs and Climbs
Traffic Pattern Operations
Visual Scanning and Collision Avoidance
Straight-and-Level Flight
Level Turns
  - Straight
  - Turning
Descents
  - Straight
  - Turning
Maneuvering During Slow Flight
Stalls
  - Power-On
  - Power-Off
  - Accelerated
Steep Turns
Normal Approach and Landings
After Landing Procedures

COMPLETION STANDARDS:
At the completion of this lesson, the student will be able to perform all the listed ground procedures without instructor assistance. During take-off and landings, the student will demonstrate good directional control and maintain lift-off, climb, approach, and touch down speeds with 10 knots of the correct speed. Straight-and-level flight, climbs, and descents will be performed while maintaining assigned airspeed within 10 knots, roll outs from turns will be within fifteen degrees of assigned headings, and specific altitudes within 150 feet. In addition, the student will be able to demonstrate the correct flight procedure for maneuvering during slow flight, steep power turns, and the correct entry and recovery procedures for stalls.
FLIGHT LESSON 2 – DUAL AIRPLANE

LESSON OBJECTIVE:
During this lesson, the student will be introduced to engine-out procedures and will learn to identify the inoperative engine, initiate appropriate corrective procedures, maneuver the airplane with one engine inoperative and demonstrate engine inoperative loss of directional control and recovery techniques, shut down and restart procedures and the effects on aircraft performance of various airspeeds and configurations during single engine operations. Engine failures will occur during all phases of flight: takeoff roll, climb out, cruise, approach to landing and landing.

CONTENT:

Lesson Review
Preflight Preparation
Normal and Crosswind Take-Offs and Landings

Lesson Introduction
Emergency Operations (Engine Out)
  -Flight Principles Engine Inoperative
  -Engine Failure on Takeoff Before Vmc
  -Engine Failure After Liftoff
  -Engine Failure Enroute
  -Engine Failure on Approach and Landing
  -Identification of Inoperative Engine
  -Use of Controls to Counteract Yaw and Roll
  -Trouble-Shooting Procedures
  -Full Feather and In-Flight Restart

Maneuvering With One Engine Inoperative
  -Straight and Level Flight
  -Turns in Both Directions
  -Climbs and Descents to Assigned Altitudes
  -Engine Inoperative Loss of Directional Control (Vmc Demo)
  -Effects of Various Airspeeds and Configurations During Single Engine Flight (Drag Demo)

COMPLETION STANDARDS:
At the completion of this lesson, the student will be able to perform the maneuvers listed in this lesson. The student will also be able to identify the inoperative engine and use the correct control inputs to maintain straight flight. The student will have a complete and accurate knowledge of the cause, effect, and significance of Vmc, and also understand the impact of engine-out operations on aircraft performance.
FLIGHT LESSON 3 – DUAL AIRPLANE

LESSON OBJECTIVE:
During this lesson, the student will be introduced to and perform maximum performance take-offs and climbs, maximum performance approach and landings, and go-arounds for rejected (balked) landings. The students will also perform engine-out procedures introduced in Flight Lesson 2. The student will be introduced to and learn emergency operations of airplane systems.

CONTENT:

Lesson Review
Normal and Crosswind Take-offs and Landings
Slow Flight
Stalls
  - Power-On
  - Power-Off
  - Accelerated
Emergency Operations (Engine Out)
  - Flight Principles Engine Inoperative
  - Engine Failure on Takeoff
  - Engine Failure After Liftoff
  - Engine Failure Enroute
  - Engine Failure On Approach and Landing
  - Identification of Inoperative Engine
  - Use of Controls to Counteract Yaw and Roll
  - Trouble Shooting Procedures
  - Full Feather and In-Flight Engine Restart
Maneuvering With One Engine Inoperative
  - Engine Inoperative Loss of Directional Control (Vmc Demo)
  - Effects of Various Airspeeds and Configurations During Single Engine Flight
    (Drag Demo)

Lesson Introduction
Short Field Take-off and Maximum Performance Climb
Short Field Landing
Straight and Level Flight Multi and Single Engine (IR)
Level, Climbing and Descending Turns (IR)

COMPLETION STANDARDS:
At the completion of this lesson, the student will be able to perform all the maneuvers listed in this lesson. The student will also be able to identify the inoperative engine and use the correct control inputs to maintain straight flight. The student will have a complete and accurate knowledge of the cause, effect, and significance of Vmc and recognize the imminent loss of control. The student will also understand the impact of engine-out operations on aircraft control. The student will understand the impact of single engine operations on aircraft performance.
FLIGHT LESSON 4 – DUAL AIRPLANE

LESSON OBJECTIVE:
During this lesson, the student will be introduced to and learn multi-engine maneuvers and procedures for holding as well as precision and non-precision approaches. The student will also learn the procedures for conducting single-engine approaches.

CONTENT:
Lesson Introduction

Normal Operations
- Holding (IR)
- Precision Approaches (IR)
- Non-Precision Approaches (IR)
- Missed Approaches Procedures (IR)

Emergency Operations (Single Engine)
- Identification of Inoperative Engine (IR)
- Procedures for Shutdown and Feathering (IR)
- Engine Failure During Straight-and-Level Flight (IR)
- Engine Failure During Turns (IR)
- Engine Failure During Climbs and Descents (IR)
- Engine Failure During Precision and Non-Precision Approaches (IR)
- Single Engine Missed Approach Procedures (IR)

COMPLETION STANDARDS:
At the completion of this lesson, the student will demonstrate the ability to perform each of the listed maneuvers and procedures while maintaining the desired altitude to plus or minus 150 feet, headings to within plus or minus 15 degrees, airspeed to within plus or minus 15 knots and Decision Altitude or Minimum Descent Altitude from minus 0 to plus 150 feet.
**FLIGHT LESSON 5 – DUAL – AIRPLANE DAY CROSS-COUNTRY**

**LESSON OBJECTIVE:**
During this lesson the student will become familiar with the cross-country procedures involved in flying multi-engine aircraft during the day. This lesson will consist of a cross-country flight of at least two-hour duration, a total straight line distance of more than 100 nautical miles from the original point of departure and occurring in the day.

**CONTENT:**
**Lesson Introduction**
Cross-Country Flight Planning
National Airspace System
Departure Procedures
Pilotage and Dead Reckoning
Navigation Systems
  -GPS
  -VOR
Diversions
Lost Procedures
Cruise Procedures
  -Power Settings and Mixture Leaning
  -ATC Services
Arrival Procedures
Instrument Approach Procedures (Precision or Non-Precision as Selected by the Instructor)
High Altitude Operations
  -Supplemental Oxygen
  -Pressurization
Emergency Operations
  -Emergency Descent
  -Systems and Equipment Malfunctions
  -Emergency Equipment and Survival Gear
  -Light Gun Signals

**COMPLETION STANDARDS:**
This lesson is complete when the specific requirements for this cross-country flight have been met and the student has demonstrated the ability to safely act as pilot in command during cross-country flights in a multi-engine airplane during the day.

**UNIVERSITY OF OKLAHOMA**

**STUDENT NAME _______________________________ ID# __________________
INSTRUCTOR NAME _________________________ CERT# __________________
**

**AIRCRAFT # CRM** FLIGHT **STAGE # ME** LESSON # 5

**SAT ____%** **UNSAT ____%** **INCOMPLETE ____%** **CANCELLATION_____

**HOMEWORK COMPLETE: Y / N** (% grade is normally part of the lesson grade.)

**Note:**
1. Circle appropriate status/grade and put number (%) grade on line.
2. If cancellation state reason.

**REMARKS:** __________________________________________________________

**FOR I OR U: SUBJECTS THAT ARE NOT COMPLETE/INSTRUCTOR COMMENTS**

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TOTAL TIME ________________

**STUDENT SIGNATURE_______________________________________**

**INSTRUCTOR SIGNATURE_______________________________________**
FLIGHT LESSON 6 – DUAL AIRPLANE NIGHT CROSS-COUNTRY

LESSON OBJECTIVE:
During this lesson the student will become familiar with the cross-country procedures involved in flying a multi-engine aircraft at night. This lesson will consist of a cross-country flight of at least a two-hour duration, a total straight-line distance of more than 100 nautical miles from the original point of departure and occurring at night.

CONTENT:
Lesson Introduction
Cross-Country Flight Planning
Physiological Aspects of Night Flying
Lighting and Equipment for Night Flying
National Airspace system
Departure Procedures
Pilotage and Dead Reckoning
Navigation Systems
- GPS
- VOR
Diversions
Lost Procedures
Cruise Procedures
- Power Settings and Mixture Leaning
- ATC Services
Arrival Procedures
Instrument Approach Procedures (Precision or Non-Precision as Selected By The Instructor)
Land and Hold Short Procedures (LAHSO)
Emergency Operations
- Emergency Descent
- Systems and Equipment Malfunctions
- Emergency Equipment and Survival Gear

COMPLETION STANDARDS:
This lesson is complete when the specific requirements for this cross-country flight have been met and the student has demonstrated the ability to safely act as pilot in command during cross country flights in a multi-engine airplane at night.
FLIGHT LESSON 7 – DUAL – LOCAL

LESSON OBJECTIVE:
During this lesson, the student will review all maneuvers as determined by the instructor. By the completion of this lesson, the student will be able to demonstrate pilot in command proficiency in all maneuvers.

CONTENT:

Lesson Review
Ground Operations
  -Preflight
  -Engine Starting
  -Engine Runup
  -Taxi
  -Post Flight
Takeoffs
  -Normal and Crosswind
  -Short Field and Maximum Performance
Maneuvering During Slow Flight
Stalls
  -Power On
  -Power Off
  -Accelerated
Steep Turns
Vmc Demo
Engine Failure
  -Takeoff
  -Climb Out
  -Cruise
  -Landing with One Engine Inoperative
Emergency Descent
Equipment and System Malfunctions
Instrument Approaches (IR)
  -Precision Approach (Single and Multi-Engine)
  -Non-Precision Approach (Single and Multi-Engine)
Landings
  -Normal and Crosswind
  -Short Field

COMPLETION STANDARDS:

At the completion of this lesson the student will demonstrate the ability to perform each of the listed maneuvers and procedures at a proficiency level that meets or exceeds those criteria listed in the FAA Commercial Pilot Practical Test Standards.
FLIGHT LESSON 8 – DUAL AIRPLANE

FINAL STAGE CHECK

LESSON OBJECTIVE:
This lesson is the final stage check conducted by the Chief Flight Instructor or designated Assistant Chief Flight Instructor. During this lesson, the student must demonstrate knowledge and proficiency in all tasks to a level required by the FAA Commercial Pilot Practical Test Standards for addition of an airplane multi-engine land rating with instrument privileges to a commercial pilot certificate with airplane single engine land and instrument airplane ratings. The Areas of Operations/Tasks listed in the oral and flight portions below are the minimum required. An applicant’s proficiency on other tasks from the practical test standards may be evaluated at the discretion of the examiner.

Note: The examiner will check for updates to the practical test standards. Any additional SEA’s or AO’s/Tasks added in the future will be evaluated.

CONTENT:

Special Emphasis Areas: In addition to the specific Areas of Operation (AO’s) and Tasks identified in the oral and flight portions of the test, the following special emphasis areas will be evaluated during the test.

Positive Aircraft Control
Positive Exchange of Flight Controls
Stall/spin Awareness
Collision Avoidance
Wake Turbulence Avoidance
Controlled Flight Into Terrain
Aeronautical Decision Making and Risk Management
Wire Strike Avoidance
Checklist Usage
Temporary Flight Restrictions
Special Use Airspace
Aviation Security
Single Pilot Resource Management
Any other areas added in future PTS Changes.

(CONTINUED ON NEXT PAGE)
FLIGHT LESSON 8 – DUAL (CONT’D)

ORAL PORTION OF PRACTICAL TEST

The applicant will prepare a cross country flight plane (based on maximum allowable passengers, baggage and/or cargo load using real time weather).

AOI, Task F: Performance and Limitations (Added emphasis on weight shift calculation, accelerate stop distance, computation of single and multiengine climb rates, service and absolute ceilings and consideration of those factors in flight planning and ADM. The applicant’s understanding of performance loss when operating on one engine will be thoroughly evaluated.).
Notes:

AOI, Task G: Operation of Systems
Notes:

AOI, Task H: Principles of Flight, Engine Inoperative. (In addition to the criteria listed for this task in the PTS, added emphasis on factors in determining critical engine, factors affecting Vmc, knowledge of Vyse and factors affecting Vyse).
Notes:

AOVII, Task E: Spin Awareness

AOVIII, Task E: Systems and Equipment Malfunctions
Notes:

AOVIII, Task F: Emergency Equipment and Survival Gear
Notes:

AOII, Task A: Preflight Inspection
Notes:

AOII, Task B: Cockpit Management
Notes:

AOII, Task C: Engine Starting

AOII, Task D: Taxiing
Notes:

AOII, Task F: Runway Incursion Avoidance
Notes:

AOII, Task G: Before Takeoff Check
Notes:

(CONTINUED ON NEXT PAGE)
FLIGHT LESSON 8 – DUAL (CONT’D)

AOIV, Task A: Normal and Crosswind Takeoff and Climb
Notes:

AOIV, Task B: Norman and Crosswind Approach and Landing
Notes:

AOIV, Task C: Short-Field Takeoff and Maximum Performance Climb
Notes:

AOIV, Task D: Short-Field Approach and Landing
Notes:

Incorporate the following Emergency Operations into the takeoff tasks:
AOVIII, Task B: Engine Failure During Takeoff Before Vmc (simulated)
AOVIII, Task C: Engine Failure After Lift-Off (Simulated)
Notes:

AOV, Task A: Steep Turns
Notes:

AOVII, Task A: Maneuvering During Slow Flight
Notes:

AOVII, Task B: Power-Off Stalls
Notes:

AOVII, Task C: Power-On Stalls
Notes:

AOVII, Task D: Accelerated Stalls
Notes:

AOVIII, Task A: Emergency Descent
Notes:

AOVIII, Task E: Systems and Equipment Malfunctions
Notes:

AOX, Task A: Maneuvering with One Engine Inoperative
Notes:

AOX, Task B: Vmc Demonstration
Notes:

AOX, Task C: Engine Failure During Flight (By Reference to Instruments)
Notes:

AOX, Task D: Instrument Approach – One Engine Inoperative (By Reference to Instruments)
Notes:

AOVIII, Task D: Approach and Landing With Inoperative Engine (Simulated)
Notes:

COMPLETION STANDARDS:
The student will demonstrate satisfactory performance as defined by the Commercial Pilot Practical Test Standards:
1. At the discretion of the instructor, students who progress rapidly within a specific stage, may within reasonable variances, continue to the next lesson with less time than is specified in the specific lesson curriculum, provided all content and completion standards are satisfactorily completed. The time stated in the lesson is the approximate minimum time that a student would need to meet the lesson objectives and completion standards; not absolute required times. The lesson time could be slightly more or slightly less. These reduced hours must be included in other lessons to complete the total ground or flight time specified by category in the training course outline in order to satisfactorily complete the course.

2. At no time will a student be allowed to continue to the next stage without having successfully completed all of the lessons and the required tests or stage checks related to the completion of the previous stage.

3. Any time logged in an AATD will not count toward the minimum flight time requirements of the course.

4. Flight training for this course will be done in accordance with the F.A.A approved syllabus. Deviations from the syllabus due to student training requirements, weather related factors, or other items as necessary will be allowed as long as the following requirements are met:

   1.) A notation will be made in the student training record as to the lesson covered and the reason for the deviation.

   2.) The student will complete all syllabus requirements before a graduation certificate is issued.

5. To satisfactorily complete the course of training, the student must meet all course objectives and completion standards. The student must complete the ground school courses.
APPENDIX C
UNIVERSITY OF OKLAHOMA
PRACTICE AREAS

The University of Oklahoma Department of Aviation has three (3) practice areas used for normal flight training operations on a daily basis. They are designated practice area 'A', 'B', and 'C'.

Practice area 'A' is described as an area southwest of Max Westheimer Airport bounded on the north by State Highway 9, on the south by the 35° line of latitude, on the west by the line extending north and south along a similar direction road extending south from the town of Blanchard, and on the east by the line formed by the railroad tracks running southeast from Norman, OK along and near Interstate Highway 35.

Practice area 'B' is described as an area southeast of Max Westheimer Airport bounded on the north by State Highway 9, on the south by State Highway 33, on the west by the railroad tracks extending southeast from Norman, OK, and on the east by an imaginary line extending south from the east side of Lake Thunderbird and ending at State Highway 33.

Practice area 'C' is described as an area west of Max Westheimer Airport bounded on the north by an imaginary line extending west from State Highway 9 southwest of Norman, OK to the town of Pocasset, OK, on the south by the 35° line of latitude, on the west by the line extending north and south along a similar direction road extending north from the town of Chickasha, OK, and on the east by the line extending north and south along a similar direction road extending south from the town of Blanchard, OK.