



UNIVERSITY *of*
DUBUQUE

**MULTI-ENGINE
AIRPLANE LAND CLASS
TRAINING COURSE OUTLINE**



UNIVERSITY *of* DUBUQUE

MULTI-ENGINE AIRPLANE LAND CLASS TRAINING COURSE OUTLINE

UNIVERSITY of DUBUQUE

This is to certify that

_____ is enrolled in the FAA approved

MULTI-ENGINE RATING COURSE

conducted at the University of Dubuque

School #GV8S178Q

_____ Enrollment Date

_____ Primary Flight Instructor

_____ Chief Flight Instructor

AIRPLANE MULTI-ENGINE LAND CLASS
CERTIFICATION COURSE

STUDENT FLIGHT RECORD

University of Dubuque / 2000 University Ave / Dubuque, IA 52001

FTN #

AIR AGENCY CERTIFICATE NO. GV8S178Q

PILOT'S LEGAL NAME _____ SODA
PILOT'S LEGAL SIGNATURE _____
SSN _____ Date of Birth _____

CITIZENSHIP

I certify that _____ has presented to me a _____
(Certified Birth Certificate or U.S. Passport), establishing that _____ (He or She) is a U.S.
citizen or national in accordance with 49 CFR 1552.3(h).

Instructor _____ Date _____

Certificate No. _____ Expires _____

PERMANENT ADDRESS

Street _____

City _____ State _____ Zip _____

Phone: Home _____ Cell _____

Date of Enrollment _____ Date Completed _____

Medical Certificate: Class _____ Date Issued _____ Expires _____

Pilot Certificate No. _____ Date Issued _____

GRADUATION RECORD

END-OF-COURSE GRADUATION: DATE _____ RESULT _____

END-OF-COURSE EXAMINER _____

RECORDS CERTIFIED COMPLETE AND ACCURATE: DATE _____

NAME _____ TITLE _____

PREVIOUS EXPERIENCE

DUAL _____

NIGHT SOLO _____

SOLO _____

NIGHT LANDINGS _____

X-C DUAL _____

HOOD _____

X-C SOLO _____

ACTUAL IFR _____

NIGHT DUAL _____

FLIGHT TRAINING DEVICE _____

EVALUATION

FLIGHT / ORAL BY _____ DATE _____

TITLE _____

CHIEF OR ASSISTANT CHIEF INSTRUCTOR

CREDIT GIVEN

GROUND HOURS: Part 141 _____ Part 61 _____ HOURS AWARDED _____

FLIGHT HOURS: Part 141 _____ Part 61 _____ HOURS AWARDED _____

TERMINATION OF TRAINING

DATE _____

CERTIFIED BY _____

CHIEF OR ASSISTANT CHIEF INSTRUCTOR

CERTIFICATE NO.

TRANSFERRED

SCHOOL _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

TRANSFER DATE _____

AIR AGENCY NO. _____

COPY ISSUED TO STUDENT: DATE _____ BY _____

List of Effective Pages

This list of effective pages shows the standing of all pages in this syllabus with regard to their revision status.

The list shows the page number, the revision number and the date of the revision.

Revised pages in this syllabus will include a change bar (|) on the side of the page where changes have been made.

The Revision Process

1. Revise the pages in question.
2. Make two copies of the revised pages.
3. Correct this “List of Effective Pages” to reflect the revised pages.
4. Make two copies of this corrected “List of Effective Pages”.
5. Send all four copies to the local Flight Standards District Office for approval.
6. Insert corrected pages in all syllabus copies when approval is granted.

<u>Page</u>	<u>Revision</u>	<u>Revision Date</u>	<u>Page</u>	<u>Revision</u>	<u>Revision Date</u>
1	Original	11-02-2004	27	Revision 11	09-15-2018
2	Original	11-02-2004	28	Revision 3	01-09-2014
3	Revision 13	10-15-2019	29	Revision 11	09-15-2018
4	Original	11-02-2004	30	Revision 11	09-15-2018
5	Revision 14	05-13-2021	31	Revision 13	10-15-2019
6	Revision 12	06-01-2019	32	Revision 11	09-15-2018
7	Revision 13	10-15-2019	33	Revision 11	09-15-2018
7a	Revision 14	05-13-2021	34	Revision 13	10-15-2019
8	Original	11-02-2004	35	Revision 13	10-15-2019
9	Revision 13	10-15-2019	36	Revision 13	10-15-2019
10	Original	11-02-2004	37	Revision 9	06-01-2017
11	Revision 9	06-01-2017	38	Revision 13	10-15-2019
12	Revision 1	11-23-2009	39	Revision 9	06-01-2017
13	Revision 11	09-15-2018	39a	Revision 9	06-01-2017
14	Revision 11	09-15-2018	40	Revision 2	05-07-2012
15	Revision 13	10-15-2019	41	Revision 1	11-23-2009
16	Revision 11	09-15-2018	42	Revision 1	11-23-2009
17	Revision 13	10-15-2019	43	Revision 8	03-23-2015
18	Revision 2	11-23-2009	44	Revision 1	11-23-2009
19	Revision 13	10-15-2019	45	Revision 1	11-23-2009
20	Revision 11	09-15-2018	46	Revision 1	11-23-2009
21	Revision 2	11-23-2009	47	Revision 1	11-23-2009
22	Revision 13	10-15-2019	48	Revision 1	11-23-2009
23	Revision 11	09-15-2018	49	Revision 1	11-23-2009
24	Revision 13	10-15-2019	50	Revision 1	11-23-2009
25	Revision 13	10-15-2019	51	Revision 1	11-23-2009
26	Revision 3	06-05-2012			

TRAINING COURSE OUTLINE

LOCATION

The University of Dubuque, located at 2000 University Avenue, Dubuque, Iowa, 52001, holds Air Agency Certificate No. GV8S178Q. The University of Dubuque operates its pilot training school at the Dubuque Regional Airport, Dubuque, Iowa.

COURSE TITLE

Airplane Multi-Engine Land Class Rating Certification Course

This Training Course Outline meets all the curriculum requirements for the Airplane Multi-Engine Land Class Rating Certification Course contained in Appendix I to Title 14 Code of Federal Regulation Part 141 (14 CFR Part 141). This syllabus contains separate flight training and ground training sections, which may be taught concurrently or separately.

COURSE OBJECTIVE

Students will gain the knowledge, skill and aeronautical experience necessary to meet the requirements for the addition of a Multi-Engine Land Class Rating to a Commercial Pilot Certificate.

COURSE COMPLETION STANDARDS

To meet the course completion standards, students must demonstrate through knowledge, oral, flight tests, and appropriate records, that they meet the knowledge, skill and experience requirements necessary to acquire a Multi-Engine Land Class Rating.

MAIN OPERATIONS BASE

The Dubuque Regional Airport is the main operations base for training in this course. The airport has hard-surface runways and meets the requirements of 14 CFR 141.38 for day and night operations. Fuel services and maintenance services are available weekdays during normal working hours. Weekend and after hours fuel and maintenance are available on request.

MAIN OPERATIONS FACILITY

The school's primary flight facility is the Babka Flight Center, 10656 Airport Road, located at the Dubuque Regional Airport, Dubuque, Iowa 52003. This building conforms to the requirements of 14 CFR 141.43 for briefing areas and 14 CFR 141.45 for ground training facilities. This permanent structure has 10 briefing areas of at least 6' by 7' and 14 additional office/training rooms with a maximum number of two students per area. Each briefing/training room will have communications capabilities for contacting a Flight Service Station. The building has Wi Fi capabilities for students and instructors to access weather and flight planning applications online.

GROUND INSTRUCTIONAL FACILITIES

The primary ground instructional facilities are in the Babka Flight Center, located at the Dubuque Regional Airport, Dubuque, Iowa 52003. This facility has three classrooms with a capacity of 24 students in each. The building and rooms are heated, lighted, and ventilated to conform to local building, sanitation, and health codes.

Based on enrollment and class formats, ground schools may also be conducted on the main campus of the University of Dubuque located at 2000 University Avenue, Dubuque, Iowa 52001. The University of Dubuque is accredited by the North Central Association of the Council for Higher Education. The University's classrooms meet the requirements of the Association and conform to local building, sanitation and health codes. Campus classrooms and computer labs are available in the Myers Library, Blades Hall, Alumni Hall, Dunlap Technology Center, MTAC, Mercer-Birmingham, and the University Science Center. Classrooms range in size from 142 seats in the Dunlap Technology Center to 6 seats in the Myers library.

GROUND INSTRUCTIONAL EQUIPMENT / TRAINING AIDS

Training aids and equipment used may include the following: Whiteboards, televisions, podium, LCD/Overhead projector with screen, laptop and/or desktop and/or tablet computers, computer/video interface units for TV/LCD projector. Other aids may include airplane models, airplane parts, instrument panel posters, aviation software, multiple aviation websites, E6B flight computer, plotter, navigation charts, Instrument Terminal Procedures, and EFB's. These aids and equipment will be kept accurate and current for the relevant course of training.

An Advanced Aviation Training device (AATD) may be used in this course as outlined in 14 CFR 141 and AC 61-136. An aircraft may be used to fulfill the instrument training requirement of those lessons if the training devices are not available or desired.

TRAINING DEVICES

The FRASCA RTD and ALSIM 250 are approved Advanced Aviation Training Devices that are available for training in accordance with their respective FAA Letter of Authorization.

AIRCRAFT

Piper Seminole PA-44-180s are available for flight training.

For day, VFR, local area flight within 25 nautical miles of Dubuque Regional Airport or an approved satellite base, an airplane can be dispatched when it meets the requirements of 14 CFR 91.205 (a)(b), and has a serviceable communications radio.

For night, VFR, local area flight within 25 nautical miles of Dubuque Regional Airport or an approved satellite base, an airplane can be dispatched when it meets the requirements of 14 CFR 91.205 (a)(b)(c), and has a serviceable communications radio, and a serviceable landing light.

For flight outside the local area, the airplane must meet the above requirements and also be equipped with at least one serviceable VOR navigational receiver, or one panel mounted GPS receiver.

PERSONNEL

The Chief Instructor for the Airplane Multi-Engine Land Class Certification Course meets the requirements for Chief Instructor as listed in the 14 CFR 141.35 and has been approved by the local FAA Flight Standards District Office. When course enrollments and individual availabilities warrant such appointments, the University of Dubuque will request the appointment of other key personnel such as; Assistant Chief Instructors, Check Instructors and Chief Ground Instructors. All requested appointees will meet the requirements of the appropriate sections of 14 CFR 141.35, Subpart B.

Flight instructors will have a Certified Flight Instructor, Airplane Multi-Engine Land rating, will have received standardization, and will receive recurrent training annually.

CHIEF AND ASSISTANT CHIEF INSTRUCTORS

The Chief Flight Instructor for the Multi-engine Airplane Land Class Rating Course is Ms. Suzanne Peterson certificate #2801778.

The Chief Ground Instructor for the Multi-engine Airplane Land Class Rating Course is Ms. Polly Kadolph certificate #3689827.

The following persons have been authorized as Assistant Chief Flight Instructors for the Multi-engine Airplane Land Class Rating Course: Mr. Michael J. Glynn certificate #2883378, Mr. Robert Anthony (Tony) Foster certificate #3213651, Mr. Kyle F. Jones certificate #3755779, Mr. Jack D. Erickson certificate #3891398, and Mr. Ching-Kuan Su certificate #3540078.

ENROLLMENT PREREQUISITES

Students must be able to write, read, speak, and understand the English language and possess a Commercial Pilot Certificate with an instrument rating prior to enrolling in the flight portion of the Airplane Multi-engine Land Class Course.

ENROLLMENT PROCEDURE

Upon enrollment in the flight portion of the training syllabus students will be issued a Certificate of Enrollment showing the date of enrollment and the course entered. Students will also receive a copy of the approved training syllabus. Students may enter the ground portion of the syllabus prior to or during the flight portion. Enrollment certificates and syllabi will be retained at UD Flight Operations at all times unless otherwise directed by the Chief Instructor. Students will have access to a copy of the University of Dubuque Student Flight Operations Manual which outlines the school's operational and safety procedures.

CREDIT FOR PREVIOUS 14 CFR PART 141 PILOT TRAINING

Flight credit may be transferred from other certificated schools to the University of Dubuque's flight program based on an oral test, flight check, written test, or any combination thereof. Students must arrange for the transmittal of flight records from the previous school to the University of Dubuque. The University will determine the amount of credit to be transferred. Credit will be entered in the student's training record along with the documents and tests on which the acceptance is based. The maximum credit given may be up to 50% of the University's approved curriculum requirements.

CREDIT FOR PREVIOUS 14 CFR PART 61 PILOT TRAINING

Flight credit may be transferred from 14 CFR Part 61 schools to the University of Dubuque's flight program based on an oral test, flight check, written test or any combination thereof. Students should submit a record of previous training from the school where it was received. The University will determine the amount of credit to be transferred. Credit will be entered in the student's training record along with the documents and tests on which the acceptance is based. The maximum credit given may be up to 25% of the University's approved curriculum requirements.

GRADING SYSTEM FOR FLIGHT TRAINING

GRADE STANDARD

- 3.....Meets Practical Test Standards
- 2.....Meets Lesson Standards
- 1.....Needs Additional Training
- D.....Demonstration

The above grading standard will be used to evaluate student performance. Grades will be entered on each lesson page. At the completion of each stage of training the students will be examined orally and by flight evaluation. Upon successful completion of the evaluation the student will proceed to the next stage of flight training.

AIRPORTS USED

The airports listed below are approved for use by the University of Dubuque, 14 CFR Part 141 Airplane Multi-Engine Land Class student to satisfy the requirements of the school's Multi-Engine Land Class Certification Course syllabus. Mileage to these airports is indicated.

IOWA	ILLINOIS	MISSOURI	MINNESOTA
Mason City (MCW) - 124 Des Moines (DSM) - 142	Midway (MDW) - 137 Chicago Executive (PWK) - 125	Kansas City (MKC) - 265 St. Louis (STL) - 220	Rochester (RST) - 120 St. Paul (STP) - 183

Other airports may be selected by a student, but those airports must be approved by a university multi-engine flight instructor, considering the following: (1) 3000' recommended minimum runway length (2) availability of 100LL aviation gasoline. Instructors must ensure that all airports used meet the requirements of Title 14 CFR Part 141.38 (b) (c) (d) (e) and (f).

REVIEW LESSON PROCEDURE

During training, students may need to do additional work on lessons, or review past lessons. If an instructor needs additional lesson pages the instructor will:

- Copy a blank lesson page for the lesson concerned;
- Use the copied page to record the review or additional work;
- Write the word "Review" in a prominent place on the copied lesson page;
- Place the added lesson page(s) sequentially behind the original lesson page.

	Dual Local Flight	Dual X-Country Day	Dual X-Country Night	Dual Instrument or AATD*
STAGE 1	5			
STAGE 2	1	2	2	5
TOTALS	6	2	2	5*
Total minimum Multi-Engine flight training time is 10 hours to include 5 hours of instrument training.				

* A maximum of 2 hours may be flown in an approved AATD.

HOW TO USE THIS SYLLABUS

1. This syllabus was designed to be a reasonable complete list of the tasks required for the completion of each lesson. The list of tasks relieves the instructor of having to remember all of the things that should be covered and rated in each lesson. At first, the number of tasks may seem daunting; however, they flow in a natural progression from start to finish and should cause little additional load on the instructor. Some tasks may be accompanied by italicized notes. These notes are additional memory helps for the instructor, student and check pilot.
2. At the top left of each lesson page is a block labeled "HOURS". There are three white blocks inside the black "HOURS" block. Each lesson allows for three flights or briefings. You should put the time for each flight or briefing in one of the white boxes. When a lesson is completed, that is, when every task in the lesson has a grade of "2" or better, the instructor should total up the time for the lesson and enter it at the bottom of the page in the cumulative times area.
3. Each task in a lesson has three blank lines to the left. These lines are for recording the rating of each task. Every task in a lesson must receive a rating of "2" or better before the lesson can be considered complete. If a lesson requires more than three flights or briefings to complete the lesson, the instructor will insert and use blank copies of the original lesson to record further flights or briefings, until the lesson is satisfactorily completed.
4. Lessons may require the instructor's and the student's signature, along with the date, airplane type, and airplane "N" number at the completion of each flight or briefing.
5. The cumulative times area at the bottom of each lesson is self-explanatory. It is the instructor's and the student's combined responsibility to make sure this area is accurately filled out, not at the conclusion of each flight or briefing, but at the conclusion of each lesson. Be sure to carry the "TOTAL" time for a finished lesson to the "PREVIOUS" time on the next lesson.
6. The "TIME" requirement at the top of each lesson is the time required for the student to stay "on track", time wise, throughout the syllabus. A lesson may be completed with somewhat less than the approximate time noted, but this time must then be made up in later lessons if the student is to finish the syllabus with the required amount of time. Having more hours than required is not a problem. Having fewer hours than suggested is cause for the instructor to be aware of the situation and work to ensure that the student finishes the stage and syllabus with the required number of hours. We will use the command and response method of checklist usage. That is, the pilot not flying will read the item while the pilot flying will perform the task with the appropriate verbal response. The PNF will visually confirm that the task has been properly performed.
7. All flight training should contain elements of crew resource management (CRM) and cockpit resource management training. The flight instructor should observe, evaluate and train the student on performing the duties of Pilot In Command and should act like a Second In Command and provide the student with training in crew concept setting during cross-country flights.

ABBREVIATIONS

a/c	aircraft	FAR	Federal Aviation Regulation	pre	before
ACS	Airman Certification Standards	freq	frequency / frequencies	prep	preparation
a/s	airspeed	FSS	Flight Service Station	pwr	power
ADF	Automatic Direction Finder	FTD	Flight Training Device	req	required
alt	altitude	GPS	Global Positioning System	RNAV	Area Navigation
approx	approximately	hdg	heading	sim	simulated
ARROW	Airworthiness, registration, radio license (international), operator's manual, weight and balance	hr	hour	TACs	Terminal Area Charts
ATC	Air Traffic Control	HSI	Horizontal Situation Indicator	TC	true course
BC	Back Course	IAS	Indicated Airspeed	TCO	Training Course Outline
calcs	calculations	ID	identify	VHF	very high frequency
CG	center of gravity	IFR	Instrument Flight Rules	Vmc	Visual Meteorological Conditions
comm	communication	ILS	Instrument Landing System	VR-IR	Integrated flight training using visual and instrument reference
Cs	constant speed	inop	inoperative	vol	volume
cx	correction	inst	flight solely by reference to instruments while using a view limiting device	VOR	very high freq, omni directional, radio range
dist	distance	LOC	Localizer	Vx	best angle of climb
DME	Distance Measuring Equipment	MRA	Manufacturer's recommended airspeed	Vy	best rate of climb
EGT	Exhaust Gas Temperature	nav	navigation	WACs	World Aeronautical Charts
equip	equipment	NDB	Non Directional Base	X-country	cross country
ETA	estimated time of arrival	OBS	Omni Bearing Selector	xmitter	transmitter
FAA	Federal Aviation Association	ops	operations	X-wind	crosswind
		PMC	pre-maneuver checklist	√	The aircraft checklist will be used
		PNF	Pilot not flying		

MULTI-ENGINE AIRPLANE LAND CLASS RATING CERTIFICATION

Training Course Outline

STAGE ONE

Lessons 1—6

During this stage the student will learn the flight procedures and maneuvers necessary to competently and safely operate a twin-engine airplane with both engines operating normally. In addition, the student will learn the techniques and procedures used to meet engine-out emergencies. This includes engine shutdown, engine-out maneuvering, and V_{mc} recoveries.

The student must successfully complete each of the flight lessons. Additionally, at the completion of this stage the student must be able to perform all normal and emergency operating procedures and maneuvers applicable to a multi-engine rating. The student will also be able to accurately and smoothly maneuver the airplane with one engine inoperative with tolerances stated in the completions standards.

The student should be using CRM techniques in the operation of the aircraft in coordination with the instructor when appropriate.

This stage has a minimum of 5 hours of instruction.

Hours		

MULTI-ENGINE LESSON 1— (BRIEFING) AIRCRAFT SYSTEMS AND AIRCRAFT FAMILIARIZATION

OBJECTIVE: To review multi-engine aircraft systems - general and aircraft specific.
TIME: As required

PREFLIGHT PREPARATION

- ___ ___ ___ Pilot's Operating Handbook
- ___ ___ ___ Aircraft log books
- ___ ___ ___ Certificates and documents
- ___ ___ ___ Vmc factors

PERFORMANCE AND LIMITATIONS

- ___ ___ ___ Weight and balance
- ___ ___ ___ Takeoff calculations
 - ___ ___ ___ Takeoff ground roll
 - ___ ___ ___ Takeoff over obstacle
- ___ ___ ___ Accelerate / stop calculations
- ___ ___ ___ Climb performance—all engines operating, gear up and down
- ___ ___ ___ SE climb performance
- ___ ___ ___ Time, fuel, distance to climb
- ___ ___ ___ Cruise performance charts
- ___ ___ ___ Time, fuel, distance to descend
- ___ ___ ___ Landing calculations
 - ___ ___ ___ Over 50' obstacle
 - ___ ___ ___ Landing ground roll
- ___ ___ ___ V Speeds

AIRCRAFT SYSTEMS

- ___ ___ ___ Fuel, oil, hydraulic systems - general
- ___ ___ ___ Fuel, oil, hydraulic systems - A/C specific
- ___ ___ ___ Electrical systems - general
- ___ ___ ___ Electrical systems - A/C specific
- ___ ___ ___ Avionics—A/C specific
- ___ ___ ___ Landing gear systems - general
- ___ ___ ___ Landing gear systems - A/C specific
- ___ ___ ___ Propeller systems - general

AIRCRAFT SYSTEMS cont.

- ___ ___ ___ Propeller synchronizing systems - general
- ___ ___ ___ Propeller systems - A/C specific
- ___ ___ ___ Propeller synchronizing systems - A/C specific
- ___ ___ ___ A/C powerplant
- ___ ___ ___ Turbo charging & supercharging systems - general
- ___ ___ ___ Pitot static and associated instruments
- ___ ___ ___ De-ice and anti-ice systems - general
- ___ ___ ___ De-ice and anti-ice systems - A/C specific
- ___ ___ ___ Environmental and pressurization systems

COMPLETION STANDARDS

This lesson will be complete when the student's knowledge of all items rates a grade of 2 or better.

<u>Instructor</u>	<u>Student</u>	<u>Date</u>

NOTES

Hours		

MULTI-ENGINE LESSON 2 AIRCRAFT—(DUAL) AIRCRAFT FAMILIARIZATION

OBJECTIVE: The student will be familiarized with the operations of the aircraft systems, power settings and airspeeds for normal operations.

TIME: Approximately 1.0 hour.

PREFLIGHT BRIEFING

- ___ ___ ___ Discussion of this lesson
- ___ ___ ___ Wake turbulence and wind shear avoidance
- ___ ___ ___ Collision avoidance
- ___ ___ ___ RUNWAY INCURSION avoidance

EMERGENCY PROCEDURES— REVIEW

- ___ ___ ___ Positive exchange of control
- ___ ___ ___ Pre take off briefing
- ___ ___ ___ Precautions and actions in case of real emergency

PREFLIGHT PROCEDURES

- ___ ___ ___ Weight and balance calculations
- ___ ___ ___ Obtain and brief weather
- ___ ___ ___ Performance charts
- ___ ___ ___ Take off calculations
- ___ ___ ___ Accelerate / stop calculation
- ___ ___ ___ Multiengine climb performance, gear down and up
- ___ ___ ___ Single engine climb performance
- ___ ___ ___ Time, fuel, distance to climb
- ___ ___ ___ Cruise calculations
- ___ ___ ___ Time, fuel, distance to descend
- ___ ___ ___ Landing calculations

PREFLIGHT

- ___ ___ ___ Cockpit ✓
- ___ ___ ___ Certificates & documents—*ARROW*
- ___ ___ ___ Preflight inspection ✓
- ___ ___ ___ Airplane servicing

STARTUP

- ___ ___ ___ Engine start ✓
- ___ ___ ___ Comm radio setup—*freq, vol, xmitter*
- ___ ___ ___ GPS / RNAV, NAV radio setup—*freq, ID, set course*

TAXI

- ___ ___ ___ Taxi ✓
- ___ ___ ___ Taxi clearance—*copy, confirm, comply*
- ___ ___ ___ Begin taxi—*brake check, steering check*
- ___ ___ ___ Taxiing—*wind, speed, braking, hazards*
- ___ ___ ___ Traffic watch / Call HOLD SHORT lines
- ___ ___ ___ Runup ✓
- ___ ___ ___ Radio communications

TAKEOFF / CLIMB / CRUISE

- ___ ___ ___ Takeoff ✓
- ___ ___ ___ Take off briefing
- ___ ___ ___ Takeoff clearance—*copy, confirm, comply*
- ___ ___ ___ Take off—normal, crosswind
- ___ ___ ___ Traffic pattern departure
- ___ ___ ___ Climb
- ___ ___ ___ Cruise climb
- ___ ___ ___ Level-off from climb
- ___ ___ ___ Cruise ✓
- ___ ___ ___ Leaning procedures (EGT)
- ___ ___ ___ Cruise power settings for various attitudes
- ___ ___ ___ Turns, climbs, various a/s and configurations

**MULTI-ENGINE LESSON 2 AIRCRAFT—(DUAL) AIRCRAFT FAMILIARIZATION
(Continued)**

DESCENTS

___	___	___	Planning
___	___	___	Descent √
___	___	___	Descents, various a/s and config
___	___	___	Descent at cruise airspeed
___	___	___	Level off from descent
___	___	___	Descents at approach airspeed and landing config with turns

APPROACH AND LANDING

___	___	___	Landing √
___	___	___	Radio communications
___	___	___	Traffic pattern entry
___	___	___	Traffic pattern
___	___	___	Normal, x-wind landing
___	___	___	Engine shut down
___	___	___	Securing the aircraft

POSTFLIGHT

___	___	___	Post flight inspection of aircraft
___	___	___	Debrief
___	___	___	Complete TCO and logbook

COMPLETION STANDARDS

The lesson will be complete when all areas have a grade of 2 or better.

Straight and level flight	+/- 200 feet
Heading	+/- 15 degrees
Airspeed	+/- 15 KIAS

<u>Instructor</u>	<u>Student</u>	<u>Date</u>	<u>A/C Type</u>	<u>N#</u>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

	Dual Pre/Post	Dual Day	Dual Night	Dual X-Ctry	Dual Inst	Dual AATD	Total A/C	Inst/AATD
Previous								
This Lesson								
Total								

Hours		

MULTI-ENGINE LESSON 3 AIRCRAFT (DUAL)—STEEP TURNS, SLOW FLIGHT, STALLS

OBJECTIVE: The student will become familiar with the aircraft handling in slow flight, stalls, steep turns and short field take offs and landings.

TIME: Approx 1 hour.

PREFLIGHT BRIEFING

- ___ ___ ___ Discussion of this lesson
- ___ ___ ___ Wake turbulence and wind shear avoidance
- ___ ___ ___ Collision avoidance
- ___ ___ ___ RUNWAY INCURSION avoidance

EMERGENCY PROCEDURES—REVIEW

- ___ ___ ___ Positive exchange of control
- ___ ___ ___ Pre take off briefing
- ___ ___ ___ Precautions and actions in case of emergency

PREFLIGHT PROCEDURES

- ___ ___ ___ Weight and balance calculations
- ___ ___ ___ Obtain and brief weather
- ___ ___ ___ Performance charts
- ___ ___ ___ Take off calculations
- ___ ___ ___ Accelerate / stop calculations
- ___ ___ ___ Multiengine climb performance, gear up and down
- ___ ___ ___ Single engine climb performance
- ___ ___ ___ Time, fuel, distance to climb
- ___ ___ ___ Cruise calculations
- ___ ___ ___ Time, fuel, distance to descend
- ___ ___ ___ Landing calculations

PREFLIGHT

- ___ ___ ___ Cockpit ✓
- ___ ___ ___ Certificates & documents—*ARROW*
- ___ ___ ___ Preflight inspection ✓
- ___ ___ ___ Airplane servicing

STARTUP

- ___ ___ ___ Engine start ✓
- ___ ___ ___ Comm radio setup—*freq, vol, xmitter*
- ___ ___ ___ GPS / RNAV, Nav radio setup—*freq, ID, set course*

TAXI

- ___ ___ ___ Taxi ✓
- ___ ___ ___ Taxi clearance—*copy, confirm, comply*
- ___ ___ ___ Begin taxi—*brake check, steering check*
- ___ ___ ___ Taxiing—*wind, speed, braking, hazards*
- ___ ___ ___ Traffic watch / Call HOLD SHORT lines
- ___ ___ ___ Run-up ✓
- ___ ___ ___ Radio communications

TAKEOFF / CLIMB / CRUISE

- ___ ___ ___ Takeoff ✓
- ___ ___ ___ Take off briefing
- ___ ___ ___ Takeoff clearance—*copy, confirm, comply*
- ___ ___ ___ Take off—short, 0° flaps
- ___ ___ ___ Traffic pattern departure
- ___ ___ ___ Level-off from climb
- ___ ___ ___ Cruise ✓
- ___ ___ ___ Leaning procedures (EGT)
- ___ ___ ___ Cruise power settings

**MULTI-ENGINE LESSON 3 AIRCRAFT (DUAL)—STEEP TURNS, SLOW FLIGHT, STALLS
(Continued)**

PERFORMANCE MANUEVER

____ ____ ____ Steep turns

SLOW FLIGHT

____ ____ ____ Various configurations

____ ____ ____ Climbs / descents

____ ____ ____ Turns

STALLS

____ ____ ____ Power off

____ ____ ____ Power on

____ ____ ____ Accelerated

COMPLETION STANDARDS

The lesson will be complete when all areas have a grade of 2 or better.

Standards are as follows:

1. Altitude ± 100 feet
2. Headings $\pm 10^\circ$
3. Airspeed ± 10 knots
4. Bank $\pm 5^\circ$

APPROACH AND LANDING

____ ____ ____ Landing \checkmark

____ ____ ____ Radio communications

____ ____ ____ Traffic pattern entry

____ ____ ____ Traffic pattern

____ ____ ____ Short field obstacle landing

____ ____ ____ Zero flap landing

____ ____ ____ Engine shut down

____ ____ ____ Securing the aircraft

POSTFLIGHT

____ ____ ____ Post flight inspection of aircraft

____ ____ ____ Debrief

____ ____ ____ Complete TCO and logbook

Instructor

Student

Date

A/C Type

N#

_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

	Dual Pre/Post	Dual Day	Dual Night	Dual X-Ctry	Dual Inst	Dual AATD	Total A/C	Inst/AATD
Previous								
This Lesson								
Total								

Hours		

MULTI-ENGINE LESSON 4—BRIEFING—CROSS-COUNTRY PLANNING AND ENGINE-OUT PROCEDURES

OBJECTIVE: Review certification and cross-country procedures for normal category multi-engine airplane and introduce engine-out and emergency procedures.

TIME: As required.

MULTI-ENGINE AIRPLANE CERTIFICATION REQUIREMENTS

____ FAR 23 / Vmc factors

V SPEEDS

____ Definitions and POH values

WEATHER INFORMATION

____ Weather charts

____ METARs, TAFs, FDs,

____ PIREPS, SIGMETS, AIRMETS

____ Go, no-go decisions

FLIGHT PLANNING

____ Aeronautical charts

____ Airport/Facility Directories

____ NOTAMS

____ Flight log preparation

____ Taxi chart review

____ Weight and balance

____ Performance charts

____ Fuel planning

____ Filing flight plans

AERODYNAMICS—ENGINE-OUT

____ Induced airflow

____ Factors causing yaw and turning tendency

____ Definition of Vmc

____ Factors affecting Vmc

____ Definition of critical engine

____ Feathering

____ Zero sideslip

EMERGENCY PROCEDURES

____ Positive exchange of control

____ Pre take off briefing

____ Engine failure, take off below Vmc

____ Engine failure, take off after rotation

____ Engine failure, take off after rotation, insufficient runway

____ Engine failure in traffic pattern

____ Engine failure in cruise

EMERGENCY PROCEDURES continued

____ Precautions and actions in case of real emergency

____ Approach & landing single-engine

____ Engine roughness or overheat

____ Carburetor or induction icing

____ Loss of oil pressure

____ Fuel starvation

____ Electrical malfunctions

____ Vacuum pressure malfunction

____ Pitot/Static malfunction

____ Landing gear or flap malfunction

____ Inop/Runaway trim

____ Inadvertent door or window opening

____ Structural icing

____ Smoke/Fire/Engine compartment fire

____ Emergency descent

PREFLIGHT PROCEDURES

____ Accelerate / stop calculation

____ Single engine climb performance

ENGINE-OUT EMERGENCY PROCEDURES

____ Identifying inop engine (before shut down)

____ Control inputs required (before shut down)

____ Proper flap and gear retraction

____ Engine shutdown and feather (use fuel shut off valve)

____ X-feed operations

____ Use of Checklist

ENGINE-OUT MANEUVERING

____ Use of trim

____ Engine-out cruise with turns

____ Engine-out climbs and descents with turns

____ In-flight restart of shut-down engine

____ Engine-out missed approach

MANEUVER

____ Vmc demonstration

MULTI-ENGINE LESSON 4—BRIEFING—CROSS-COUNTRY PLANNING AND ENGINE-OUT PROCEDURES
(Continued)

NOTE

Single engine go-around to be initiated at least 400' AGL or higher.

COMPLETION STANDARDS

This lesson will be complete when the student's knowledge of all items rates a grade of 2 or better.

Instructor

Student

Date

_____	_____	_____
_____	_____	_____
_____	_____	_____

	Dual Pre/Post	Dual Day	Dual Night	Dual X-Ctry	Dual Inst	Dual AATD	Total A/C	Inst/AATD
Previous								
This Lesson								
Total								

Hours		

MULTI-ENGINE LESSON 5 (DUAL)—ENGINE OUT AND EMERGENCY PROCEDURES

OBJECTIVE: To introduce single engine and emergency procedures in the aircraft.

TIME: Approximately 1.5 hours.

PREFLIGHT BRIEFING

- ___ ___ ___ Discussion of this lesson
- ___ ___ ___ Wake turbulence and wind shear avoidance
- ___ ___ ___ Collision avoidance
- ___ ___ ___ RUNWAY INCURSION avoidance
- ___ ___ ___ Emergency checklists
- ___ ___ ___ Memory items

EMERGENCY PROCEDURES—BRIEFING

- ___ ___ ___ Positive exchange of control
- ___ ___ ___ Pre take off briefing
- ___ ___ ___ Engine failure, take off below Vmc
- ___ ___ ___ Engine failure, take off after rotation
- ___ ___ ___ Engine failure, take off after rotation, insufficient runway
- ___ ___ ___ Engine failure in traffic pattern
- ___ ___ ___ Engine failure in cruise
- ___ ___ ___ Precautions and actions in case of real emergency

PREFLIGHT PROCEDURES

- ___ ___ ___ Weight and balance calculations
- ___ ___ ___ Obtain and brief weather
- ___ ___ ___ Performance charts
- ___ ___ ___ Short and obstacle clearance take off calculations
- ___ ___ ___ Accelerate / stop calculation
- ___ ___ ___ Multiengine climb performance gear up and down
- ___ ___ ___ Single engine climb performance
- ___ ___ ___ Short and obstacle clearance landing calculations

PREFLIGHT

- ___ ___ ___ Cockpit ✓
- ___ ___ ___ Certificates & documents—*ARROW*
- ___ ___ ___ Preflight inspection ✓
- ___ ___ ___ Airplane servicing

STARTUP

- ___ ___ ___ Engine start ✓
- ___ ___ ___ Comm radio setup—*freq, vol, xmitter*
- ___ ___ ___ GPS / RNAV, nav radio setup—*freq, ID, set course*

TAXI

- ___ ___ ___ Taxi ✓
- ___ ___ ___ Taxi clearance—*copy, confirm, comply*
- ___ ___ ___ Begin taxi—*brake check, steering check*
- ___ ___ ___ Taxiing—*wind, speed, braking, hazards*
- ___ ___ ___ Traffic watch / Call HOLD SHORT lines
- ___ ___ ___ Run-up ✓
- ___ ___ ___ Radio communications

TAKEOFF / CLIMB / CRUISE

- ___ ___ ___ Takeoff ✓
- ___ ___ ___ Take off briefing
- ___ ___ ___ Takeoff clearance—*copy, confirm, comply*
- ___ ___ ___ Simulated engine failure on take off ground roll
- ___ ___ ___ Take off—crosswind
- ___ ___ ___ Take off—short obstacle 0° flaps
- ___ ___ ___ Simulated engine failure on climb-out
- ___ ___ ___ Traffic pattern departure
- ___ ___ ___ Level-off from climb
- ___ ___ ___ Cruise ✓
- ___ ___ ___ Leaning procedures (EGT)
- ___ ___ ___ Cruise power settings

MULTI-ENGINE LESSON 5 (DUAL)—ENGINE OUT AND EMERGENCY PROCEDURES
(Continued)

ENGINE-OUT EMERGENCY PROCEDURES

- ___ ___ ___ Identifying inop engine (before shut down)
- ___ ___ ___ Control inputs required (before shut down)
- ___ ___ ___ Proper flap and gear retraction
- ___ ___ ___ Engine shutdown and feather (use fuel shut off valve)
- ___ ___ ___ Use of checklist

ENGINE-OUT MANEUVERING

- ___ ___ ___ X-feed operation
- ___ ___ ___ Use of trim
- ___ ___ ___ Engine-out cruise with turns
- ___ ___ ___ Engine-out climbs and descents with turns
- ___ ___ ___ In-flight restart of shut-down engine

SIMULATED MANEUVERS

- ___ ___ ___ Vmc demonstration

DESCENTS

- ___ ___ ___ Descent checklist
- ___ ___ ___ Descent at cruise airspeed
- ___ ___ ___ Level off from descent
- ___ ___ ___ Descents at approach airspeed and landing configurations with turns
- ___ ___ ___ Emergency descent

APPROACH AND LANDING

- ___ ___ ___ Landing ✓
- ___ ___ ___ Radio communications
- ___ ___ ___ Traffic pattern entry
- ___ ___ ___ Go around procedure (2 engines)
- ___ ___ ___ Single engine traffic pattern
- ___ ___ ___ Single engine go around
- ___ ___ ___ Single engine landing
- ___ ___ ___ Engine shut down
- ___ ___ ___ Securing the aircraft

POSTFLIGHT

- ___ ___ ___ Post flight inspection of aircraft
- ___ ___ ___ Debrief
- ___ ___ ___ Complete TCO and logbook

NOTE

Single engine go-around to be initiated at least 400' AGL or higher.

**MULTI-ENGINE LESSON 5 (DUAL)—OUT AND EMERGENCY PROCEDURES
(Continued)**

COMPLETION STANDARDS

The lesson will be complete when all areas have a grade of 2 or better.

Standards are as follows:

1. Altitude ± 100 feet
2. Headings $\pm 10^\circ$
3. Airspeed ± 10 knots
4. Vmc demo: $\pm 20^\circ$, ± 5 knots

<u>Instructor</u>	<u>Student</u>	<u>Date</u>	<u>A/C Type</u>	<u>N#</u>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

	Dual Pre/Post	Dual Day	Dual Night	Dual X-Ctry	Dual Inst	Dual AATD	Total A/C	Inst/AATD
Previous								
This Lesson								
Total								

NOTES

Hours		

**MULTI-ENGINE LESSON 6 — STAGE CHECK
AIRCRAFT HANDLING AND SINGLE ENGINE OPERATIONS**

OBJECTIVE: To review single engine and emergency procedures in the aircraft.
TIME: Approximately 1.5 hours.

- ___ ___ ___ **Vmc Factors**
- AIRCRAFT SYSTEMS—ORAL**
- ___ ___ ___ Electrical
- ___ ___ ___ Landing gear / hydraulic
- ___ ___ ___ Engine and propeller
- ___ ___ ___ Fuel / oil
- ___ ___ ___ Air frame and flight controls
- ___ ___ ___ Environmental

- PREFLIGHT BRIEFING**
- ___ ___ ___ Discussion of this lesson
- ___ ___ ___ V Speeds
- ___ ___ ___ Wake turbulence / wind shear
- ___ ___ ___ Weight and balance
- ___ ___ ___ Take off and landing calcs
- ___ ___ ___ Accelerate / stop calcs
- ___ ___ ___ Climb performance:
- ___ ___ ___ All engines operating,
 gear up and down
- ___ ___ ___ One engine inoperative

- ENGINE-OUT EMERGENCY PROCEDURES—
BRIEFING**
- ___ ___ ___ Engine failure below Vmc
- ___ ___ ___ Engine failure during climb-out
- ___ ___ ___ Memory items
- ___ ___ ___ Emergency checklists
- ___ ___ ___ Identifying inop engine
- ___ ___ ___ Control inputs required
- ___ ___ ___ Proper flap and gear retraction
- ___ ___ ___ Procedure for engine shutdown

- PREFLIGHT**
- ___ ___ ___ Cockpit ✓
- ___ ___ ___ Certificates and documents—
ARROW
- ___ ___ ___ Preflight inspection ✓
- ___ ___ ___ Airplane servicing

- STARTUP**
- ___ ___ ___ Engine start ✓
- ___ ___ ___ Comm radio setup—*freq, vol, xmitter*
- ___ ___ ___ GPS / RNAV, Nav radio setup—
freq, ID, set course

- TAXI**
- ___ ___ ___ Taxi ✓
- ___ ___ ___ Taxi clearance—*copy, confirm,
comply*
- ___ ___ ___ Begin taxi—*brake check,
steering check*
- ___ ___ ___ Taxiing—*wind, speed, braking,
hazards*
- ___ ___ ___ Traffic watch / Call HOLD
SHORT lines
- ___ ___ ___ Run-up ✓
- ___ ___ ___ Radio communications

MULTI-ENGINE LESSON 6 — STAGE CHECK
AIRCRAFT HANDLING AND SINGLE ENGINE OPERATIONS
(Continued)

TAKEOFF / CLIMB / CRUISE

- ___ ___ ___ Takeoff ✓
- ___ ___ ___ Take off briefing
- ___ ___ ___ Takeoff clearance—*copy, confirm, comply*
- ___ ___ ___ Simulated engine failure on take off ground roll
- ___ ___ ___ Take off—short obstacle 0° flaps
- ___ ___ ___ Simulated engine failure on climb-out
- ___ ___ ___ Traffic pattern departure
- ___ ___ ___ Level-off from climb—*VR-IR*
- ___ ___ ___ Cruise ✓
- ___ ___ ___ Leaning procedures (EGT)
- ___ ___ ___ Cruise power settings

SIMULATED SINGLE ENGINE OPERATION

- ___ ___ ___ Vmc demonstration

ENGINE-OUT EMERGENCY PROCEDURES

- ___ ___ ___ Use of checklist
- ___ ___ ___ Identifying inop engine
- ___ ___ ___ Control inputs required
- ___ ___ ___ Proper flap and gear retraction
- ___ ___ ___ Engine shutdown and feather
- ___ ___ ___ Emergency descent

ENGINE-OUT MANEUVERING

- ___ ___ ___ Use of trim
- ___ ___ ___ Engine-out cruise with turns
- ___ ___ ___ Engine-out climbs and descents with turns
- ___ ___ ___ In-flight restart of shut-down engine

SLOW FLIGHT, VARIOUS CONFIGURATIONS

- ___ ___ ___ Entry
- ___ ___ ___ Recovery

STALLS

- ___ ___ ___ Power off
- ___ ___ ___ Power on
- ___ ___ ___ Accelerated

PERFORMANCE MANEUVERS

- ___ ___ ___ Steep turns

SYSTEMS & EQUIPMENT MALFUNCTIONS

Select at least (5) of the following:

- ___ ___ ___ Engine roughness or overheat
- ___ ___ ___ Carburetor or induction icing
- ___ ___ ___ Loss of oil pressure
- ___ ___ ___ Fuel starvation
- ___ ___ ___ Electrical malfunction
- ___ ___ ___ Vacuum/Pressure malfunction
- ___ ___ ___ Pitot/Static
- ___ ___ ___ Landing gear or flap malfunction
- ___ ___ ___ Inop or runaway trim
- ___ ___ ___ Inadvertent door or window opening
- ___ ___ ___ Structural icing
- ___ ___ ___ Smoke/Fire/Engine compartment fire

DESCENTS

- ___ ___ ___ Descent checklist
- ___ ___ ___ Descent at cruise airspeed
- ___ ___ ___ Level off from descent

APPROACH AND LANDING

- ___ ___ ___ Landing check list
- ___ ___ ___ Traffic patterns
- ___ ___ ___ Short field
- ___ ___ ___ Zero flap landing
- ___ ___ ___ Normal/crosswind
- ___ ___ ___ Engine-out

MULTI-ENGINE LESSON 6 — STAGE CHECK
AIRCRAFT HANDLING AND SINGLE ENGINE OPERATIONS
(Continued)

SINGLE ENGINE GO AROUND AND LANDING—
SIMULATED

- ___ ___ ___ Go around (Initiate >400 ft AGL)
- ___ ___ ___ Traffic pattern
- ___ ___ ___ Landing
- ___ ___ ___ Engine shut down
- ___ ___ ___ Securing the aircraft

POSTFLIGHT

- ___ ___ ___ Post flight inspection of aircraft
- ___ ___ ___ Debrief
- ___ ___ ___ Complete TCO and logbook

COMPLETION STANDARDS

The lesson will be complete when all areas have a grade of 2 or better.

Standards are as follows:

1. Altitude ± 100 feet
2. Headings $\pm 10^\circ$
3. Airspeed ± 10 knots
4. Vmc demo: $\pm 20^\circ$, ± 5 knots

<u>Instructor</u>	<u>Student</u>	<u>Date</u>	<u>A/C Type</u>	<u>N#</u>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

	Dual Pre/Post	Dual Day	Dual Night	Dual X-Ctry	Dual Inst	Dual AATD	Total A/C	Inst/AATD
Previous								
This Lesson								
Total								

**MULTI-ENGINE RATING STAGE CHECK EVALUATION
(CONTINUED)**

CRITIQUE

RECOMMENDATION

- 1 _____ This stage check performance indicates that additional review is necessary.
- A. Do Review Lessons on all items marked "1" until your Instructor indicates a satisfactory "2".
 - B. Insert the Review Lesson sheets following this page.
 - C. Return to the Chief / Assistant Chief Instructor for reevaluation.

Check Instructor	Student	Date
_____	_____	_____

2 _____ This stage check was performed in a satisfactory manner.

Check Instructor	Student	Date
_____	_____	_____

MULTI-ENGINE AIRPLANE LAND CLASS RATING CERTIFICATION

Training Course Outline

STAGE TWO

Lessons 7—11

During this stage of training, the student will integrate lessons learned in VFR multi-engine operations to instrument flying. This stage will consist of a minimum of 5 hours of flying including the day and night cross-country flights as required by FAR Part 141, Appendix I 4 (k)(2)(i) through (v).

Three (3) hours of flight training in preparation for the practical test within 2 calendar months preceding the date of the test.

The student must demonstrate instrument competency in multi-engine operations both in normal operation and with an engine-out and meet performance levels outlined in the FAA multi-engine ACS.

Note: Any revisions to the FAA multi-engine ACS will take precedence over lesson.

Hours		

MULTI-ENGINE LESSON 7— EXPANDED IFR BRIEFING

OBJECTIVE: Review IFR operations, regulations and single engine operations in IMC conditions.

TIME: As required.

- ___ ___ ___ REVIEW TITLE 14 CFR,
INSTRUMENT FLIGHT RULES
- ___ ___ ___ AIRSPACE CLASSIFICATIONS
AND REQUIREMENTS
- ___ ___ ___ AIRWAYS
- ___ ___ ___ RADAR SERVICES AND ATC
COMM

RADIO NAVIGATION

- ___ ___ ___ VOR
- ___ ___ ___ GPS / RNAV

INSTRUMENT APPROACHES—TWO ENGINES

- ___ ___ ___ VOR
- ___ ___ ___ ILS / LOC
- ___ ___ ___ Back course
- ___ ___ ___ GPS / RNAV

INSTRUMENT LANDINGS—TWO ENGINES

- ___ ___ ___ From straight in approach
- ___ ___ ___ From circling approach

INSTRUMENT APPROACHES—ONE ENGINE INOP

- ___ ___ ___ VOR
- ___ ___ ___ ILS / LOC
- ___ ___ ___ Back course
- ___ ___ ___ GPS / RNAV

INSTRUMENT LANDINGS—ONE ENGINE INOP

- ___ ___ ___ From straight in approach
- ___ ___ ___ From circling approach

HOLDS

- ___ ___ ___ VOR
- ___ ___ ___ GPS / RNAV
- ___ ___ ___ LOC
- ___ ___ ___ DME

<u>Instructor</u>	<u>Student</u>	<u>Date</u>	<u>A/C Type</u>	<u>N#</u>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Hours		

MULTI-ENGINE LESSON 8 AIRCRAFT—(DUAL) 100 NM DAY X-COUNTRY

OBJECTIVE: The student will conduct a day flight with one leg of at least 100 nm.

TIME: Minimum 2 hours. (Approximately 1 hour instrument)

PREFLIGHT BRIEFING

- ___ ___ ___ Discussion of this lesson
- ___ ___ ___ Wake turbulence and wind shear avoidance
- ___ ___ ___ Collision avoidance
- ___ ___ ___ RUNWAY INCURSION avoidance
- ___ ___ ___ X-country flight planning

EMERGENCY PROCEDURES—REVIEW

- ___ ___ ___ Positive exchange of control
- ___ ___ ___ Pre take off briefing
- ___ ___ ___ Precautions and actions in case of real emergency

PREFLIGHT PROCEDURES

- ___ ___ ___ Weight and balance calculations
- ___ ___ ___ Obtain and brief weather
- ___ ___ ___ Performance charts
- ___ ___ ___ Take off calculations
- ___ ___ ___ Accelerate / stop calculation
- ___ ___ ___ Multiengine climb performance, gear down and up
- ___ ___ ___ Single engine climb performance
- ___ ___ ___ Time, fuel, distance to climb
- ___ ___ ___ Cruise calculations
- ___ ___ ___ Time, fuel, distance to descend
- ___ ___ ___ Landing calculations
- ___ ___ ___ Flight planning form completed
- ___ ___ ___ Flight plan filed

PREFLIGHT

- ___ ___ ___ Cockpit ✓
- ___ ___ ___ Certificates & documents—ARROW
- ___ ___ ___ Preflight inspection ✓
- ___ ___ ___ Airplane servicing

STARTUP

- ___ ___ ___ Engine start ✓
- ___ ___ ___ Comm radio setup—freq, vol, xmitter
- ___ ___ ___ GPS / RNAV, nav radio setup—freq, ID, set course

TAXI

- ___ ___ ___ Taxi ✓
- ___ ___ ___ Taxi clearance—copy, confirm, comply
- ___ ___ ___ Begin taxi—brake check, steering check
- ___ ___ ___ Taxiing—wind, speed, braking, hazards
- ___ ___ ___ Traffic watch / Call HOLD SHORT lines
- ___ ___ ___ Run-up ✓
- ___ ___ ___ Radio communications

TAKEOFF / CLIMB / CRUISE

- ___ ___ ___ Takeoff ✓
- ___ ___ ___ Take off briefing
- ___ ___ ___ Takeoff clearance—copy, confirm, comply
- ___ ___ ___ Take off—short field, crosswind
- ___ ___ ___ Traffic pattern departure
- ___ ___ ___ Climb ✓
- ___ ___ ___ Cruise climb
- ___ ___ ___ Level-off from climb
- ___ ___ ___ Cruise ✓
- ___ ___ ___ Leaning procedures (EGT)
- ___ ___ ___ Cruise power set as calculated

MULTI-ENGINE LESSON 8 AIRCRAFT—(DUAL) 100 NM DAY X-COUNTRY

(Continued)

AT LEAST ONE LEG OF 100 NM

___ ___ ___ Pilotage / Dead reckoning
___ ___ ___ GPS/RNAV navigation

ATTITUDE INSTRUMENT FLYING

___ ___ ___ Straight and level
___ ___ ___ Standard rate turns—level,
climbing, descending
___ ___ ___ Climbs / descents—constant
rate and constant IAS
___ ___ ___ Unusual attitude recoveries

INSTRUMENT APPROACHES

Select 2—(1) Partial panel approaches
___ ___ ___ VOR, LOC, or BC/LOC
___ ___ ___ ILS
___ ___ ___ GPS
___ ___ ___ Straight in or circling

DESCENTS

___ ___ ___ Planning descent
___ ___ ___ Descent √
___ ___ ___ Descent at desired airspeed
___ ___ ___ Level-off from descent

APPROACHES AND LANDINGS

___ ___ ___ Landing √
___ ___ ___ Radio communications
___ ___ ___ Traffic pattern entry
___ ___ ___ Traffic patterns
___ ___ ___ Normal / crosswind landing
___ ___ ___ Engine shut-down
___ ___ ___ Securing the aircraft

POSTFLIGHT

___ ___ ___ Post flight inspection of aircraft
___ ___ ___ Debrief
___ ___ ___ Complete TCO and logbook

MULTI-ENGINE LESSON 8 AIRCRAFT—(DUAL) 100 NM DAY X-COUNTRY

(Continued)

COMPLETION STANDARDS

The lesson will be complete when the student's knowledge of all items rates a grade of 2 or better.

Straight and level flight +/- 100 feet

Heading +/- 10°

Airspeed +/- 10 knots

<u>Cross-Country Route</u>	<u>Distance</u>

<u>Instructor</u>	<u>Student</u>	<u>Date</u>	<u>A/C Type</u>	<u>N#</u>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

	Dual Pre/Post	Dual Day	Dual Night	Dual X-Ctry	Dual Inst	Dual AATD	Total A/C	Inst/AATD
Previous								
This Lesson								
Total								

Hours		

MULTI-ENGINE LESSON 9 AIRCRAFT (DUAL)—100 NM NIGHT CROSS-COUNTRY

OBJECTIVE: The student will conduct a night flight with one leg of at least 100 nm.

TIME: Minimum 2 hours. (Approximately 1 hour instrument)

PREFLIGHT BRIEFING

- ___ ___ ___ Discussion of this lesson
- ___ ___ ___ Wake turbulence and wind shear avoidance
- ___ ___ ___ Collision avoidance
- ___ ___ ___ RUNWAY INCURSION avoidance
- ___ ___ ___ A/C lighting systems
- ___ ___ ___ Airport lighting systems
- ___ ___ ___ Night flying regulations
- ___ ___ ___ X-country flight planning

EMERGENCY PROCEDURES—BRIEFING

- ___ ___ ___ Positive exchange of control
- ___ ___ ___ Pre take off briefing
- ___ ___ ___ Precautions and actions in case of real emergency

PREFLIGHT PROCEDURES

- ___ ___ ___ Weight and balance calculations
- ___ ___ ___ Obtain and brief weather
- ___ ___ ___ Performance charts
- ___ ___ ___ Take off calcs
- ___ ___ ___ Accelerate / stop calculations
- ___ ___ ___ Multiengine climb performance, gear up and down
- ___ ___ ___ Single engine climb performance
- ___ ___ ___ Time, fuel, distance to climb
- ___ ___ ___ Cruise calculations
- ___ ___ ___ Time, fuel, distance to descend
- ___ ___ ___ Landing calculations
- ___ ___ ___ Flight planning form completed
- ___ ___ ___ Flight plan filed

PREFLIGHT

- ___ ___ ___ Cockpit ✓
- ___ ___ ___ Certificates & documents—*ARROW*
- ___ ___ ___ Preflight inspection ✓
- ___ ___ ___ Airplane servicing

STARTUP

- ___ ___ ___ Engine start ✓
- ___ ___ ___ Comm radio setup—*freq, vol, xmitter*
- ___ ___ ___ GPS / RNAV, Nav radio setup—*freq, ID, set course*

TAXI

- ___ ___ ___ Taxi ✓
- ___ ___ ___ Taxi clearance—*copy, confirm, comply*
- ___ ___ ___ Begin taxi—*brake check, steering check*
- ___ ___ ___ Taxiing—*wind, speed, braking, hazards*
- ___ ___ ___ Traffic watch / Call HOLD SHORT lines
- ___ ___ ___ Run-up ✓
- ___ ___ ___ Radio communications

TAKEOFF / CLIMB / CRUISE

- ___ ___ ___ Takeoff ✓
- ___ ___ ___ Take off briefing
- ___ ___ ___ Takeoff clearance—*copy, confirm, comply*
- ___ ___ ___ Take off—short, 0° flaps, crosswind
- ___ ___ ___ Traffic pattern departure
- ___ ___ ___ Level-off from climb
- ___ ___ ___ Cruise ✓
- ___ ___ ___ Leaning procedures (EGT)
- ___ ___ ___ Cruise power set as calculated

MULTI-ENGINE LESSON 9 AIRCRAFT (DUAL)—100 NM NIGHT CROSS-COUNTRY
(Continued)

AT LEAST ONE LEG OF 100 NM

- Pilotage / Dead reckoning
- GPS / RNAV navigation

ATTITUDE INSTRUMENT FLYING

- Straight and level
- Standard rate turns—level, climbing, descending
- Climbs / descents—constant rate and constant IAS
- Unusual attitude recoveries

INSTRUMENT APPROACHES

Select 2 approaches—at least 1 partial panel

- VOR, LOC, or BC/LOC
- ILS
- GPS
- Straight in or circling

DESCENTS

- Planning descent
- Descent ✓
- Descent at desired airspeed
- Level off from descent

APPROACH AND LANDING

- Landing ✓
- Radio communications
- Traffic pattern entry
- Traffic pattern
- Normal / x-wind landing
- Engine shut down
- Securing the aircraft

POSTFLIGHT

- Post flight inspection of aircraft
- Debrief
- Complete TCO and logbook

MULTI-ENGINE LESSON 9 AIRCRAFT (DUAL)—100 NM NIGHT CROSS-COUNTRY
 (Continued)

COMPLETION STANDARDS

The lesson will be complete when all areas have a grade of 2 or better.

Standards are as follows:

1. Altitude ± 100 feet
2. Headings $\pm 10^\circ$
3. Airspeed ± 10 knots

<u>Cross-Country Route</u>	<u>Distance</u>

<u>Instructor</u>	<u>Student</u>	<u>Date</u>	<u>A/C Type</u>	<u>N#</u>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

	Dual Pre/Post	Dual Day	Dual Night	Dual X-Ctry	Dual Inst	Dual AATD	Total Acft	Inst/AATD
Previous								
This Lesson								
Total								

Hours		

MULTI-ENGINE LESSON 10 (Aircraft or AATD) IFR— ENGINE-OUT IFR APPROACHES

OBJECTIVE: To review IFR approaches with one engine inoperative.

TIME: As required. Approximately 3 hours instrument.

PREFLIGHT BRIEFING

- ___ ___ ___ Discussion of this lesson
- ___ ___ ___ Review holding procedures
- ___ ___ ___ Review planned approaches
- ___ ___ ___ Wake turbulence / wind shear
- ___ ___ ___ Weather briefing
- ___ ___ ___ Normal take off and landing calculations
- ___ ___ ___ Accelerate stop calculations
- ___ ___ ___ Climb performance
 - ___ ___ ___ All engines operating
 - ___ ___ ___ One engine inoperative

STARTUP

- ___ ___ ___ Engine start ✓
- ___ ___ ___ Comm radio setup—*freq, vol, xmitter*
- ___ ___ ___ Nav radio setup—*freq, ID, set course*

TAXI

- ___ ___ ___ Taxi ✓
- ___ ___ ___ IFR clearance
- ___ ___ ___ Taxi clearance—*copy, confirm, comply*
- ___ ___ ___ Begin taxi—*brake check, steering check*
- ___ ___ ___ Taxiing—*wind, speed, braking, hazards*
- ___ ___ ___ Traffic watch / Call HOLD SHORT lines
- ___ ___ ___ Run-up ✓

TAKEOFF / CLIMB / CRUISE

- ___ ___ ___ Takeoff ✓
- ___ ___ ___ Take off briefing
- ___ ___ ___ Takeoff clearance—*copy, confirm, comply*
- ___ ___ ___ Take off—normal, crosswind
- ___ ___ ___ Traffic pattern departure
- ___ ___ ___ Communication with ATC
- ___ ___ ___ Level-off from climb—*VR-IR*
- ___ ___ ___ Unusual attitude recovery (IR)
- ___ ___ ___ Cruise ✓
- ___ ___ ___ Leaning procedures (EGT)
- ___ ___ ___ Cruise power settings

ENGINE-OUT EMERGENCY PROCEDURES

- ___ ___ ___ Identifying inop engine
- ___ ___ ___ Control inputs required
- ___ ___ ___ Proper flap and gear retraction
- ___ ___ ___ Procedures for engine shutdown and feather

ENGINE-OUT APPROACHES

Select 2 approaches—at least 1 partial panel

- ___ ___ ___ VOR
- ___ ___ ___ ILS
- ___ ___ ___ BC/LOC
- ___ ___ ___ GPS / RNAV
- ___ ___ ___ Straight in
- ___ ___ ___ Circling

MULTI-ENGINE LESSON 10 (DUAL) IFR— ENGINE-OUT IFR APPROACHES
(Continued)

DESCENTS

- ___ ___ ___ Descent checklist
- ___ ___ ___ Descent at cruise airspeed
- ___ ___ ___ Level off from descent
- ___ ___ ___ Descents at approach airspeed and landing configurations with turns
- ___ ___ ___ Missed approach procedure

APPROACH AND LANDING

- ___ ___ ___ Landing check list
- ___ ___ ___ Normal, x-wind landing—single engine (straight-in)
- ___ ___ ___ Normal landing—single engine, from a circling approach

POSTFLIGHT

- ___ ___ ___ Engine shut down
- ___ ___ ___ Securing the aircraft
- ___ ___ ___ Debrief
- ___ ___ ___ Update syllabus and logbook

NOTES

COMPLETION STANDARDS

The lesson will be complete when all areas have a grade of 2 or better.

Standards are as follows:

1. Altitude ± 100 feet
2. Headings $\pm 10^\circ$
3. Airspeed ± 10 knots

<u>Instructor</u>	<u>Student</u>	<u>Date</u>	<u>A/C Type</u>	<u>N#</u>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

	Dual Pre/Post	Dual Day	Dual Night	Dual X-Ctry	Dual Inst	Dual AATD	Total A/C	Inst/AATD
Previous								
This Lesson								
Total								

Hours		

MULTI-ENGINE LESSON 11 (DUAL)— REVIEW FOR CHECK RIDE

OBJECTIVE: To review flight procedures in preparation for the end of course check ride.

TIME: Aircraft: As required.

PREFLIGHT BRIEFING

- ___ ___ ___ Discussion of this lesson
- ___ ___ ___ Multi-engine ACS review
- ___ ___ ___ Wake turbulence and wind shear avoidance
- ___ ___ ___ Collision avoidance
- ___ ___ ___ RUNWAY INCURSION avoidance
- ___ ___ ___ Emergency procedures

PREFLIGHT PROCEDURES

- ___ ___ ___ Weight and balance calculations
- ___ ___ ___ Obtain and brief weather
- ___ ___ ___ Review all performance charts
- ___ ___ ___ Take off calculations (various)
- ___ ___ ___ Landing calculations (various)
- ___ ___ ___ Accelerate / stop calculations
- ___ ___ ___ Multiengine climb performance, gear up and down
- ___ ___ ___ Single engine climb performance
- ___ ___ ___ Time, fuel, distance to climb
- ___ ___ ___ Cruise calculations
- ___ ___ ___ Time, fuel, distance to descend
- ___ ___ ___ Wake turbulence avoidance

PREFLIGHT

- ___ ___ ___ Cockpit ✓
- ___ ___ ___ Certificates & documents—*ARROW*
- ___ ___ ___ Preflight inspection ✓
- ___ ___ ___ Airplane servicing

STARTUP

- ___ ___ ___ Engine start ✓
- ___ ___ ___ Comm radio setup—*freq, vol, xmitter*
- ___ ___ ___ GPS / RNAV, Nav radio setup—*freq, ID, set course*

TAXI

- ___ ___ ___ Taxi ✓
- ___ ___ ___ Taxi clearance—*copy, confirm, comply*
- ___ ___ ___ Begin taxi—*brake check, steering check*
- ___ ___ ___ Taxiing—*wind, speed, braking, hazards*
- ___ ___ ___ Traffic watch / Call HOLD SHORT lines
- ___ ___ ___ Run-up ✓

TAKEOFF / CLIMB / CRUISE

- ___ ___ ___ Takeoff ✓
- ___ ___ ___ Take off briefing
- ___ ___ ___ Takeoff clearance—*copy, confirm, comply*
- ___ ___ ___ Take off—normal, cross-wind, short field
- ___ ___ ___ Traffic pattern departure
- ___ ___ ___ Level-off from climb—*VR-IR*
- ___ ___ ___ Cruise ✓
- ___ ___ ___ Leaning procedures (EGT)
- ___ ___ ___ Cruise power settings

PERFORMANCE MANEUVERS

- ___ ___ ___ Steep turns

MULTI-ENGINE LESSON 11 (DUAL)— REVIEW FOR CHECK RIDE
(Continued)

SLOW FLIGHT

____ ____ ____ Various configurations

STALLS

____ ____ ____ Power off

____ ____ ____ Power on

____ ____ ____ Accelerated

ENGINE-OUT EMERGENCY PROCEDURES

____ ____ ____ Engine failure during take off ground roll

____ ____ ____ Identifying inop engine

____ ____ ____ Control inputs required

____ ____ ____ Proper flap and gear retraction

____ ____ ____ Engine failure during climb-out

____ ____ ____ Procedures for engine shutdown and feather

ENGINE-OUT MANEUVERING

____ ____ ____ Use of trim

____ ____ ____ Engine-out cruise with turns

____ ____ ____ Engine-out climbs and descents with turns

____ ____ ____ In-flight restart of shut-down engine

____ ____ ____ Systems & equipment malfunctions

DESCENTS

____ ____ ____ Descent √

____ ____ ____ Descent at cruise airspeed

____ ____ ____ Level off from descent

____ ____ ____ Descents at approach airspeed and landing config with turns

____ ____ ____ Emergency descent

APPROACH AND LANDING

____ ____ ____ Landing check list

____ ____ ____ Traffic pattern entry

____ ____ ____ Traffic pattern

____ ____ ____ Normal, x-wind, short field

____ ____ ____ Go around

____ ____ ____ Missed approach procedure

____ ____ ____ Engine shut down

____ ____ ____ Securing the aircraft

POSTFLIGHT

____ ____ ____ Post flight inspection of aircraft

____ ____ ____ Debrief

____ ____ ____ Update syllabus and logbook

COMPLETION STANDARDS

The lesson will be complete when all areas have a grade of 3 or better and meet the FAA Multi-engine ACS.

1. Altitude ±100 feet
2. Headings ±10°
3. Airspeed ±10 knots

<u>Instructor</u>	<u>Student</u>	<u>Date</u>	<u>A/C Type</u>	<u>N#</u>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

	Dual Pre/Post	Dual Day	Dual Night	Dual X-Ctry	Dual Inst	Dual AATD	Total Acft	Inst/AATD
Previous								
This Lesson								
Total								

MULTI-ENGINE END-OF-COURSE EVALUATION

OBJECTIVE: To assure that the student meets the minimum requirements of the FAA multi-engine ACS.

TIME: As required for thorough evaluation.

Student _____ Examiner _____ Date _____

NOTE:

The evaluator must assess the applicant on all skill elements for each task included in each area of operation of the ACS unless otherwise noted. The evaluator must also assess at least one knowledge element and one risk management element in each task.

EVALUATION PRELIMINARIES

____ Drivers license or picture ID
____ Pilot's Certificate—*valid*
____ Medical certificate—*valid*
____ 8710 Form—*correct, dated, signed*
____ Certificate of Enrollment—*current*
____ Training Course Outline—*completed*
____ Ground school completion—*verified*

I. PREFLIGHT PREPARATION

____ Performance and limitations

Operation of Systems:

Examiner will select at least (3) of the following:

____ Primary flight controls and trim
____ Secondary flight controls
____ Powerplant and propeller
____ Landing gear
____ Fuel, oil, and hydraulic
____ Electrical
____ Avionics
____ Pitot/Vacuum/Pressure instruments
____ Environmental
____ De-icing and anti-icing

Or

____ Indications of systems abnormalities or failures

II. PREFLIGHT PROCEDURES

____ Preflight assessment
____ Engine starting
____ Before takeoff check

III. TAKEOFFS, LANDINGS, GO-AROUNDS

____ Normal, takeoff and climb
____ Normal approach and landing
____ Short-field and maximum performance climb
____ Short-field approach and landing

IV. SLOW FLIGHT AND STALLS

Note: Establish and maintain an airspeed at which any further increase in angle of attack, increase in load factor, or reduction in power, would result in a stall warning (e.g., aircraft buffet, stall horn, etc.)

____ Maneuvering during slow flight—*specified configurations*

Note: Acknowledge the cues and recover promptly at the first indication of an impending stall (e.g., aircraft buffet, stall horn, etc.)

____ Power-off stalls—approach or landing configuration
____ Power-on stalls (take off or departure configuration)
____ Accelerated stalls
____ Spin awareness

V. PERFORMANCE MANEUVER

____ Steep turns—50° bank, opposite directions

MULTI-ENGINE END-OF-COURSE EVALUATION (CONTINUED)

V. EMERGENCY OPERATIONS

- Emergency descent
- Engine failure during takeoff before Vmc (Simulated)
- Engine failure after lift-off (Simulated)
- Approach and landing with inop engine (Simulated)

Systems and Equipment Malfunctions

Examiner will select at least (3) of the following elements or sub-elements:

- Partial or complete power loss
- (a) Engine roughness or overheat
- (b) Carburetor or induction icing
- (c) Loss of oil pressure
- (d) Fuel starvation
- Electrical malfunction
- Vacuum/Pressure malfunction
- Pitot/Static malfunction
- Landing gear or flap malfunction
- Inop trim
- Inadvertent door or window opening
- Smoke/Fire/Engine compartment fire

VI. MULTI-ENGINE OPERATIONS

- Maneuvering with one inoperative engine
- Vmc demonstration
- Engine failure during flight (by reference instruments)
- Instrument approach-one engine inoperative

VII. POSTFLIGHT PROCEDURES

- After landing, parking, securing

COMPLETION STANDARDS

The applicant must meet the FAA Commercial Pilot and Instrument Multi-engine Land Class ACS on this evaluation before being awarded a Multi-engine Rating.

**MULTI-ENGINE RATING END-OF-COURSE EVALUATION
(CONTINUED)**

Attempt Flight 1

Examiner _____

Student _____

Date _____

Oral Time _____

Flight Time _____

Attempt Flight 2

Examiner _____

Student _____

Date _____

Oral Time _____

Flight Time _____

Attempt Flight 3

Examiner _____

Student _____

Date _____

Oral Time _____

Flight Time _____

TOTAL ORAL TEST TIME _____

TOTAL FLIGHT TEST TIME _____

AIRCRAFT N # _____

COMMENTS:

Recommendations:

1 _____ **The End-Of-Course Evaluation performance indicates the additional review is necessary.**

- Do review lessons on all items marked "1" until your instructor indicates a satisfactory "3".
- Insert the review lesson sheets following this page.
- Then return to the Chief or Assistant Chief Instructor for reevaluation.

Chief/ Assistant Chief Instructor	Student	Date
_____	_____	_____

2 _____ **This End-of-Course Evaluation was performed in a satisfactory manner.**

Chief/ Assistant Chief Instructor	Student	Date
_____	_____	_____



Memo

To: Chief Flight Instructor

From:

CC: TCO and Chief Ground Instructor

Date:

RE: AVI 435 Multi-engine Ground School Completion

I certify that the student named below has received the required ground training of CFR Part 141 Appendix I and Appendix D [3] [a] [1] and [b] as appropriate for the Multi-engine Land Class Rating.

Name:

SSN:

DOB:

Instructor's Name _____

Instructor's Signature _____

MULTI-ENGINE GROUND TRAINING COURSE

15 HOURS OF GROUND TRAINING REQUIRED

STAGE 1

OBJECTIVE

The student will obtain the aeronautical knowledge necessary to competently pilot a multi-engine aircraft during normal flight operations and single-engine operations. The systems and operation of a general aviation multi-engine aircraft such as a BE1900, Piper Navajo, or King Air should be reviewed in detail and the material related to the Piper Seminole.

STAGE COMPLETION STANDARDS

The student will display an understanding of the material covered by oral and/or written quizzes. At the end of this stage, the student must successfully complete the Stage 1 exam. The instructor will review each incorrect response to insure complete understanding before the student proceeds to Stage 2.

LESSON 1 THE MULTI-ENGINE EXPERIENCE

OBJECTIVES

To introduce the student to human factors related to multi-engine flying and to review elements related to human factors, night operations, privileges, limitations and flight operations.

HUMAN FACTORS

Review the symptoms, causes, effects and corrective actions for:

- Hypoxia
- Hyperventilation
- Middle ear and sinus problems
- Spatial disorientation
- Motion sickness
- CO poisoning
- Stress and fatigue
- Dehydration

NIGHT TIME OPERATIONS

- Physiological aspects of night flying as it relates to vision.
- Lighting systems identifying airports, runways, taxiways and obstructions, and pilot controlled lighting.
- Airplane lighting systems.
- Personal equipment essential for night flight.
- Night orientation, navigation, and chart reading techniques.
- Safety precautions and emergencies unique to night flying.
- Somatogravic illusion and black hole approach illusion.

PRIVILEGES, LIMITATIONS, & FLIGHT OPERATIONS

- Commercial pilot certificate privileges, limitations, and recent flight experience requirements.
- Medical certificate class and duration.
- Pilot logbook or flight records.
- Airworthiness and registration certificates.
- Operating limitations, placards, instrument markings, and POH/AFM.
- Weight and balance data and equipment list.

LESSON COMPLETION STANDARDS

The student will demonstrate understanding during oral or written quizzes by the instructor at the completion of the lesson. The instructor will review incorrect responses to ensure student understanding.

ASSIGNED READING

Reading and homework for the next lesson will be assigned as required.

LESSON 2 AIRCRAFT SYSTEMS

OBJECTIVES

To determine that the student has knowledge of aircraft systems, and high altitude operations.

POWER PLANTS

- Piston
- Turbo
- Turbine

SYSTEMS

- Primary flight controls and trim
- Flaps, leading edge devices and spoilers
- Landing gear
- Fuel, oil and hydraulic
- Electrical
- Avionics
- Pitot-static, vacuum/pressure and associated flight instruments
- Environmental
- Deicing and anti-icing

HIGH ALTITUDE OPERATIONS

- Supplemental oxygen requirements for flight crew and passengers when operating non-pressurized airplanes.
- Identification and differences between "aviator's breathing oxygen" and other types of oxygen.
- Operational characteristics of continuous flow, demand, and pressure-demand oxygen systems.
- Fundamental concept of cabin pressurization.
- Physiological hazards associated with high altitude flight and decompression.

LESSON COMPLETION STANDARDS

The student will demonstrate understanding during oral or written quizzes by the instructor at the completion of the lesson. The instructor will review incorrect responses to ensure student understanding.

ASSIGNED READING

Reading and homework for the next lesson will be assigned as required.

LESSON 3
PERFORMANCE AND LIMITATIONS

OBJECTIVES

To review the elements related to performance and limitations using charts, tables and data.

WEIGHT AND BALANCE CALCULATIONS

- Weight and balance calculations.
- Adverse effects of exceeding weight and balance limits.
- Different types of take-off and landing calculations under various atmospheric, runway, loading and aircraft configurations.
- Climb calculations under various atmospheric, loading, and aircraft configurations.
- Single-engine climb calculations under various atmospheric loading and aircraft configurations.
- Calculation of service ceiling and absolute ceiling all engine operating and single-engine.
- Cruise calculations under various atmospheric conditions and power settings.
- Time, fuel and distance to climb and descent.
- Accelerate—stop calculations.
- Accelerate—go calculations.
- Other performance charts related to the aircraft understudy and the Piper Seminole.

LESSON COMPLETION STANDARDS

The student will demonstrate understanding during oral or written quizzes by the instructor at the completion of the lesson. The instructor will review incorrect responses to ensure student understanding.

ASSIGNED READING

Reading and homework for the next lesson will be assigned as required.

LESSON 4
FAR 23

OBJECTIVES

To review airworthiness requirements related to multi-engine aircraft.

GENERAL

FLIGHT

SUBPART D—DESIGN AND CONSTRUCTION

SUBPART E—POWERPLANT

SUBPART F—EQUIPMENT

SUBPART G—OPERATING LIMITATIONS AND INFORMATION

LESSON COMPLETION STANDARDS

The student will demonstrate understanding during oral or written quizzes by the instructor at the completion of the lesson. The instructor will review incorrect responses to ensure student understanding.

ASSIGNED READING

Reading and homework for the next lesson will be assigned as required.

LESSON 5
MULTI-ENGINE AERODYNAMICS

OBJECTIVES

To study the elements related to multi-engine flight and single-engine operations.

- Definition of critical engine
- Definition of V_{mc}
- Factors affecting V_{mc}
- Relationship of V_{mc} and stall speeds
- V_{mc} recovery procedure
- Causes of yaw and roll
- Decision making in single-engine operations
 - * in cruise
 - * In the traffic pattern
 - * On approaches
 - * On landings

LESSON COMPLETION STANDARDS

The student will demonstrate understanding during oral or written quizzes by the instructor at the completion of the lesson. The instructor will review incorrect responses to ensure student understanding.

ASSIGNED READING

Reading and homework for the next lesson will be assigned as required.

LESSON 6
STAGE ONE EXAM

OBJECTIVES

To review the material covered in Stage 1 by a written exam.

LESSON COMPLETION STANDARDS

A minimum grade of 80% is required.

LESSON 7
REVIEW OF STAGE ONE EXAM

OBJECTIVES

To discuss the Stage 1 exam.

LESSON COMPLETION STANDARDS

The instructor will review incorrect responses to ensure student understanding.

ASSIGNED READING

Reading and homework for the next lesson will be assigned as required.

NOTES

MULTI-ENGINE GROUND TRAINING COURSE

STAGE 2

OBJECTIVE

The student will gain a thorough understanding and knowledge of single-engine operations and the correct single-engine flight procedures.

STAGE COMPLETION STANDARDS

The student will display an understanding of the material covered by oral and/or written quizzes.

LESSON 1
CREW RESOURCE MANAGEMENT

OBJECTIVES

To discuss the effective use of all available information.

HUMAN RESOURCES IN SINGLE PILOT AND MULTIPLE CREW OPERATIONS

- Cockpit crew
- Cabin crew
- Dispatcher
- Maintenance
- ATC
- FSS

LESSON COMPLETION STANDARDS

The student will demonstrate understanding during oral or written quizzes by the instructor at the completion of the lesson. The instructor will review incorrect responses to ensure student understanding.

ASSIGNED READING

Reading and homework for the next lesson will be assigned as required.

LESSON 2
DEFINITIONS OF V-SPEEDS FOR NORMAL AND SINGLE-ENGINE OPERATIONS

OBJECTIVES

To review all the V speeds used in multi-engine flying.

The definitions and uses of the various V speeds will be discussed and applied to a typical multi-engine general aviation aircraft and the Piper Seminole.

LESSON COMPLETION STANDARDS

The student will demonstrate understanding during oral or written quizzes by the instructor at the completion of the lesson. The instructor will review incorrect responses to ensure student understanding.

ASSIGNED READING

Reading and homework for the next lesson will be assigned as required.

**LESSON 3
SINGLE-ENGINE OPERATIONS**

OBJECTIVES

To review and discuss the elements related to single-engine operations.

- Single-engine performance charts
- Shut down, feather and restart procedures

SYSTEMS MANAGEMENT DURING SINGLE-ENGINE OPERATIONS

- Fuel
- Electrical
- Pneumatic
- Hydraulic

LESSON COMPLETION STANDARDS

The student will demonstrate understanding during oral or written quizzes by the instructor at the completion of the lesson. The instructor will review incorrect responses to ensure student understanding.

ASSIGNED READING

Reading and homework for the next lesson will be assigned as required.

**LESSON 4
EMERGENCIES**

OBJECTIVES

To discuss emergencies and troubleshooting systems.

System Diagrams and charts will be used to diagnose and trouble shoot faults in various systems including:

- Primary flight controls and trim
- Flaps, leading edge devices and spoilers
- Landing gear
- Fuel, oil and hydraulic
- Electrical
- Avionics
- Pitot-static, vacuum/pressure and associated flight instrument
- Environmental
- Deicing and anti-icing
- Fire on ground and in flight
- Fuel pump failure
- Landing gear malfunctions
- Combustion heater overheat

LESSON COMPLETION STANDARDS

The student will demonstrate understanding during oral or written quizzes by the instructor at the completion of the lesson. The instructor will review incorrect responses to ensure student understanding.

ASSIGNED READING

Reading and homework for the next lesson will be assigned as required.

LESSON 5
STAGE TWO EXAM

OBJECTIVES

To review that material discussed in Stage 2.

LESSON COMPLETION STANDARDS

A minimum grade of 80% is required.

LESSON 6
REVIEW OF STAGE TWO EXAM

OBJECTIVES

To discuss the Stage 2 exam.

LESSON COMPLETION STANDARDS

The instructor will review incorrect responses to ensure student understanding.

ASSIGNED READING

Reading and homework for the next lesson will be assigned as required.

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