MASTER COURSE OUTLINE
Prepared By: Gregory Crane Date: January 2014

COURSE TITLE
MULTIENGINE-INSTRUCTOR

GENERAL COURSE INFORMATION

Dept.: AVF	Course Num: 291	(Formerly:)
CIP Code: 49.0102	Intent Code: 22	Program Code:
Credits: 2		
Total Contact Hrs Per Qtr.: 22		
Lecture Hrs: 22	Lab Hrs:	Other Hrs:

Distribution Designation: General Elective (GE)

COURSE DESCRIPTION (as it will appear in the catalog)
Preparation for the FAA Multi-Engine Flight Instructor rating.

PREREQUISITES
Commercial Airplane with Instrument rating, Multi-Engine Land ratings, Flight Instructor Single Engine.

TEXTBOOK GUIDELINES
Appropriate textbook as chosen by Aviation Flight Faculty (Example: *Complete Multi Engine Pilot* by Gardner)
FAA-H-8083-3
FAA S-8081-6A
FAA-S-8081-12A

COURSE LEARNING OUTCOMES
Upon successful completion of the course, students should be able to demonstrate the following knowledge or skills:

1. Pass the practical examination for the Multi-Engine Instructor rating.

INSTITUTIONAL OUTCOMES
IO1 **Communication**: Students will be able to communicate clearly and effectively

COURSE CONTENT OUTLINE

Lessons:	Dual	Pre&Post
1. Right Seat Familiarization	1.2	1.0
2. Aircraft Systems and Single Engine Flight	1.2	1.0
3. Single Engine Procedures	1.2	1.0
4. Single Engine Procedures	1.2	1.0
5. Takeoffs, Landings, and Commercial Maneuvers	1.3	1.0
6. Instrument Proficiency	1.4	1.0
7. Review	1.3	1.0
8. Flight Check	1.2	2.0*oral exam
Total	10.0	9.0

The lesson times are to be used as a guide only. The actual time used will vary depending upon the needs of the student. A single lesson may take more than one flight to complete or more than one lesson may be completed on a single flight. Minimum completion time for this course is 10 hours.

LESSON 1: RIGHT SEAT FAMILIARIZATION

Objectives: Establish aircraft familiarity using normal procedures, and instill a feel for general flight characteristics from the right seat. Emphasis on power plant operation, leaning, cowl flap operation, power changes, slow flight, stalls and steep turns.

1. Preflight discussion.
2. Preflight planning.
3. Aircraft preflight.
4. Normal start, taxi, and takeoff procedures.
5. Cruise climb: propeller synchronization, power 2500 rpm, 25" mp.
6. Level-off:
    a. Cruise power settings.
    b. Leaning procedures.
    c. Use of power computer to determine percent power.
    d. Normal fuel system operation.
7. Steep turns.
8. Slow flight. (V_{s1} x1.2)
9. Power off stall.
10. Power on stall.
11. Accelerated stall.
12. Descent planning and procedures.
13. Normal approach and landings (touch and go's).
14. Post-flight critique.

Completion standards: The student shall demonstrate proficiency in normal operations and flight at critically slow airspeeds. Airspeed, altitude and heading must be maintained within plus or minus 5 knots, plus or minus 100' and plus or minus 10 degrees.

LESSON 2: AIRCRAFT SYSTEMS AND SINGLE ENGINE FLIGHT

Objective: Review normal operating procedures and flight characteristics. Introduce discussion and demonstration of aircraft systems and execution of single-engine flight, V_{mc} demonstration and drag demonstration.

1. Preflight discussion of lesson plan.
    a. Systems
        i. Primary flight controls and trim.
        ii. Pitot static/vacuum system and associated instruments.
        iii. Landing gear.
        iv. Wing flaps, leading edge devices, and spoilers.
        v. Powerplant, including controls, indicators, cooling, and fire detection.
        vi. Propellers, including controls and indicators.
        vii. Fuel, oil, and hydraulic systems.
        viii. Electrical system.
        ix. Environmental system.
        x. Deicing and anti-icing systems.
        xi. Avionics system.
        xii. Any system unique to the airplane flown.
    b. Performance & Limitations
        i. TO and landing distance.
        ii. Climb ROC SE and Normal.
        iii. Weight & Balance.
2. Aircraft preflight.

3. Normal takeoff and climb.
4. Power on stall.
5. Emergency landing gear extension.
6. Cross-feed operation.
7. Wing flap system emergency operation (asymmetry).
8. Heater operation.
9. Vacuum system.
10. Alternate induction air operation.
11. Emergency static pressure source.
12. Propeller and windshield anti-ice system.
13. Pitot heat.
14. Auto-pilot.
15. Avionics systems and indicators.
16. Demonstrate effect of various configurations on drag.
17. VMC demonstration.
18. Engine feather and shutdown procedures.
19. Demonstrate zero sideslip and effect on performance.
20. Cross-feed with one engine shutdown.
21. Air start procedure. (Normal or aerodynamically).
22. Post-flight critique.

Completion Standards: The student shall demonstrate proficiency in the execution of single-engine flight, V_{mc} demonstration and drag demonstration. Airspeed, altitude and heading must be maintained within 5 kts, 100' and 10 degree respectively.

LESSON 3: SINGLE ENGINE PROCEDURES

Objective: Develop instructor skills in demonstrating and explaining normal operations, aircraft systems, flight at critically slow airspeeds, single-engine flight, and V_{mc} and drag demonstrations. Develop pilot skills in the execution of single-engine procedures.

1. Preflight discussion of lesson plan.
    a. Principles of S.E. flight.
        i. Effects of density altitude.
        ii. Importance of reducing drag.
        iii. Importance of establishing and maintaining proper airspeed.
        iv. Importance of maintaining proper pitch and bank attitudes, and proper coordination of controls.
        v. Effects of weight and center of gravity.
        vi. Critical engine.
        vii. Reasons for loss of directional control.
        viii. Indications of approaching loss of directional control.
        ix. Reasons for variations in V_{mc}.
        x. Relationship of V_{mc} to stall speed, including determination of whether a loss of directional control demonstration can be safely accomplished.
        xi. Takeoff emergencies, including planning, decisions, and single-engine operations.
2. Aircraft preflight.
3. Review and practice teaching.
    a. Slow flight.
    b. Steep turns.
    c. Power off stall.
    d. Power on stall.
    e. Engine feather and shutdown.
    f. V_{mc} demo.
    g. Drag demo.
    h. Zero sideslip.

i. Air start procedure.

4. SE procedures: Demonstrate simulated feather-zero thrust.
    a. Practice single engine approach and landing (simulated feather).
    b. Random unexpected engine failures.
    c. Engine failure while simulating missed approach: gear and flaps down.
    d. Use simulated feather to minimize engine thermal shock.
    e. Practice single engine approach and landings.
    f. Exact single engine procedures vary with the specific flight condition and/or aircraft configuration:
        i. Failure on takeoff roll.
        ii. Failure on initial climb below V_{mc} (discussion only).
        iii. Failure on initial climb sufficient runway to land.
        iv. Failure on initial climb, above V_{mc} above V_{XSE}, no runway remaining.
        v. Cruise climb or cruise.
        vi. Descent.
        vii. Landing pattern.
        viii. Go-around.
5. Post-flight critique.

Completion Standards: The student shall demonstrate competency in explaining and demonstrating flight at critically slow airspeeds, single engine flight, drag demonstrations and VMC demonstrations. The student shall demonstrate competency in executing single engine emergency procedures.
Air speed, altitude, etc...

LESSON 4: SINGLE ENGINE PROCEDURES
Objective: Develop instructor skills in explaining and demonstrating single engine flight and emergency procedures.
1. Preflight discussion of lesson plan.
2. Aircraft preflight.
3. Review and practice teaching:
    a. Demonstrate simulated feather-zero thrust.
    b. Practice single engine approach and landing (simulated feather).
    c. Random unexpected engine failures.
    d. Use simulated feather to minimize engine thermal shock.
    e. Practice single engine approach and landings.
    f. Exact single engine procedures vary with the specific flight condition and/or aircraft configuration:
        i. Failure on takeoff roll.
        ii. Failure on initial climb below V_{mc} (discussion only).
        iii. Failure on initial climb sufficient runway to land.
        iv. Failure on initial climb, above V_{mc}, above Vxse no runway remaining.
        v. Cruise climb or cruise.
        vi. Descent.
        vii. Landing Pattern.
        viii. Go-around.
4. Post-flight critique.

Completion Standards: The student shall demonstrate competency in explaining and demonstrating all aspects of single engine flight and emergency procedures. Airspeed, altitude, etc...

LESSON 5: MAXIMUM PERFORMANCE TAKEOFFS AND LANDINGS AND COMMERCIAL MANEUVERS
Objective: Develop pilot and instructor skills in executing and explaining various takeoffs and landings and commercial maneuvers.
1. Preflight discussion of lesson plan.
2. Aircraft preflight.
3. Introduction of maneuvers followed by practice teaching:

a. Short field landing.
b. Soft field landing.
c. Short field takeoff.
d. Soft field takeoff.
e. Crosswind takeoff and landings (Wind conditions permitting).
f. No flap landings.
g. Emergency descent.
h. Steep turns.

4. Post-flight critique.

Completion Standards: The student shall demonstrate competency in explaining and demonstrating the listed maneuvers including takeoffs and landings.

LESSON 6: INSTRUMENT PROFICIENCY

Objective: Develop instrument competency. Develop instructional skills in explaining and demonstrating single-engine procedures in an IFR environment.

1. Preflight discussion of lesson plan.
2. Aircraft and instrument preflight.
3. Review of instrument flight.
    a. Use of RNAV and other special equipment.
    b. Holding.
    c. VOR, ILS, NDB, RNAV approaches.
4. Introduction and practice teaching of single engine emergency procedures and flight in an IFR environment. (Engine failure in turns and engine failure in straight flight.)
    a. SE holding.
    b. SE approaches.
    c. SE missed approach.
5. Post-flight critique.

Completion Standards: The student shall demonstrate proficiency in teaching single engine procedures while executing an IFR flight. Airspeed, altitude, etc.

LESSON 7: REVIEW

Objective: The student shall practice maneuvers to prepare for the final phase check including the explanation of each maneuver as outlined in his/her lesson plan.

1. Preflight discussion of lesson plan.
2. Preflight planning.
3. Aircraft preflight.
4. Practice teaching:
    a. Required maneuvers.
    b. Takeoffs and landings.
    c. Drag demo.
    d. V_{mc} demo.
    e. SE flight.
    f. SE emergencies.
    g. SE landings.
    h. SE go-arounds.
    i. Analysis and correction of student errors.
5. Post-flight critique.

Completion Standards: The student shall perform, explain and demonstrate assigned maneuvers within acceptable performance guidelines as listed in the appropriate Practical Test Standards.

LESSON 8: FINAL PHASE CHECK

Objective: The student shall demonstrate the ability to: effectively conduct a flight lesson; perform and apply multiengine flight training maneuvers; accurately analyze student pilot errors and correct those errors.

1. Preflight planning.
2. Conduct a flight lesson.
3. Analyze and correct errors.
4. Perform and analyze maneuvers.
5. Post-flight instruction.

Completion Standards:

The student shall perform and explain the assigned maneuvers, in addition to analyzing and correcting student pilot errors. The conducted flight lesson, the analysis and the correction of student pilot errors shall meet the acceptable performance guidelines of the appropriate Practical Test Standards. The performance of flight maneuvers shall meet the acceptable performance guidelines of the appropriate practical test standards

DEPARTMENTAL GUIDELINES *(optional)*

Evaluation is by demonstration of flight proficiency and completion of home assignments:

Grading:

Satisfactory performance of maneuvers, procedures and home assignments. _____Pass

Unsatisfactory performance of any maneuver, procedure or home assignments. _____Fail

_____ _____

DIVISION CHAIR APPROVAL **DATE**