

FLORIDA STATE COLLEGE AT JACKSONVILLE
COLLEGE CREDIT COURSE OUTLINE

COURSE NUMBER: AMT 1773

COURSE TITLE: Aviation Maintenance Technology Powerplant III

PREREQUISITE(S): None

COREQUISITE(S): None

STUDENT ADVISORY NOTES: Completion of General I through IV

CREDIT HOURS: 6

CONTACT HOURS/WEEK: 16

CONTACT HOUR BREAKDOWN:

Lecture/Discussion:	8
Laboratory:	8
Other <u>lecture/lab combination</u> :	

FACULTY WORKLOAD POINTS: 8

STANDARDIZED CLASS SIZE ALLOCATION: 25 (FAA Limited)

COURSE DESCRIPTION: This course is designed to introduce skills and the necessary knowledge and understanding of aircraft turbine engine fundamentals; engine fire protection and engine instrument systems; and powerplant electrical systems.

SUGGESTED TEXT(S):	<u>TITLE</u>	<u>NUMBER</u>
	Jeppesen A&P Technician Powerplant Textbook ISBN # 0-88487-207-6	
	Jeppesen A&P Technician Powerplant Workbook ISBN # 0-88487-243-2	
	Jeppesen A&P Technician Powerplant Test Guide ISBN # 0-88487-310-2	
	FAA AC 43.13-1B/2A Acceptable Methods, Techniques & Practices ISBN #0-89100-306-1	
	FAR Handbook for Aviation Maintenance Technicians ISBN #0-88487-314-5	
	Aviation Mechanic Handbook, by Dale Crane #ASA-M-HB1	

IMPLEMENTATION DATE: Summer Term, 2006 (20063)

REVIEW OR MODIFICATION DATE: Fall Term, 2008 (20091) - Outline Review 2007

COURSE TOPICS	CONTACT HOURS <u>PER TOPIC</u>
Note: S Denotes required project	
I. FUNDAMENTALS OF TURBINE ENGINES	40
A. Terms and Safety	
Objectives:	
1. List safety precautions relating to turbine engines.	
2. Define terms and definitions related to turbine engines.	
3. Identify and practice turbine-engine safety precautions.	
4. Discuss MSDS related to turbine engines.	
B. Turbine Engine Development	
Objectives:	
1. Discuss the history of jet propulsion.	
2. Identify and discuss torque producing turbine engines.	
3. Identify and discuss thrust producing turbine engines.	
4. Discuss turbine engine energy transformation cycles.	
5. Discuss inspection, checking and troubleshooting of turbine driven auxiliary power units (Level 1) (App. D.II, m. 41)	
6. Identify and discuss factors affecting engine thrust.	
7. Perform calculations to determine engine thrust.	
C. Turbine Engine Design and Construction	
Objectives:	
1. Discuss the purpose, construction, and operation of the compressor section.	
2. Explain the causes and prevention of compressor stall.	
3. Discuss the purpose and operation of compressor bleed valves.	
4. Discuss the purpose, construction, and operation of the diffuser section.	
5. Discuss the purpose, construction, and operation of the combustion section.	
6. Discuss the purpose, construction, and operation of the turbine section.	
7. Discuss the purpose, construction, and operation of the exhaust section.	
8. Discuss the components of the accessory section and their purposes.	
D. Turbine Engine Inlet Systems	
Objectives:	
1. Discuss the purpose and operation of subsonic engine inlets.	
2. Discuss the purpose and operation of supersonic engine inlets.	
3. Discuss ram pressure recovery.	
4. Discuss the purpose and operation of inlet anti-ice systems.	
5. Discuss inspection and troubleshooting of unducted fan systems and components (Level 1) (App. D.I, l. 40)	

CONTACT HOURS
PER TOPIC

COURSE TOPICS (continued)

Note: § Denotes required project

E. Turbine Engine Exhaust Systems

Objectives:

1. Discuss the purpose, construction, and operation of subsonic exhaust systems.
2. Discuss the purpose, construction, and operation of supersonic exhaust systems.
3. Discuss the purpose and operation of afterburners.
4. Discuss the purpose, construction, and operation of thrust reversers.
5. Discuss maintenance, troubleshooting, and repair of engine thrust reverser systems and related components. (Level 1) (App. D.II, j. 32b)
6. Discuss the purpose, construction, and operation of noise suppressors

F. Unit Test

II. ENGINE FIRE PROTECTION AND ENGINE INSTRUMENT SYSTEMS

45

A. Fire Protection Systems

Objectives:

1. Define terms related to fire protection and detection systems.
2. Discuss fire classifications and zones.

B. Operation, Maintenance, Repair and Troubleshooting of Fire Detection and Protection Systems.

Objectives:

1. Discuss types and operation of fire detection and protection systems.
2. Describe the routing of fire warning sensors.
3. Discuss installation procedures of fire warning sensors.
4. Discuss troubleshooting, maintenance and repair of fire detection systems.
5. **§ Inspect, check, service, troubleshoot, and repair as required a fire detection and extinguishing system. (Level 3) (App. D.II, b. 11) (PP2-009)**

C. Aircraft Engine Instruments and Warning Systems

Objectives:

1. Identify and discuss engine pressure instruments.
2. Discuss temperature indicating systems.
3. Explain types and operation of tachometer systems.
4. Describe usage of fluid flow meters.
5. Discuss torque meter usage and operation.
6. Identify vibration monitoring systems
7. Describe purpose and operation of fault indicating and isolating systems.
8. **§ Troubleshoot a fluid flow rate indicating system. (Level 2) (App. D.II, a. 9) (PP2-010)**
9. **§ Inspect, check, service, troubleshoot, and repair a temperature indicating system. (Level 3) (App. D.II, a. 10) (PP2-011)**

CONTACT HOURS
PER TOPIC

COURSE TOPICS (continued)

Note: § Denotes required project

10. § Inspect, check, service, troubleshoot, and repair an engine pressure indicating system. (Level 3) (App. D.II, a. 10) (PP2-012)
11. § Inspect, check, service, troubleshoot, and repair an engine RPM indicating system. (Level 3) (App. D.II, a. 10) (PP2-013)

D. Unit Test

III. TURBINE ENGINE LUBRICATION, COOLING, IGNITION,
AND FUEL METERING SYSTEMS

55

A. Introduction to the Lubrication System

Objectives:

1. Define terms related to turbine engine lubrication systems.
2. List functions of the lubrication system.

B. Types of Lubricating Systems

Objectives:

1. Discuss methods of lubricant application.
2. Explain characteristics and operating principles of wet-sump lubricating systems.
3. Explain characteristics and operating principles of dry-sump lubricating systems.
4. Use schematic to trace oil flow in wet and dry-sump systems.

C. Operations and Components of the Lubricating System

Objectives:

1. Describe the operation of a turbine-engine lubrication system.
2. Identify the components of a turbine-engine lubricating system and their functions.

D. Maintaining and Troubleshooting the Lubrication System.

Objectives:

1. Describe cleaning, inspecting and testing of oil coolers.
2. Discuss inspection and cleaning procedures for turbine engine oil strainer and screen assembly.
3. § Check and inspect a turbine engine oil strainer screen. (Level 3) (App. D.II, d. 15,16) (PP2-014)
4. § Adjust oil pressure. (Level 3) (App. D.II, d. 15,16) (PP2-015)

E. Turbine Engine Cooling Systems

Objectives:

1. Discuss turbine engine cooling requirements.
2. Discuss the types and operation of turbine section cooling.
3. Discuss the purpose and construction of engine insulating blankets.
4. Identify the need and discuss the operation of engine nacelle cooling.

CONTACT HOURS
PER TOPIC

COURSE TOPICS (continued)

Note: § Denotes required project

F. Aircraft Turbine Engine Ignition Systems

Objectives:

1. Distinguish between the operations of D.C. and A.C. input systems.
2. **§ Identify types of igniter plugs. (Level 2) (App. D.II, e. 18) (PP2-016)**
3. Discuss techniques for cleaning and inspecting igniter plugs.
4. Discuss basic troubleshooting and maintenance procedures used on turbine engines.

G. Turbine Engine Fuel Metering Systems

Objectives:

1. Discuss the types and operation of turbine engine fuel system components. (Level 1) (App. D.II, f. 20)
2. Discuss the types and operation of turbine engine fuel spray nozzles. (Level 1) (App. D.II, F. 20)
3. Discuss the types and operation of turbine engine fuel controls. (Level 1) (App. D.II, f. 20)
4. Discuss the purpose and operation of turbine engine water injection systems. (Level 1) (App. D.II, F. 20)
5. Describe the use of, and methods of, inspecting and servicing turbine engine water injection systems. (Level 1) (App. D.II, F.20)

H. Unit Test

IV. POWERPLANT ELECTRICAL

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A. Safety and Terms

Objectives:

1. List and practice safety precautions related to powerplant wiring, aircraft motors, and generators.
2. Define terms related to powerplant wiring, electrical components, aircraft motors and generators.

B. Wiring Diagrams

Objectives:

1. Discuss block diagrams.
2. Discuss pictorial diagrams.
3. Interpret schematic diagrams.

C. Powerplant Wiring

Objectives:

1. Discuss types of wire and insulation.
2. Discuss wire size selection
3. Interpret and use a wire/cable size chart.
4. **§ Select proper wire for various applications. (Level 3) (App. D,II, c.13) (PP2-001)**

CONTACT HOURS
PER TOPIC

COURSE TOPICS (continued)

Note: § Denotes required project

D. Wiring Installations

Objectives:

1. Compare single and double wire installation.
2. Determine proper wire grouping, bundles, and routing.
3. Identify aircraft wire markings.
4. Differentiate between conduit and shielding.
5. § Lace and tie wire bundles. (Level 3) (App. D.II, c. 3) (PP2-002)

E. Circuit Protective Devices

Objectives:

1. Identify aircraft fuses.
2. Identify aircraft circuit breakers.
3. § Interpret circuit protector charts. (Level 3) (App. D. II, c. 13) (PP2-003)

F. Circuit Controls

Objectives:

1. Discuss types and usage of switches.
2. § Interpret switch de-rating chart. (Level 3) (App. D.II, c. 13) (PP2-004)
3. Discuss switch installation.
4. Identify relay and solenoid construction, operation, and applications.

G. Electrical System Troubleshooting

Objectives:

1. Discuss troubleshooting techniques.
2. Describe the installation of various electrical system components.
3. § Install, check, and service engine electrical wiring, controls, switches, indicators, and protective devices. (Level 3) (App. D.II,c.13) (PP2-005)

H. Aircraft Motor Theory

Objectives:

1. Identify components of aircraft motors.
2. Discuss magnetic reaction in an aircraft motor.
3. Identify types of aircraft electric motors.
4. Discuss methods of controlling aircraft motor speed and direction.

I. Aircraft DC Motors

Objectives:

1. Discuss the construction and operation of aircraft DC motors.
2. Describe methods of controlling aircraft DC motors.

CONTACT HOURS
PER TOPIC

COURSE TOPICS (continued)

Note: § Denotes required project

J. Aircraft Starter Motors

Objectives:

1. List and discuss types of starter motors.
2. Identify components of a starter motor.
3. Describe methods of starter engagement.
4. **§ Disassemble, inspect, and reassemble a starter motor. (Level 3) (App. D.II, c.12; D.II, e.19a) (PP2-006)**

K. Aircraft AC Motors

Objectives:

1. Describe the construction and operation of aircraft AC motors.
2. Discuss methods of controlling aircraft AC motors.

L. Motor Brakes and Clutches

Objectives:

1. Discuss types and the construction of motor brakes.
2. Discuss types and the construction of motor clutches.

M. Starter Generators

Objectives:

1. Discuss the construction and operation of starter generators.
2. Identify starter generator applications.

N. 12-Volt Shunt-Wound Generator System

Objectives:

1. Explain the installation and removal of an aircraft generator.
2. **§ Troubleshoot, disassemble, inspect, reassemble, and test a generator. (Level 3) (App. D.II, c. 12) (PP2-007)**

O. 24-Volt Compound-Wound Generator System

Objectives:

1. Discuss the operation of a carbon pile voltage regulator.
2. Identify interpoles and series windings and discuss their usage.
3. Troubleshoot, inspect, and adjust a carbon pile voltage regulator.

P. 12/24 Volt Alternators

Objectives:

1. Discuss alternator parts and their functions.
2. Compare generators and alternators.

COURSE TOPICS (continued)

CONTACT HOURS
PER TOPIC

Note: § Denotes required project

3. Explain alternator controls.
4. Discuss alternator service and maintenance.
5. **§ Troubleshoot, disassemble, inspect, repair, reassemble, and test an alternator. (Level 3) (App. D.II, c.12) (PP2-008)**

Q. Unit Test.

V. POWERPLANT III REMEDIATION, REVIEW, AND TESTING

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Powerplant Block III Final Exam

PROGRAM TITLE: Aviation Maintenance Management
COURSE TITLE: Aviation Maintenance Technology Powerplant III
CIP NUMBER: 1649.010401

LIST PERFORMANCE STANDARD ADDRESSED:

NUMBER(S): TITLES(S):

- 21.0 MAINTAIN ENGINE INSTRUMENT SYSTEMS--The student will be able to:
- 21.01 Troubleshoot, service, and repair electrical and mechanical fluid rate-of-flow indicating systems. [FAA FAR Part 147, Level 2]
 - 21.02 Inspect, check, service, troubleshoot, and repair electrical and mechanical engine temperature-, pressure-, and rpm-indicating systems. [FAA FAR Part 147, Level 3]
- 22.0 MAINTAIN ENGINE FIRE-PROTECTION SYSTEMS--The student will be able to:
- 22.01 Inspect, check, service, troubleshoot, and repair engine fire-detection and extinguishing systems. [FAA FAR Part 147, Level 3]
- 23.0 MAINTAIN ENGINE ELECTRICAL SYSTEMS--The student will be able to:
- 23.01 Repair engine electrical system components. [FAA FAR Part 147, Level 2]
 - 23.02 Install, check, and service engine electrical wiring, controls, switches, indicators, and protective devices. [FAA FAR Part 147, Level 3]
- 24.0 MAINTAIN LUBRICATION SYSTEMS--The student will be able to:
- 24.01 Identify and select lubricants. [FAA FAR Part 147, Level 2]
 - 24.02 Repair engine lubrication system components. [FAA FAR Part 147, Level 2]
 - 24.03 Inspect, check, service, troubleshoot, and repair engine lubrication systems. [FAA FAR Part 147, Level 3]
- 25.0 MAINTAIN IGNITION SYSTEMS--The student will be able to:
- 25.02 Inspect, service, troubleshoot, and repair turbine engine ignition systems and components. [FAA FAR Part 147, Level 2]
 - 25.03 Inspect, service, troubleshoot, and repair turbine engine electrical starting systems. [FAA FAR Part 147, Level 3]
 - 25.04 Inspect, service, and troubleshoot turbine engine pneumatic starting systems. [FAA FAR Part 147, Level 1]
- 26.0 MAINTAIN-FUEL METERING SYSTEMS--The student will be able to:
- 26.01 Troubleshoot and adjust turbine engine fuel-metering systems and electronic-engine fuel controls. [FAA FAR Part 147, Level 1]
 - 26.04 Inspect, check, service, troubleshoot, and repair reciprocating and turbine engine fuel-metering systems. [FAA FAR Part 147, Level 3]

LIST PERFORMANCE STANDARD ADDRESSED: (continued)

NUMBER(S):

TITLES(S):

- 28.0 MAINTAIN INDUCTION SYSTEMS--The student will be able to:
28.02 Inspect, check, service, troubleshoot, and repair heat exchangers, superchargers, and turbine engine airflow and temperature control systems. [FAA FAR Part 147, Level 1]
- 30.0 MAINTAIN ENGINE EXHAUST AND REVERSER SYSTEMS--The student will be able to:
30.03 Troubleshoot and repair engine thrust reverser systems and related components. [FAA FAR Part 147, Level 1]



NOTE: Use either the Tab key or mouse click to move from field to field. The box will expand to accommodate your entry.

<i>Section 1</i>	
COURSE PREFIX AND NUMBER: AMT 1773	SEMESTER CREDIT HOURS: 6
COURSE TITLE: Aviation Maintenance Technology Powerplant 3	

Section 2

TYPE OF COURSE: (Click on the box to check all that apply)

<input type="checkbox"/> AA Elective	<input checked="" type="checkbox"/> AS Required Professional Course	<input type="checkbox"/> College Prep
<input type="checkbox"/> AS Professional Elective	<input checked="" type="checkbox"/> AAS Required Professional Course	<input type="checkbox"/> Technical Certificate
<input type="checkbox"/> Other _____		
<input type="checkbox"/> General Education: (For General Education courses, you must also complete Section 3 and Section 7)		

Section 3 (If applicable)

INDICATE BELOW THE DISCIPLINE AREA FOR GENERAL EDUCATION COURSES:

<input type="checkbox"/> Communication	<input type="checkbox"/> Social & Behavioral Sciences	<input type="checkbox"/> Mathematics
<input type="checkbox"/> Natural Sciences	<input type="checkbox"/> Humanities	

Section 4

INTELLECTUAL COMPETENCIES:

<input checked="" type="checkbox"/> Reading	<input type="checkbox"/> Speaking	<input type="checkbox"/> Critical Analysis	<input type="checkbox"/> Quantitative Skills	<input type="checkbox"/> Scientific Method of Inquiry
<input checked="" type="checkbox"/> Writing	<input checked="" type="checkbox"/> Listening	<input type="checkbox"/> Information Literacy	<input type="checkbox"/> Ethical Judgment	<input checked="" type="checkbox"/> Working Collaboratively

<i>Section 5</i>	
LEARNING OUTCOMES	METHOD OF ASSESSMENT
• Understand theory of operation of turbine engines	Written test created from FAA Test Bank of Questions
• Inspect, check, service a fire extinguishing system	Practical test based on FAA Practical Test Standards
• Adjust turbine engine oil pressure	Practical test based on FAA Practical Test Standards
• Lace and tie wire bundles	Practical test based on FAA Practical Test Standards
• Disassemble, inspect and reassemble a starter motor	Practical test based on FAA Practical Test Standards
• Inspect, repair and test an alternator	Practical test based on FAA Practical Test Standards
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Section 6

Name of Person Completing This Form: Richard Rozanski