

COURSE OUTLINE

DEPARTMENT: Aviation Maintenance Technology

CURRICULUM: Aviation Powerplant Technology

COURSE TITLE: Powerplant Theory and Maintenance

COURSE NUMBER: AMT 133

TYPE OF COURSE: Occupational Preparatory

COURSE LENGTH: 1 Quarter

CREDIT HOURS: 17 credits

CLASS SIZE: 25 students maximum

COURSE DESCRIPTION: This course is designed to cover three areas. The first area is an in-depth study of theory, operation and maintenance of the internal combustion reciprocating engine. It will include dismantling, inspection, repair or replacement of parts and partial re-assembly of an aircraft powerplant.

The second area of study is theory, operation and overhaul of gas turbine engines. Current maintenance practices are introduced, along with inspection of the compressor section, burner section and turbine section.

The third area of study is the inspection, repair and servicing of aircraft internal combustion cooling, exhaust and induction systems used on reciprocating and gas turbine engines.

AMT 133
Course Outline

COURSE OBJECTIVES: Students learn and are able to:

1. Demonstrate tool safety precautions along with safe shop practices.
2. Explain basic understanding of operational theory for reciprocating and gas turbine engines.
3. Perform basic maintenance and overhaul processes on reciprocating and turbine engines.
4. Inspect, repair and service the aircraft internal combustion engine cooling, exhaust, and induction systems.
5. Use the FAR. library and manufacturer's service bulletins.

PREREQUISITES: Successful completion of AMT 111 and AMT 112 or by permission of Unit Administrator and the instructor.

REQUIRED TEXTS: Required texts (see book list in student information packet)

COURSE SUBJECTS:

- I. Reciprocating Engines
- II. Turbine Engines
- III. Cooling Systems
- IV. Exhaust Systems
- V. Induction Systems

Lecture time for the program **will be** as much **as 1/2** but not **less** than **1/4** of the total hours. Laboratory/shop time **will be** as much **as 3/4** but not **less** than **1/2** of the total hours. Total contact time available is 265 hours.

RECIPROCATING ENGINES

I. SAFETY PRACTICES

II. THEORY

- A. History
- B. External and internal combustion
- C. Engine types
- D. Constant volume cycle
- C. Horsepower
- E. Thermal efficiency
- F. Volumetric efficiency
- G. Piston Displacement
- H. Compression Ratio
- I. Ignition timing
- J. Firing Order

III. INSPECTION PRACTICES

- A. Visual inspection
- B. Non-destructive testing
- C. Dimensional inspection technique
- D. Engine data
- F. Type certification
- D. Service bulletins
- G. Airworthiness Directives

IV. OVERHAUL PRACTICES

- A. Disassembly
- B. Cylinders
- C. Valves
- D. Valve guides
- E. Valve seats
- F. Valve springs
- G. Pistons
- H. Piston pins
- I. Piston rings
- J. Connecting rods
- K. Crankshaft

- L. Camshaft
- M. Valve lifters
- N. Pushrods
- O. Rocker arms
- P. Crankcase
- Q. Bearings
- R. Reassembly

V. COOLING SYSTEMS

- A. Pressure cooling
- B. Cooling fins
- C. Cooling baffles
- D. Baffle seals
- E. Augmentor tubes
- F. Cowl flaps
- G. Cowling
- H. Inspection practices

VI. EXHAUST SYSTEMS

- A. Exhaust stacks
- B. Crossover tubes
- C. Collector systems
- D. Alternate air provisions
- E. Mufflers
- F. Augmentor tubes
- G. Power recovery devices
- H. Carbon monoxide detection
- I. Inspection practices

VII. INDUCTION SYSTEMS

- A. Intake scoops
- B. Air filters
- C. Alternate air door
- D. Atmospheric considerations
- E. Effects on volumetric efficiency

TURBINE ENGINES

I. THEORY

- A. History
- B. Constant pressure cycle
- C. Physics of gas flow
- D. Bernoulli's principle
- E. Thrust
- F. Engine pressure ratio
- G. Compressor pressure ratio
- H. Bypass ratio
- I. Engine types
- J. Propulsive efficiency

II. OVERHAUL PRACTICES

- A. Station designations
- B. Section designations
- C. Disassembly
- D. Inlet duct
- E. Centrifugal compressors
- F. Axial flow compressors
- G. Compressor blades
- H. Diffuser section
- I. Multiple can combustors
- J. Can-annular combustors
- K. Annular combustors
- L. Reverse-flow annular combustors
- M. Fuel nozzles
- N. Turbine inlet guide vanes
- O. Turbine blades
- P. Turbine nozzles
- Q. Reassembly

III. INSPECTION PRACTICES

- A. Visual inspection
- B. Borescope
- C. Dimensional inspection technique
- D. Data plate information
- E. Manufactures service information
- F. Airworthiness directives

IV. COOLING SYSTEMS

- A. Primary airflow
- B. Secondary airflow
- C. Guide vane cooling
- D. Turbine blade cooling
- E. Turbine Case Clearance Control
- F. Metal fatigue

V. EXHAUST

- A. Exhaust gas temperature
- B. Noise suppressors
- C. Thrust reversers
- D. Afterburners
- E. Exhaust cones