NASHUA COMMUNITY COLLEGE

COURSE OUTLINE FORM

Course Title: Maintenance Forms & Records			
Course Prefix & No. AVTN101N	**Lecture Hours: 2**	**Lab Hours: 3**	**Credit Hours: 3**
Department: Transportation			
Program: Aviation Technologies			
Revision Date: 5/2018			

Prerequisites/ Co-requisites:

Student must complete and pass the College Accuplacer exam.

Required Accuplacer Score:

Entrance Skills:

- Must be able to speak, read and write in English. Must be at least 18 years of age upon the completion on this 21-month course in order to test with the FAA to obtain Airframe and Powerplant licenses
- Basic math, writing skills and some mechanical skills are preferred
- An understanding of the basic use of tools
- Knowledge and use of precision measurement equipment and related tools
- Proper use and knowledge of (PPE) Personal Protection Equipment, as related to the task
- An understanding of the safe use of equipment, along with the ability to follow safety instructions

Catalog Description:

This course is a study of selection and use of FAA technical and legal publications in order to perform the duties of an aircraft maintenance technician. Maintenance publications, forms and records, mechanic privileges, weight and balance problem solving, aircraft weighing procedures and establishing an aircraft equipment list will be covered.

Course Competencies:

Competency (Knowledge and Skills) Students will be able to:	**Critical Thinking Level**	**Linked to Program Outcome(s) #**
1. Explain FAA Maintenance privileges and limitationsalong with the classification of Airman	Comprehension	
2. Apply proper maintenance inspections along with accurate maintenance record entries	Analysis	
3.Demonstrate the difference between a major repairand alteration with form 337	Application	
4. Describe the proper weight and balance proceduresand the location of center of gravity points	Application	
5. Identify the weight and balance theory as it relates tolocating the balance point or CG and performing the solution and chart formulas	Knowledge	
6. Demonstrate the differences between single engineand multi-engine aircraft weight and balance computations	Application	
7. Apply forward and aft CG checks and formulasneeded to commutate them	Analysis	

Course Competencies:

Competency (Knowledge and Skills) Students will be able to:	**Critical Thinking Level**
Explain how to fine the center of gravity after a repair or alteration	Comprehension
Describe the procedures needed to determine if you need to install a ballast	Application
Identify in finding the maximum payload and the determination for large aircraft weight and balance computations	Knowledge
Demonstrate the use of and electronic computer in the computation of weight and balance	Application

Course Outline:

Content Topic	**Subtopics:**
a.) Maintenance Privileges and Limitations	a.) Maintenance classifications b.) Inspections c.) Repairs d.) Alterations e.) Preventive maintenance
b.) Classification of Maintenance Airman	a.) Mechanic b.) Privileges and limitations of a mechanic c.) Inspection authorization d.) Requirements for certification e.) Requirements for IA certification and renewal f.) Privileges of a mechanic with an inspection authorization g.) Repairmen
c.) Maintenance and Inspection Records	a.) Required maintenance records b.) Maintenance record entries c.) Maintenance entries d.) Inspection entries
d.) Maintenance Forms	a.) Major repair and alteration FAA Form 337 b.) Malfunction or defect report c.) Inspection reminder
e.) Weight and Balance Theory	a.) Locating the balance point, or center of gravity b.) Shifting CG c.) Solution by chart d.) Solution by formula
f.) Weight and Balance Documentation	a.) FAA – Furnished information b.) Manufacturers – Furnished information

Course Outline:

g.) Weighing the Aircraft	a.) Equipment for weighing b.) Preparation for weighing
h.) Locating the Center of Gravity	a.) Location with respect to the datum b.) Tail wheel airplane with the datum ahead of the main wheels c.) Tail wheel airplane with the datum behind the main wheels d.) Nose wheel airplane with the datum ahead of the main wheels e.) Nose wheel airplane with the datum behind the main wheels f.) Location with respect to the mean aerodynamic cord
i.) Single Engine Aircraft Weight and Balance Computations	a.) The loading graph b.) CG moment index envelope
j.) Twin Engine Airplane Weight and Balance Computations	a.) Finding the empty weight and empty weight center of gravity b.) The chart method; The formula method c.) Finding the operational CG d.) The chart method; CG in percent of MAC
k.) Adverse – Loaded CG Checks	a.) Forward CG check b.) Aft CG check c.) Center of gravity change after repair or alteration d.) Determination of needed ballasts
l.) Large Aircraft Weight and Balance Computations	a.) Finding the maximum payload b.) Determining minutes of fuel dump time c.) Weight and balance computations with an electronic computer

Performance Evaluation:

Formative Assessments	Summative Assessments
a.) Lab participation grade b.) Classroom participation c.) Quizzes d.) Midterm exam e.) Homework assignments	a.) Final exam b.) Lab practical exam

Method of Instruction:

The methods of instruction that will be used in this course include but are not limited to:

a.) Lecture

b.) Required reading

c.) Lab instruction

d.) Watching assigned and in class videos

e.) Canvas usage

Instructional Facilities:

For this course a traditional classroom with audio/visual equipment is required as well as working lab space in the aviation labs.

Revision History:

Last recorded revision 08/13/1991

Associate Professor, Donald Vallerand

Latest revision 05/21/2018

Associate Professor, Jeffrey Sullivan

Will this course be taught online? Yes____ No X

If yes, please complete the Online Course Outline Form.

NASHUA COMMUNITY COLLEGE

COURSE OUTLINE FORM

Course Title: Airframe Structures I			
Course Prefix & No: AVTN102	**Lecture Hours: 2**	**Lab Hours: 6**	**Credit Hours: 4**
Department: Transportation			
Program: Aviation Technologies			
Revision Date: 7/2018			

Prerequisites/ Co-requisites:

Student must complete and pass the College Accuplacer exam.

Required Accuplacer Score:

Entrance Skills:

- Must be able to speak, read and write in English. Must be at least 18 years of age upon the completion on this 21-month course in order to test with the FAA to obtain Airframe and Powerplant licenses
- Basic math, writing skills and some mechanical skills are preferred
- An understanding of the basic use of tools
- Knowledge and use of precision measurement equipment and related tools
- Proper use and knowledge of (PPE) Personal Protection Equipment, as related to the task
- An understanding of the safe use of equipment, along with the ability to follow safety instructions

Catalog Description:

This course is a study of repair procedures on aircraft fabric surfaces and wood structural members in accordance with FAA and manufacturer's instructions, as well as an introduction to sheet metal repairs using correct repair procedures, tools and materials. The application of aircraft finishing including enamel, lacquer and dope for fabric covered surfaces will also be discussed.

Course Competencies:

Competency (Knowledge and Skills) Students will be able to:	**Critical Thinking Level**	**Linked to Program Outcome(s) #**
1. Explain a working understanding of proper aircraftsheet metal construction and techniques	Comprehension	
2. Demonstrate the knowledge of tools used for sheetmetal construction and repair	Application	
3. Explain inspection techniques used to determine theairworthiness of a wood structure aircraft	Comprehension	
4. Apply inspection techniques used to determine the air worthiness of a wood structure aircraft	Analysis	
5. Demonstrate the methods of application of aircraftfabric and inspection techniques used to determinethe airworthiness of fabric covering	Application	
6. Demonstrate the proper techniques of chemical and dry stripping metallic aircraft paint	Application	
7. Apply procedures used for the preparation ofpainting metal	Analysis	
8. Explain the difference between zinc chromateprimers, wash primers and epoxy primers	Comprehension	
9. Describe the acrylic, synthetic and polyurethanefinishing systems	Application	
10. Identify fabric finishing problems, like orange peel,fish eyes, runs and sags, pinholes, blushing, poor adhesion, dope roping, ringworm's and rejuvenation	Knowledge	
11. Demonstrate effective troubleshooting for paint gunproblems, such as distorted spray patterns and spraygun spitting	Application	
12. Identify the proper cleaning and maintenance ofpaint spray equipment	Knowledge	
13. Demonstrate proper paint and dope applications, spray area, proper air supply and spray equipment	Application	
14. Apply proper safety precautions regarding aircraftpainting and finishing systems such as fire, respiratory and toxicity safety awareness	Analysis	

Course Outline:

Content Topic	**Subtopics:**
a.) Nonmetallic Aircraft Structures	a.) Aircraft Wood Structures b.) Glues and Gluing c.) Construction and Repair of Wood Structures d.) Protection and Inspection of Wooden Aircraft Structures
b.) Aircraft Fabric Covering	a.) Fabric Covering Systems b.) Aircraft Recovering c.) Cotton Fabric Covering d.) Inorganic Fabric Covering e.) Repair of Aircraft Fabric
c.) Aircraft Painting and Finishing	a.) Metal Finishing b.) Fabric Finishing c.) Paint and Dope Application
d.) Metallic Aircraft Construction	a.) Sheet-Metal Aircraft Construction b.) Types of Metal Structure c.) Stresses Acting on an Aircraft Structure
e.) Materials for Metal Aircraft Construction	a.) Non-Ferrous Metals b.) Ferrous Metals c.) Strength of Metal Structural Materials
f.) Aircraft Structural Fasteners	a.) Solid Rivets b.) Special Fasteners
g.) Tools for Sheet-Metal Construction and Repair	a.) Layout Tools b.) Marking Tools c.) Cutting Tools d.) Deburring Tools e.) Drills f.) Forming Tools g.) Riveting Tools h.) Sheet-Metal Assembly Tools

Performance Evaluation:

Formative Assessments	Summative Assessments
a.) Lab participation grade b.) Classroom participation c.) Quizzes d.) Midterm exam e.) Homework assignments	a.) Final exam b.) Lab practical exam

Method of Instruction:

The methods of instruction that will be used in this course include but are not limited to:

a.) Lecture

b.) Required reading

c.) Lab instruction

d.) Watching assigned and in class videos

e.) Canvas usage

Instructional Facilities:

For this course a traditional classroom with audio/visual equipment is required as well as working lab space in the aviation labs.

Revision History:

Last recorded revision: None

Associate Professor, Jeffrey Sullivan

Latest revision: 07/13/2018

Associate Professor, Jeffrey Sullivan

Will this course be taught online? Yes _ No X

If yes, please complete the Online Course Outline Form.

NASHUA COMMUNITY COLLEGE

COURSE OUTLINE FORM

Course Title: Airframe Structures II			
Course Prefix & No. AVTN103N	**Lecture Hours: 3**	**Lab Hours: 6**	**Credit Hours: 5**
Department: Transportation			
Program: Aviation Technologies			
Revision Date: 7/2018			

Prerequisites/ Co-requisites:

AVTN102, AVTN108
Student must complete and pass the College Accuplacer exam.

Required Accuplacer Score:

Entrance Skills:

- Must be able to speak, read and write in English. Must be at least 18 years of age upon the completion on this 21-month course in order to test with the FAA to obtain Airframe and Powerplant licenses
- Basic math, writing skills and some mechanical skills are preferred
- An understanding of the basic use of tools
- Knowledge and use of precision measurement equipment and related tools
- Proper use and knowledge of (PPE) Personal Protection Equipment, as related to the task
- An understanding of the safe use of equipment, along with the ability to follow safety instructions

Catalog Description:

The various materials and processes used in constructing aircraft are covered in this course. The proper use in selection of materials, rivets, fasteners for structural in nonstructural applications and welding are covered. In addition, the following materials and their repair procedures will be covered: honeycomb, fiberglass, plastic and laminated surfaces.

Course Competencies:

Competency (Knowledge and Skills) Students will be able to:	**Critical Thinking Level**	**Linked to Program Outcome(s) #**
1. Explain the proper layout and forming of metallic sheet-metal construction	Comprehension	
2. Apply proper techniques in achieving accurate bend radius, setback and bend allowance	Analysis	
3. Demonstrate the procedures in folding a box and forming compound curves	Application	
4. Describe the proper use of solid rivets regarding sheetmetal joints	Application	
5. Identify the formulas to use to achieve proper rivet edge spacing and edge distance	Knowledge	
6. Demonstrate the differences in hole preparation procedures for both protruding head rivets and flush head rivets.	Application	
7. Apply the proper procedures for rivet installation, to include compression riveting and gun riveting	Analysis	
8. Identify how to use the manufacturers structural repairmanual to perform sheet metal structural repairs	Knowledge	
9. Explain how to effectively perform an appraisal of damage to a sheet-metal structure	Comprehension	
10. Describe the procedures used to perform a flush patch repair.	Application	
11. Identify the crucial procedures regarding repairs to pressure vessels	Knowledge	

12. Demonstrate the NACA method of flush riveting	Application
13. Identify the safety precautions regarding welding inthe personal protection equipment needed	Knowledge
14. Describe shielded metal arc welding (SMAW) and gastungsten arc welding (GTAW)	Application
15. Demonstrate a welding bead with an oxyacetylene welder and how to inspect the weld for a cold weld	Application
16. Apply the proper technique for oxyacetylene cutting,brazing and soldering and welding aluminum	Analysis
17. Identify the steps necessary to perform a weldingrepair on an aircraft structure	Knowledge
18. Explain the many types of composite structures andmaterials	Comprehension
19. Identify the procedures needed to perform a fiberglassrepair on an aircraft control surface	Knowledge
20. Demonstrate the ability to perform a repair to thefuselage of an aircraft using a Kevlar style repair	Application
21. Apply inspection and repair procedures to perform acomposite structure Inspection	Analysis
22. Describe procedures when working with transparent plastic materials, such as cutting, drilling and forming	Application
23. Explain the repair of transparent plastic materials thathave crazing, holes or cracks on their surfaces	Comprehension

Course Outline:

Content Topic	
a.) Layout and Forming of Sheet Metal	a.) Grain of the Metal b.) Bend Radius c.) Setback d.) Bend Allowance e.) Layout of a Sheet-Metal Channel f.) Folding a Box g.) Forming Compound Curves
b.) Sheet-Metal Joints Using Solid Rivets	a.) Rivet Selection b.) Rivet Layout c.) Hole Preparation for Protruding Head Rivets d.) Hole preparation for Flush Rivets e.) Rivet Installation
c.) Repair of Sheet-Metal Structure	a.) Appraisal of the Damage b.) Classification of Damage c.) Repair of Cracks in Noncritical Areas d.) Surface Patch for Stressed Skin e.) Flush Patch f.) Stringer Repair g.) Repairs to Pressure Vessels h.) Repairs to Floats and Seaplane Hulls i.) Replacement of a Section of the Aircraft Skin j.) Approval of the Repair
d.) Aircraft Welding	a.) Types of Welding b.) Gas Welding c.) Oxyacetylene Cutting d.) Gas Welding Aluminum e.) Brazing and Soldering
e.) Electric Welding	a.) Electric Arc Welding b.) Electric Resistance Welding c.) Solution by chart d.) Solution by formula
f.) Repair of Aircraft Structure By Welding	a.) Specified Welding Repairs
g.) Composite Structures	a.) Composite Materials b.) Manufacturing Methods c.) Composite Structure Inspection and Repair d.) Safety around composites
h.) Transparent Plastics	a.) Storing and Handling Transparent Plastic Materials b.) Working with Transparent Plastic Materials c.) Cleaning Transparent Plastic Materials d.) Installing Plastic Windshield and Windows e.) Preparing Transparent Plastic Materials

Performance Evaluation:

Formative Assessments	Summative Assessments
a.) Lab participation grade b.) Classroom participation c.) Quizzes d.) Midterm exam e.) Homework assignments	a.) Final exam b.) Lab practical exam

Method of Instruction:

The methods of instruction that will be used in this course include but are not limited to:

a.) Lecture

b.) Required reading

c.) Lab instruction

d.) Watching assigned and in class videos

e.) Canvas usage

Instructional Facilities:

For this course a traditional classroom with audio/visual equipment is required as well as working lab space in the aviation labs.

Revision History:

Last recorded revision 08/13/1991

Associate Professor, Donald Vallerand

Latest revision 07/13/2018

Associate Professor, Jeffrey Sullivan

Will this course be taught online? Yes____ No X

If yes, please complete the Online Course Outline Form.

NASHUA COMMUNITY COLLEGE

COURSE OUTLINE FORM

Course Title: Materials and Processes			
Course Prefix & No: AVTN104	**Lecture Hours: 2**	**Lab Hours: 3**	**Credit Hours: 3**
Department: Transportation			
Program: Aviation Technologies			
Revision Date: 6/2018			

Prerequisites/ Co-requisites:

Student must complete and pass the College Accuplacer exam.

Required Accuplacer Score:

Entrance Skills:

- Must be able to speak, read and write in English. Must be at least 18 years of age upon the completion on this 21-month course in order to test with the FAA to obtain Airframe and Powerplant licenses
- Basic math, writing skills and some mechanical skills are preferred
- An understanding of the basic use of tools
- Knowledge and use of precision measurement equipment and related tools
- Proper use and knowledge of (PPE) Personal Protection Equipment, as related to the task
- An understanding of the safe use of equipment, along with the ability to follow safety instructions

Catalog Description:

This course is a study of identification, selection and inspection of aircraft hardware and materials, use of precision measurement equipment and related tools, identification and performance of nondestructive tests and interpretation of the results. Ground operation and servicing, as well as corrosion control will be presented

Course Competencies:

Competency (Knowledge and Skills) Students will be able to:	**Critical Thinking Level**	**Linked to Program Outcome(s) #**
1. Explain a working knowledge of Aircraft Materialsand Metals. Know the difference between Ferrous Metals and Nonferrous Metals, their Materials and Alloys	Comprehension	
2. Apply inspection techniques with Nondestructive Inspections. Perform Magnetic Particle Inspection andPenetrant Inspection.	Analysis	
3. Demonstrate the use of the many Precision MeasuringDevices used to inspect and confirm proper limits andmeasurements per the Manufactures Maintenance Manual	Application	
4. Describe the proper procedure for Turnbuckle Safetymethods. Explain the four different types of Turnbuckle configurations.	Application	
5. Identify and apply proper techniques with metal layout, edge distance, rivet spacing and metal bending	Knowledge	
6. Demonstrate the proper techniques used to select the proper Rivets and Materials to perform a project usingDrill Motor, Rivet Gun and Bucking Bar.	Application	
7. Apply procedures used to perform an effectiveNicopress-type sleeve swage.	Analysis	

Course Outline:

Content Topic	**Subtopics:**
a.) Materials	a.) Metals b.) Aluminum Alloys c.) Magnesium Alloys d.) Titanium e.) Monel
b.) Nonmetal Materials	a.) Aircraft Would b.) Aircraft Fabrics c.) Composite Materials d.) Plastic Resins e.) Polyester Resin and Epoxy Resin f.) Reinforcing Materials g.) Glass Fibers, Kevlar, Graphite
c.) Metal Heat Treatment	a.) Ferrous Metal Heat Treatment b.) Nonferrous Metal Heat treatment c.) Aluminum and Magnesium Alloys d.) Titanium Alloys e.) Stress Relieving, Annealing, Thermal and Case Hardening f.) Hardness Testing g.) Rockwell and Brinell Hardness Testing
d.) Nondestructive Inspection	a.) Radiographic Inspection b.) Magnetic Particle Inspection c.) Eddy Current Inspection d.) Ultrasonic Inspection e.) Penetrant Inspection f.) Welding Inspection g.) Bonded Structure Inspection
e.) Aircraft Hardware	a.) Threaded Fasteners b.) Cowling fasteners c.) Aircraft Control Cable d.) Aircraft Rivets
f.) Measuring Devices	a.) Dial Indicators b.) Micrometer and Vernier Calipers d.) Small Hole Gages and Telescoping Gages e.) Dividers and Calipers f.) Thickness and Valve Stretch Gage g.) Connecting Rod Twist Fixture

Performance Evaluation:

Formative Assessments	Summative Assessments
a.) Lab participation grade b.) Classroom participation c.) Quizzes d.) Midterm exam e.) Homework assignments	a.) Final exam b.) Lab practical exam

Method of Instruction:

The methods of instruction that will be used in this course include but are not limited to:

a.) Lecture

b.) Required reading

c.) Lab instruction

d.) Watching assigned and in class videos

e.) Canvas usage

Instructional Facilities:

For this course a traditional classroom with audio/visual equipment is required as well as working lab space in the aviation labs.

Revision History:

Last recorded revision: None

Associate Professor, Jeffrey Sullivan

Latest revision: 06/25/2018

Associate Professor, Jeffrey Sullivan

Will this course be taught online? Yes _ No X

If yes, please complete the Online Course Outline Form.

NASHUA COMMUNITY COLLEGE

COURSE OUTLINE FORM

Course Title: Aircraft Systems			
Course Prefix & No. AVTN105N	**Lecture Hours: 3**	**Lab Hours: 3**	**Credit Hours: 4**
Department: Transportation			
Program: Aviation Technologies			
Revision Date: 7/2018			

Prerequisites/ Co-requisites:

Student must complete and pass the College Accuplacer exam.

Required Accuplacer Score:

Entrance Skills:

- Must be able to speak, read and write in English. Must be at least 18 years of age upon the completion on this 21-month course in order to test with the FAA to obtain Airframe and Powerplant licenses
- Basic math, writing skills and some mechanical skills are preferred
- An understanding of the basic use of tools
- Knowledge and use of precision measurement equipment and related tools
- Proper use and knowledge of (PPE) Personal Protection Equipment, as related to the task
- An understanding of the safe use of equipment, along with the ability to follow safety instructions

Catalog Description:

This course incorporates aircraft instruments and aircraft systems. Topics include basic airframe instruments, correct handling and installation procedures for instruments, ice and rain control systems, fire protection systems, position and warning systems, cabin atmosphere and control systems, fuel systems, inspection, checks, servicing and repair of the various systems and their components

Course Competencies:

Competency (Knowledge and Skills) Students will be able to:	**Critical Thinking Level**	**Linked to Program Outcome(s) #**
1. Explain the different classifications of instruments	Comprehension	
2. Apply proper maintenance inspections pressuremeasuring instruments	Analysis	
3. Demonstrate the difference between non-electrical temperature measurements and electrical temperaturemeasurements	Application	
4. Describe the proper settings for a mechanical tachometer and an electrical tachometer	Application	
5. Identify the difference between direction indicatinginstruments and gyroscopic instruments	Knowledge	
6. Demonstrate the ability to effectively troubleshoot analtimeter fault and the steps needed to repair it	Application	
7. Apply methods used to perform a pitot static systemtest	Analysis	
8. Explain the commands of the automatic Flight Controlsystem and subsystems.	Comprehension	
9. Describe what an aural warning system is and thedifferent systems it monitors	Application	
10. Apply proper instrument range marking, instrumentinstallation, instrument handling and instrument maintenance	Analysis	
11. Explain how to check for purity, volatility, and anti-detonation qualities of fuel	Comprehension	
12. Describe the procedures needed to effectively troubleshoot the fuel anti-icing fault	Application	
13. Identify the difference between a gravity fed fuel system for a float carburetor and that for a fuelinjected engine	Knowledge	
14. Demonstrate the use of fuel system contamination control and the importance of proper grade of fuel	Application	
15. Apply techniques used for proper grounding and bonding prior to fueling or defueling an aircraft on theground	Analysis	
16. Explain how fuel filters and strainers work and their importance in the fuel system	Comprehension	

17. Identify components in the fuel quantity measuring system and how each of them are vital for accurateand temperature compensated measurements	Knowledge	
18. Demonstrate the proper way to run a fuel line, it's alignment and bonding	Application	
19. Apply techniques necessary for fuel system troubleshooting using aircraft manufacturer schematicdiagrams and logic charts	Analysis	
20. Identify the effects on the human body regarding altitude pressure and temperatures	Knowledge	
21. Describe four types of oxygen supply systems	Application	
22. Explain the proper procedures for oxygen filling and servicing and what crucial steps to follow when doingso	Comprehension	
23. Apply proper maintenance inspections of the negative pressure relief valve and the cabin air pressure reliefvalve	Analysis	
24. Demonstrate the three modes of pressurization and how each mode controls the cabin pressurization	Application	
25. Describe the components of the vapor cycle cooling system and what each component does to performadequate cooling	Application	
26. Identify the materials needed to properly service in aircraft air conditioning system	Knowledge	
27. Demonstrate all the parameters needed to have dangerous in-flight icing conditions	Application	
28. Apply effective troubleshooting on the powerplant ice protection system	Analysis	
29. Identify the components of the airfoil ice protection system and how each component works to effectivelyprevent ice from forming	Knowledge	
30. Demonstrate the ability to name all of the fire extinguishing agents currently used on aircraft todayand also list the ones that were used in past eras	Application	
31. Apply good sound troubleshooting and servicing of an aircraft's fire detector and fire extinguishing system	Analysis	
32. Identify the components used in an engine fire detection and extinguishing system.	Knowledge	

Course Outline:

Content Topic	Subtopics:
a.) Overview of Aircraft Instruments	a.) Classification of Aircraft Instruments b.) Pressure Measuring Instruments c.) Temperature Measuring Instruments d.) Mechanical Movement Measuring Instruments e.) Direction Indicating Instruments f.) Gyroscopic Instruments
b.) Aircraft Instrument Systems	a.) Pitot-Static Systems b.) Gyro instrument Power Systems c.) Automatic Flight Control Systems
c.) Aural Warning Systems	a.) No Subtopics
d.) Instrument Installation and Maintenance	a.) Instrument Range Marking b.) Instrument Installation c.) Instrument Maintenance d.) Static System Leak Checks e.) Instrument Handling
Aircraft Fuel Systems	**Aircraft Fuel Systems**
a.) Aviation Fuels	a.) Reciprocating Engine Fuel b.) Turbine Engine Fuel c.) Fuel system requirements
b.) Aircraft Fuel Systems	a.) Gravity Fed Fuel System for a Float Carburetor b.) Gravity Fed System for a Fuel Injected Engine c.) Low wing, Single Engine Fuel System for a Float Carburetor d.) Low Wing, Twin Engine Fuel System for Fuel Injected Engines e.) Twin Engine Cross Feed Fuel System f.) Four Engine Manifold Cross Feed Fuel System g.) Helicopter Fuel System h.) Large Turbine Engine Transport Fuel System i.) Fueling and Defueling j.) Fuel Dumping k.) Instrument and Controls
c.) Fuel Tanks	a.) Built Up Fuel Tanks b.) Integral Fuel Tanks c.) Bladder Type Fuel Tanks d.) Fuel Tank Filler Caps
d.) Fuel Pumps	a.) Electrical Auxiliary Pumps b.) Plunger Type Pumps c.) Centrifugal Boost Pump d.) Ejector Pump Systems e.) Engine Driven Fuel Pumps f.) Turbine Engine Fuel Pump
e.) Fuel Filters and Strainers	a.) Types of Contamination b.) Required Fuel Strainers
f.) Fuel Valves	a.) Plug Type Valves b.) Poppet Type Selector Valve c.) Electric Motor Operated Sliding Gate Valve d.) Solenoid Operated Poppet Type Fuel Shut off Valve

g.) Fuel Heaters	a.) No Subtopics
h.) Fuel System Instruments	a.) Fuel Quantity Measuring Systems b.) Fuel Flowmeters c.) Computerized Fuel Flow System d.) Fuel Pressure Warning System e.) Fuel Temperature Indicators
i.) Fuel System Plumbing	a.) Fuel Line Routing b.) Fuel Line Alignment c.) Bonding d.) Support of Fuel System Components
j.) Fuel Jettisoning System	a.) No Subtopics
k.) Fueling and Defueling	a.) Fire protection
l.) Fuel System Contamination Control	a.) Protection against Contamination b.) Importance of Proper Fuel Grade
Cabin Atmosphere Control Systems	**Cabin Atmosphere Control Systems**
a.) Cabin Atmosphere Control Systems	a.) Human Needs in Flight b.) Pressure, Temperature, Humidity c.) Air Movement d.) The Atmosphere
b.) The Physics of Cabin Atmosphere Control	a.) Heat b.) Temperature c.) Pressure
c.) Aircraft Supplemental Oxygen Systems	a.) Types of Oxygen Supply b.) Two Types of Oxygen Systems c.) Continuous Flow Oxygen Systems d.) Demand Type Oxygen Systems e.) Gaseous Oxygen Cylinders f.) Oxygen System Servicing g.) System discharge indication
d.) Aircraft Pressurization Systems	a.) Principles of Pressurization b.) Modes of Pressurization c.) Pressurization Controls d.) Pressurization Instruments e.) Cabin Air Pressure Regulator f.) Negative Pressure Relief Valve g.) Cabin Air Pressure Safety Valve h.) Augmented Airflow i.) Electronic Pressurization Controls
e.) Aircraft Heaters	a.) Exhaust System Heaters b.) Combustion Heaters
f.) Aircraft Cooling Systems	a.) Air Cycle Cooling System b.) Vapor Cycle Cooling System c.) Air Conditioning System Servicing Equipment d.) Air Conditioning System Checks e.) Installing a Partial Charge of Refrigerant f.) Air Conditioning System Servicing
Ice Control and Rain Removal Systems	**Ice Control and Rain Removal Systems**

a.) Ice Control Systems	a.) Dangers of In-Flight Icing b.) Types of Ice Control Systems c.) Pitot Static System Ice Protection d.) Windshield Ice Protection e.) Airfoil Ice Protection f.) Brake Deice System g.) Powerplant Ice Protection h.) Water Drain System Ice Protection i.) Ground Deicing and Anti-Icing
b.) Rain Removal Systems	a.) No Subtopics
Fire Protection Systems	**Fire Protection Systems**
a.) Fire Protection Systems	a.) Fire Detectors and Overheat Detection Systems b.) Thermoswitch Type Fire Detection System c.) Rate of temperature rise Detection System d.) Continuous Loop Detector System e.) Smoke and Flame Detectors
b.) Fire Extinguishing Systems	a.) Hand Held Fire Extinguishers b.) Fire Extinguishing Agents c.) Installed Fire Extinguishing Systems
c.) Complete Fire Protection System	a.) Engine Fire Detection and Extinguishing b.) APU Fire Detection and Extinguishing c.) Lower Cargo Compartment Smoke Detectors and Fire Suppression d.) Wheel Well Overheat Monitoring e.) Wing and Body Overheat Monitoring f.) Lavatory Smoke Detection and Fire Extinguisher

Performance Evaluation:

Formative Assessments	**Summative Assessments**
a.) Lab participation grade b.) Classroom participation c.) Quizzes d.) Midterm exam e.) Homework assignments	a.) Final exam b.) Lab practical exam

Method of Instruction:

The methods of instruction that will be used in this course include but are not limited to:

a.) Lecture

b.) Required reading

c.) Lab instruction

d.) Watching assigned and in class videos

e.) Canvas usage

Instructional Facilities:

For this course a traditional classroom with audio/visual equipment is required as well as working lab space in the aviation labs.

Revision History:

Last recorded revision 08/13/1991
Associate Professor, Donald Vallerand
Latest revision 07/11/2018
Associate Professor, Jeffrey Sullivan

Will this course be taught online? Yes____ No X

If yes, please complete the Online Course Outline Form.

NASHUA COMMUNITY COLLEGE

COURSE OUTLINE FORM

Course Title: Aviation Electronics			
Course Prefix & No. AVTN106N	**Lecture Hours: 2**	**Lab Hours: 2**	**Credit Hours: 3**
Department: Transportation			
Program: Aviation Technologies			
Revision Date: 7/2018			

Prerequisites/ Co-requisites:

Student must complete and pass the College Accuplacer exam.

Required Accuplacer Score:

Entrance Skills:

- Must be able to speak, read and write in English. Must be at least 18 years of age upon the completion on this 21-month course in order to test with the FAA to obtain Airframe and Powerplant licenses
- Basic math, writing skills and some mechanical skills are preferred
- An understanding of the basic use of tools
- Knowledge and use of precision measurement equipment and related tools
- Proper use and knowledge of (PPE) Personal Protection Equipment, as related to the task
- An understanding of the safe use of equipment, along with the ability to follow safety instructions

Catalog Description:

An introduction to DC and AC electricity, including their disassembly and maintenance. This course will also include generators and alternators. Emphasis will be placed on understanding control elements: electrical, hydraulic and pneumatic. The capstone of the course will be the ability to troubleshoot electromechanical problems.

Course Competencies:

Competency (Knowledge and Skills) Students will be able to:	**Critical Thinking Level**	**Linked to Program Outcome(s) #**
1. Explain how electrons and valance electrons flow inan electrical circuit	Comprehension	
2. Apply techniques used to find the direction of the flowof electricity	Analysis	
3. Demonstrate the difference between static electricityand current electricity	Application	
4. Describe the production of electricity and how it relates to heat, chemical action, pressure, light andmagnetism	Application	
5. Identify the formula for Ohm's law and provideexamples	Knowledge	
6. Demonstrate the differences between direct currentcan alternating current electricity	Application	
7. Apply techniques used to troubleshoot series andparallel circuits	Analysis	
8. Identify the formulas used for computations in bothseries and parallel circuits	Knowledge	
9. Explain inductance and capacitance	Comprehension	
10. Describe what amplitude, phase and power meanwhen talking about alternating current	Application	
11. Identify how capacitive and inductive reactants aremeasured and what they represent in an electrical circuit	Knowledge	
12. Demonstrate the use of the voltmeter, ammeter andohmmeter	Application	
13. Explain what a resistor does in a circuit	Comprehension	
14. Apply terms used to describe an inductor in an electrical circuit	Analysis	
15. Demonstrate the procedures to effectively troubleshoot switches, relays and solenoids	Knowledge	
16. Apply the difference in chemical makeup of a leadacid battery and a nickel cadmium battery	Application	

17. Explain the difference between a Zener diode and a conventional diode and how they work in an electricalcircuit	Comprehension	
18. Describe the difference between a transformer and a rectifier	Knowledge	
19. Apply knowledge on how and why direct current motors are more widely used on light aircraft and alternating current motors are more widely used onlarger aircraft	Analysis	
20. Explain what an integrated digital circuit is in the proper troubleshooting procedures using electricalmeters	Comprehension	
21. Demonstrate the difference between a simple chemicalcell, primary and secondary cells. Explain how these are used in the aircraft	Application	
22. Apply knowledge on the effects of magnetism in an electrical motor or generator. Explain how these magnets, when oriented in the proper North and Southpoles, can produce magnetic flux lines, which can produce electricity	Analysis	

Course Outline:

Content Topic	Subtopics:
a.) An Introduction to Electricity	a.) Electron Flow b.) Valance Electrons c.) Conductors d.) Insulators e.) Semiconductors f.) Ions g.) Useful Work h.) Direction of the Flow of Electricity
b.) Types of Electricity	a.) Static Electricity b.) Current Electricity
c.) Production of Electricity	a.) Electricity from Heat b.) Electricity from Chemical Action c.) Electricity from Pressure d.) Electricity from Light e.) Electricity from Magnetism
d.) Electrical Relationships	a.) Ohm's Law b.) Metric Prefixes
e.) Direct Current Electricity	a.) Direct Current Circuits
f.) Alternating Current Electricity	a.) Production and Use of Alternating Current Electricity b.) Alternating Current Terms and Values c.) Effects of Capacitance in an AC Circuits d.) Effects of Inductance and AC Circuits e.) Circuits with Resistance, Inductance and Capacitance f.) Resonance g.) Three Phase Alternating Current Electricity
g.) Electrical Circuit Components	a.) Electrical Measuring Instruments b.) Conductors c.) Resistors d.) Switches e.) Circuit Protection Devices f.) Capacitors g.) Inductors h.) Transformers i.) Rectifiers j.) Terminal Strips

h.) Solid-State Devices	a.) Semiconductor Theory b.) Semiconductor Diodes c.) Zener Diodes d.) Silicon Controlled Rectifiers e.) Triacs f.) Transistors g.) Optoelectronic Devices
i.) Integrated Circuits	a.) Digital Integrated Circuits b.) Linear Integrated Circuits
j.) Chemical Energy into Electricity	a.) Simple Chemical Cell b.) Primary Cells c.) Secondary Cells
k.) Aircraft Batteries	a.) Lead Acid Batteries b.) Nickel Cadmium Batteries
l.) Magnetism	a.) Permanent Magnets b.) Electromagnets
m.) Electrical Motors	a.) Direct Current Motors b.) Alternating Current Motors
n.) Electrical Generators	a.) Direct Current Generators
o.) Aircraft Electrical Circuits	a.) Electrically Retractable Landing Gear b.) Electrically Operated Fuel Valves

Performance Evaluation:

Formative Assessments	**Summative Assessments**
a.) Lab participation grade b.) Classroom participation c.) Quizzes d.) Midterm exam e.) Homework assignments	a.) Final exam b.) Lab practical exam

Method of Instruction:

The methods of instruction that will be used in this course include but are not limited to:
a.) Lecture
b.) Required reading
c.) Lab instruction
d.) Watching assigned and in class videos
e.) Canvas usage

Instructional Facilities:

For this course a traditional classroom with audio/visual equipment is required as well as working lab space in the aviation labs.

Revision History:

Last recorded revision 08/13/1991
Associate Professor, Donald Vallerand
Latest revision 07/13/2018
Associate Professor, Jeffrey Sullivan

Will this course be taught online? Yes____ No X

If yes, please complete the Online Course Outline Form.

NASHUA COMMUNITY COLLEGE

COURSE OUTLINE FORM

Course Title: Digital Logic / Communication and Navigation Systems			
Course Prefix & No. AVTN107N	**Lecture Hours: 2**	**Lab Hours: 2**	**Credit Hours: 3**
Department: Transportation			
Program: Aviation Technologies			
Revision Date: 7/2018			

Prerequisites/ Co-requisites:

AVTN106N
Student must also complete and pass the College Accuplacer exam.

Required Accuplacer Score:

Entrance Skills:

- Must be able to speak, read and write in English. Must be at least 18 years of age upon the completion on this 21-month course in order to test with the FAA to obtain Airframe and Powerplant licenses
- Basic math, writing skills and some mechanical skills are preferred
- An understanding of the basic use of tools
- Knowledge and use of precision measurement equipment and related tools
- Proper use and knowledge of (PPE) Personal Protection Equipment, as related to the task
- An understanding of the safe use of equipment, along with the ability to follow safety instructions

Catalog Description:

This course is a study of Digital logic gates, flip–flops, PLAs and memory, as studied on microprocessor support chips. Gate reduction techniques are introduced along with logic control circuits using relay logic. Aircraft Communication and Navigation systems are also covered and include basic radio theory, audio integrating systems, electronic navigation systems, electronic instrument systems and electronic systems installation and maintenance.

Course Competencies:

Competency (Knowledge and Skills) Students will be able to:	**Critical Thinking Level**	
1. Explain the various Logic Symbols and elements	Comprehension	
2. Apply use of system drawings and control diagrams	Analysis	
3. Demonstrate Basic Radio Theory, to includemodulation, radio waves and antennas	Application	
4. Describe Aircraft Communication Addressing andReporting System (ACARS)	Application	
5. Identify the operation and location of an EmergencyLocator Transmitter (ELT)	Knowledge	
6. Demonstrate the differences between Very High Frequency Omnidirectional Range Navigation Systems (VOR) and Instrument Landing System (ILS)	Application	
7. Apply proper troubleshooting technique on the TrafficAlert / Collision Avoidance System (TCAS)	Analysis	
8. Explain how Distance Measuring Equipment allowspilot information as to how far away he / she is fromairport or NAV or VOR stations	Comprehension	
9. Describe the operation of the Global PositioningSystem and Inertial Navigation System	Application	
10. Identify the relationship between Weather RadarSystem and Radial Altimeters	Knowledge	
11. Demonstrate meaning of the term, Terrain Awareness Warning System (TAWS)	Application	
12. Explain how the Electronic Flight Instrument System Works	Comprehension	
13. Identify components of the Air Data Computer System	Knowledge	
14. Apply proper Electronic Systems Installation and Maintenance	Analysis	

Course Outline:

Content Topic	**Subtopics:**
a.) Logic Elements	a.) AND Gate b.) NOR Gate c.) OR Gate d.) XOR Gate e.) Inverters
b.) Bistable Elements	a.) Flip-Flops and Latches
c.) Logic Families	a.) TT1 Characteristics b.) CMOS Characteristics
d.) Logic Diagrams and Number Systems	a.) Binary b.) Hex c.) ASCI1
e.) Relay Contacts and Switches	a.) AND Gate b.) OR Gate c.) Inverters
f.) Relays as Power Amplifier and Latches	a.) Logic and Control Circuits b.) Tracing Problems c.) System Drawings and Control Diagrams
Communication and Navigation Systems	**Communication and Navigation Systems**
a.) Communication Systems	a.) Basic Radio Theory b.) Aircraft communication addressing and reporting System c.) Selective Calling (SELCAL) d.) Audio Integrating System e.) Emergency Locator Transmitter (ELT)

b.) Electronic Navigation Systems	a.) Automatic Direction of Finder (ADF) b.) Very High Frequency Omnidirectional Range Navigation System (VOR) c.) Instrument Landing System (ILS) d.) Radar Beacon Transponder e.) Traffic Alert / Collision avoidance system (TCAS) f.) Distance Measuring Equipment (DME) g.) Area Navigation (RNAV) h.) LORAN i.) Global Positioning System (GPS) j.) Wide Area Augmentation System (WAAS) k.) Inertial Navigation System (INS) l.) Microwave Landing System (MLS) m.) Radar and Radial Altimeters o.) Terrain Awareness Warning System (TAWS) p.) Radar q.) Lightning Detector System
c.) Electronic Instrument Systems	a.) Microcomputers b.) Digital Indicating and Control Systems c.) Air Data Computer (ADC) d.) Flight Management Computer System (FMCS)
d.) Electronic Systems Installation and Maintenance	a.) Approval for Installation of Electronic Equipment b.) Electrical Considerations c.) Protection from Electrostatic Discharge Damage d.) Weight and Balance e.) Cooling f.) Shock Mounting g.) Static Protection h.) Antenna Installation

Performance Evaluation:

Formative Assessments	Summative Assessments
a.) Lab participation grade b.) Classroom participation c.) Quizzes d.) Midterm exam e.) Homework assignments	a.) Final exam b.) Lab practical exam

Method of Instruction:

The methods of instruction that will be used in this course include but are not limited to:

a.) Lecture

b.) Required reading

c.) Lab instruction

d.) Watching assigned and in class videos

e.) Canvas usage

Instructional Facilities:

For this course a traditional classroom with audio/visual equipment is required as well as working lab space in the aviation labs.

Revision History:

Last recorded revision 08/13/1991

Associate Professor, Donald Vallerand

Latest revision 07/10/2018

Associate Professor, Jeffrey Sullivan

Will this course be taught online? Yes____ No X

If yes, please complete the Online Course Outline Form.

NASHUA COMMUNITY COLLEGE

COURSE OUTLINE FORM

Course Title: Aviation Drafting and Blueprint Reading			
Course Prefix & No. AVTN108N	**Lecture Hours: 3**	**Lab Hours: 0**	**Credit Hours: 3**
Department: Transportation			
Program: Aviation Technologies			
Revision Date: 5/2018			

Prerequisites/ Co-requisites:

Student must complete and pass the College Accuplacer exam.

Required Accuplacer Score:

Entrance Skills:

- Must be able to speak, read and write in English. Must be at least 18 years of age upon the completion on this 21-month course in order to test with the FAA to obtain Airframe and Powerplant licenses
- Basic math, writing skills and some mechanical skills are preferred
- An understanding of the basic use of tools
- Knowledge and use of precision measurement equipment and related tools
- Proper use and knowledge of (PPE) Personal Protection Equipment, as related to the task
- An understanding of the safe use of equipment, along with the ability to follow safety instructions

Catalog Description:

This course is the study of the fundamentals of drafting and blueprint reading. This course will enable students enrolled in the Aircraft Maintenance Training program to develop the required skills to meet the FAA basic drafting and blueprint reading standards.

Course Competencies:

Competency (Knowledge and Skills) Students will be able to:	**Critical Thinking Level**	**Linked to Program Outcome(s) #**
1. Explain the types of Aircraft Drawings and their function in different locations and systems throughoutthe Aircraft and Powerplant	Comprehension	
2. Apply proper drawing techniques for the variousAircraft Systems and components	Analysis	
3. Demonstrate the difference between Perspective Views, Isometric Views, Orthographic Views andAuxiliary Views.	Application	
4. Describe the various Drawing Practices pertaining to Line Types and Weights, Dimensions and Tolerances	Application	
5. Identify the weight and balance theory as it relates tolocating the balance point or CG and performing the solution and chart formulas	Knowledge	
6. Demonstrate the differences between a Block Diagram, Schematic Diagram and Wiring Diagrams	Application	
7. Explain the different Charts used by Pilots and Aircraft Maintenance Technicians and explain howthese Charts aide in helping and confirming that theaircraft is performing to its peak performance	Analysis	

Course Outline:

Content Topic	Subtopics:
a.) Types of Aircraft Drawings	a.) Detail, Assembly and Installation Drawings b.) Sectional, Half Sectional and Cutaway Drawings c.) Exploded-View, Schematic and Block Drawings d.) Repair Drawing, Wiring and Pictorial Diagrams e.) Sketches
b.) Drawing Views	a.) Perspective Views b.) Isometric Views c.) Orthographic Views d.) Auxiliary Views
c.) Drawing Practices	a.) Line Types and Weights b.) Notes c.) Dimensions and Tolerances d.) Location Identification on an Aircraft e.) Drawing Sizes f.) Zones
d.) Charts	a.) Brake Horsepower b.) Electric Wire Chart c.) Control Cable Tension Chart d.) Specific Fuel Consumption e.) Brake Horsepower Curve

Performance Evaluation:

Formative Assessments	Summative Assessments
a.) Lab participation grade b.) Classroom participation c.) Quizzes d.) Midterm exam e.) Homework assignments	a.) Final exam b.) Lab practical exam

Method of Instruction:

The methods of instruction that will be used in this course include but are not limited to:
a.) Lecture
b.) Required reading
c.) Lab instruction
d.) Watching assigned and in class videos
e.) Canvas usage

Instructional Facilities:

For this course a traditional classroom with audio/visual equipment is required as well as working lab space in the aviation labs.

Revision History:

Last recorded revision 08/13/1991
Associate Professor, Jeffrey Sullivan
Latest revision 05/05/2018
Associate Professor, Jeffrey Sullivan

Will this course be taught online? Yes____ No X

If yes, please complete the Online Course Outline Form.

NASHUA COMMUNITY COLLEGE

COURSE OUTLINE FORM

Course Title: Airframe Electrical Systems			
Course Prefix & No. AVTN202N	**Lecture Hours: 2**	**Lab Hours: 4**	**Credit Hours: 3**
Department: Transportation			
Program: Aviation Technologies			
Revision Date: 7/2018			

Prerequisites/ Co-requisites:

AVTN106N, Student must also complete and pass the College Accuplacer exam.

Required Accuplacer Score:

Entrance Skills:

- Must be able to speak, read and write in English. Must be at least 18 years of age upon the completion on this 21-month course in order to test with the FAA to obtain Airframe and Powerplant licenses
- Basic math, writing skills and some mechanical skills are preferred
- An understanding of the basic use of tools
- Knowledge and use of precision measurement equipment and related tools
- Proper use and knowledge of (PPE) Personal Protection Equipment, as related to the task
- An understanding of the safe use of equipment, along with the ability to follow safety instructions

Catalog Description:

This course uses the applications on the principles of basic electricity to troubleshoot and repair aircraft electrical systems in accordance with the manufacturer's service instructions. An introduction to aircraft electrical systems will be discussed and will include, power control and electrical load circuits, power systems for large category aircraft, electrical system installation, electrical symbols and troubleshooting.

Course Competencies:

Competency (Knowledge and Skills) Students will be able to:	**Critical Thinking Level**	**Linked to Program Outcome(s) #**
1. Explain various circuit control and protection devices.Name the different types of switches used in aircraft electrical circuits	Comprehension	
2. Apply proper circuit arrangement with a series andparallel electrical circuit	Analysis	
3. Demonstrate the difference between Semi-conductordiodes and the Zener diodes	Application	
4. Describe the direction of current flow within anaircraft electrical circuit.	Application	
5. Identify the difference between a ground power circuitand a battery circuit	Knowledge	
6. Demonstrate how the DC alternator circuit works andits associated wiring.	Application	
7. Apply the difference between the DC generator circuitand the AC generator circuit	Analysis	
8. Explain the difference between a turbine engine auto ignition circuit and a reciprocating engine starting andignition circuit	Comprehension	
9. Describe the procedures needed to determine the proper wire size for a particular circuit, including itscurrent carrying capability	Application	
10. Identify in finding the correct terminal and connectorchoice for a barrier-type terminal strip	Knowledge	
11. Demonstrate the use of wire stripping and crimpingtools	Application	
12. Explain why logic flow charts are vital to effectivetroubleshooting of many electrical load circuits	Comprehension	
13. Demonstrate the proper use of the digital multimeteralong with continuity light meter and oscilloscopes	Application	
14. Describe the many electrical symbols and how theypresent in many electrical wiring diagrams	Knowledge	

Course Outline:

Content Topic	**Subtopics:**
a.) An Introduction to Aircraft Electrical Systems	a.) Electrical System Requirements b.) Review of Terms c.) Direction of Current Flow d.) Electrical System Components e.) Circuit Arrangement
b.) Aircraft Electrical Power Circuits	a.) Battery Circuits b.) Ground Power Circuit c.) Power Generating Systems d.) Voltage and current Indicating Circuits
c.) Aircraft Electrical Load Circuits	a.) The Starter and Navigation Light Circuit b.) Landing and Taxi Light Circuit c.) Landing Gear Actuation and Indicating Circuit d.) Antiskid Brake System e.) Electrical Propeller Deicing System f.) Turbine Engine Auto Ignition Circuit g.) Reciprocating engine starting and ignition Circuit h.) Split Bus Circuits for Avionics Protection
d.) Electrical Power Systems for Large Aircraft	a.) As covered, no subtopics
e.) Aircraft Electrical System Installation	a.) Electrical Wire b.) Terminal and Connector Installation c.) Wire Identification and Bundling d.) Junction Boxes e.) Wiring Installation
f.) Electrical System Troubleshooting	a.) Rules for Systematic Troubleshooting b.) Example of Systematic Troubleshooting c.) Troubleshooting Review d.) Logic Flowchart for Troubleshooting e.) Troubleshooting Tools
g.) Electrical Symbols	a.) As covered, no subtopics

Performance Evaluation:

Formative Assessments	Summative Assessments
a.) Lab participation grade b.) Classroom participation c.) Quizzes d.) Midterm exam e.) Homework assignments	a.) Final exam b.) Lab practical exam

Method of Instruction:

The methods of instruction that will be used in this course include but are not limited to:

a.) Lecture

b.) Required reading

c.) Lab instruction

d.) Watching assigned and in class videos

e.) Canvas usage

Instructional Facilities:

For this course a traditional classroom with audio/visual equipment is required as well as working lab space in the aviation labs.

Revision History:

Last recorded revision None

Latest revision 07/09/2018

Associate Professor, Jeffrey Sullivan

Will this course be taught online? Yes____ No X

If yes, please complete the Online Course Outline Form.

NASHUA COMMUNITY COLLEGE

COURSE OUTLINE FORM

Course Title: Hydraulics and Pneumatics			
Course Prefix & No. AVTN203N	**Lecture Hours: 3**	**Lab Hours: 5**	**Credit Hours: 5**
Department: Transportation			
Program: Aviation Technologies			
Revision Date: 5/2018			

Prerequisites/ Co-requisites:

Student must complete and pass the College Accuplacer exam.

Required Accuplacer Score:

Entrance Skills:

- Must be able to speak, read and write in English. Must be at least 18 years of age upon the completion on this 21-month course in order to test with the FAA to obtain Airframe and Powerplant licenses
- Basic math, writing skills and some mechanical skills are preferred
- An understanding of the basic use of tools
- Knowledge and use of precision measurement equipment and related tools
- Proper use and knowledge of (PPE) Personal Protection Equipment, as related to the task
- An understanding of the safe use of equipment, along with the ability to follow safety instructions

Catalog Description:

This is a study of the theory of operation, maintenance requirements and adjustment of various hydraulic and pneumatic components. Testing, inspecting, troubleshooting and servicing hydraulic and pneumatic system components in accordance with FAA and manufactures specifications, as well as troubleshooting and repairing wheel and brake systems in accordance with manufacturer specifications, will all be covered.

Course Competencies:

Competency (Knowledge and Skills) Students will be able to:	**Critical Thinking Level**	**Linked to Program Outcome(s) #**
1. Explain the basic laws of physics as they apply tofluid power systems.	Comprehension	
2. Apply Bernoulli's principle and its relationship to thepressure drop in a moving fluid	Analysis	
3. Demonstrate advantages and disadvantages of fluidpower systems	Application	
4. Describe the proper procedures to repair a sealedbrake system	Application	
5. Identify the difference between a single acting actuator system and a double acting actuator system	Knowledge	
6. Demonstrate how the aircraft power-pack systemoperates	Application	
7. Apply the terms on all the types of hydraulic fluidsand the pros and cons of each type	Analysis	
8. Explain how non-pressurized reservoirs and pressurized reservoirs work to provide head pressureon the many different types of hydraulic fluids	Comprehension	
9. Describe the procedures needed to accurately troubleshoot an aircraft hydraulic pump that is notputting out pressure	Application	
10. Identify all the constant displacement hydraulic pumps	Knowledge	
11. Demonstrate how the hydraulic fluid flows through control valves, check valves, select valves, sequencevalves and priority valves	Application	
12. Explain what hydraulic filters serve to do in a sealedaircraft hydraulic system	Comprehension	
13. Apply proper hydraulic fluid seal identification andinstallation within the components of the aircraft hydraulic system	Analysis	
14. Demonstrate ability to perform precision hydraulic line flare and flareless fittings preparation and performthe necessary tasks involved to flare the tubing and assemble the fittings to accomplish a leak tight seal	Application	
15. Identify the many flexible fluid lines, the pressures allowed and the various applications on the aircraft	Knowledge	

16. Describe low pressure pneumatic systems and how they work to provide power to several aircraft systems	Application	
17. Apply knowledge of the jet transport aircraft hydraulic system, it's installation, indications and automaticcontrol of the hydraulic fluid for many aircraft systems	Analysis	
18. Explain the procedures needed to effectively perform system maintenance and troubleshooting, on theaircraft hydraulic system	Comprehension	

Course Outline:

Content Topic	**Subtopics:**
a.) An Introduction to Fluid Power Systems	a.) Historical Overview b.) Basic Laws of Physics c.) Advantages and Disadvantages of Fluid Power Systems
b.) Basic Aircraft Hydraulic Systems	a.) Sealed Brake System b.) Reservoir Type Brake System c.) Single Acting Actuator System d.) Double Acting Actuator System e.) Power Pump Systems f.) Power Pack Systems
c.) Hydraulic System Components	a.) Hydraulic Fluids b.) Hydraulic Reservoirs c.) Hydraulic Pumps d.) Hydraulic Valves e.) Hydraulic Accumulators f.) Hydraulic Filters g.) Hydraulic Actuators h.) High-Pressure Seals i.) Seal Identification and Installation j.) Wipers
d.) Fluid Power System Lines and Fittings	a.) Fluid Lines b.) Fluid Line Fittings c.) Fluid Line Installation
Pneumatic Systems	**Pneumatic Systems**

a.) Pneumatic Systems	a.) Low Pressure Pneumatic Systems b.) Backup High-Pressure Pneumatic Systems c.) Full Pneumatic Systems
b.) Large Aircraft fluid Power Systems	a.) Sources of Hydraulic Power b.) Jet transport Airplane Hydraulic System
c.) Hydraulic System Maintenance and Troubleshooting	a.) Hydraulic System Troubleshooting b.) Troubleshooting tips and Procedures

Performance Evaluation:

Formative Assessments	Summative Assessments
a.) Lab participation grade b.) Classroom participation c.) Quizzes d.) Midterm exam e.) Homework assignments	a.) Final exam b.) Lab practical exam

Method of Instruction:

The methods of instruction that will be used in this course include but are not limited to:

a.) Lecture

b.) Required reading

c.) Lab instruction

d.) Watching assigned and in class videos

e.) Canvas usage

Instructional Facilities:

For this course a traditional classroom with audio/visual equipment is required as well as working lab space in the aviation labs.

Revision History:

Last recorded revision 08/13/1991

Associate Professor, Donald Vallerand

Latest revision 05/21/2018

Associate Professor, Jeffrey Sullivan

Will this course be taught online? Yes____ No X

If yes, please complete the Online Course Outline Form.

NASHUA COMMUNITY COLLEGE

COURSE OUTLINE FORM

Course Title: Assembly and Rigging			
Course Prefix & No. AVTN204N	**Lecture Hours: 2**	**Lab Hours: 6**	**Credit Hours: 4**
Department: Transportation			
Program: Aviation Technologies			
Revision Date: 7/2018			

Prerequisites/ Co-requisites:

AVTN101N, AVTN203N
Student must complete and pass the College Accuplacer exam.

Required Accuplacer Score:

Entrance Skills:

- Must be able to speak, read and write in English. Must be at least 18 years of age upon the completion on this 21-month course in order to test with the FAA to obtain Airframe and Powerplant licenses
- Basic math, writing skills and some mechanical skills are preferred
- An understanding of the basic use of tools
- Knowledge and use of precision measurement equipment and related tools
- Proper use and knowledge of (PPE) Personal Protection Equipment, as related to the task
- An understanding of the safe use of equipment, along with the ability to follow safety instructions

Catalog Description:

Assembly and rigging of fixed and rotary wing aircraft are introduced, including the checking and alignment of structures, balancing and rigging of movable control surfaces, jacking aircraft and the final assembly and inspection of the aircraft. Students also receive instruction and airworthiness inspection procedures.

Course Competencies:

Competency (Knowledge and Skills) Students will be able to:	**Critical Thinking Level**	**Linked to Program Outcome(s) #**
1. Explain all the flight surfaces responsible for rolepitch and yaw.	Comprehension	
2. Apply the difference in operation of pitch control devices, such as elevator, stabilator, ruddervator andcanard	Analysis	
3. Demonstrate secondary flight controls, their meaning,purpose and nomenclature	Application	
4. Describe the several different primary and secondaryflight control systems and their operation within the flight envelope	Application	
5. Identify how to properly assemble and rig the wingsand landing gear on a small fixed wing aircraft	Knowledge	
6. Demonstrate how to rig ailerons, elevator and rudder	Application	
7. Apply procedures for control surface balancing	Analysis	
8. Describe how to check cable tension, cable travel andsafety of system hardware	Application	
9. Explain the many helicopter controls needed tomaintain straight and level flight	Comprehension	
10. Describe rotor system design	Application	
11. Identify the specialized tools and equipment needed toproperly rig a helicopter assembly	Knowledge	
12. Demonstrate how to properly perform a preflightinspection	Application	
13. Apply the proper use and terminology used for the record of inspection including written entries into theaircraft log book	Analysis	
14. Explain the difference between a special inspectionand a major inspection	Comprehension	
15. Apply procedures needed to perform a 100 hourinspection	Analysis	

16. Demonstrate the procedures on how to look up recordsfor compliance of certain airworthiness directives and special service bulletins on various aircraft types	Application	
17. Describe what you would do if you were to fail andinspection, who would you contact and what wouldyou document	Application	
18. Identify the requirements needed to perform aprogressive inspection	Knowledge	

Course Outline:

Content Topic	**Subtopics:**
a.) Airplane Controls	a.) Airplane Primary Flight Controls b.) Airplane Secondary Flight Controls c.) Control System Operating Methods d.) Control Actuation Systems for Large Airplanes
b.) Airplane Assembly and Rigging	a.) Airplane Assembly b.) Control Surface Installation and Rigging
c.) Helicopter Assembly and Rigging	a.) Helicopter Controls b.) Rotor Systems c.) Helicopter Powerplants
d.) Aircraft Inspection	a.) Required Inspections b.) Preflight Inspection c.) Special Inspections d.) Major Inspections e.) Large Aircraft Inspections
e.) The Conduct of an Annual or a 100 Hour Inspection	a.) Examination of the Aircraft Records b.) Inspection of the Aircraft c.) Record of the Inspection d.) Failed Inspection
f.) Federal Aviation Regulations regarding Airworthiness Inspections	a.) As listed in FAR b.) Turbine Section c.) Maintenance Forms and Records

Performance Evaluation:

Formative Assessments	Summative Assessments
a.) Lab participation grade b.) Classroom participation c.) Quizzes d.) Midterm exam e.) Homework assignments	a.) Final exam b.) Lab practical exam

Method of Instruction:

The methods of instruction that will be used in this course include but are not limited to:

a.) Lecture

b.) Required reading

c.) Lab instruction

d.) Watching assigned and in class videos

e.) Canvas usage

Instructional Facilities:

For this course a traditional classroom with audio/visual equipment is required as well as working lab space in the aviation labs.

Revision History:

Last recorded revision 08/13/1991

Associate Professor, Donald Vallerand

Latest revision 07/13/2018

Associate Professor, Jeffrey Sullivan

Will this course be taught online? Yes____ No X

If yes, please complete the Online Course Outline Form.

NASHUA COMMUNITY COLLEGE

COURSE OUTLINE FORM

Course Title: Reciprocating Engines I			
Course Prefix & No. AVTN206N	**Lecture Hours: 3**	**Lab Hours**: 6	**Credit Hours**: 5
Department: Transportation			
Program: Aviation Technologies			
Revision Date: 6/2018			

Prerequisites / Co-requisites:

A student must have completed all FAA General Section courses or possess an FAA Airframe Certificate to be eligible to take this course. Student must have also successfully completed AVTN104N and AVTN203N courses and must complete and pass the College Accuplacer exam.

Required Accuplacer Score:

Entrance Skills:

- Must be able to speak, read and write in English. Must be at least 18 years of age upon the completion on this 21-month course in order to test with the FAA to obtain Airframe and Powerplant licenses
- Basic math, writing skills and some mechanical skills are preferred
- An understanding of the basic use of tools as related to engine disassembly and reassembly
- Knowledge and use of precision measurement equipment and related tools
- Proper use and knowledge of (PPE) Personal Protection Equipment, as related to the task
- An understanding of the safe use of equipment, along with the ability to follow safety instructions

Catalog Description:

This course will provide the student with a detailed understanding of the aircraft reciprocating engine, it's theory, development and versatile application on today's modern aircraft. Reciprocating engine configurations, such as Horizontally Opposed Engines, Radial engines, In-line and V-Engines, will also be covered. Reciprocating engine reliability, durability, operating flexibility and streamline ability will be discussed with emphasis on the importance of all these key engine requirements. The course will also include an in-depth look at Horizontally Opposed and Radial Engine construction, including all of the many internal components, mechanisms and assemblies. The student will have a hands-on understanding of each of these components, their design and how they all work together to provide safe, efficient and reliable engine power and thrust.

Course Competencies:

Competency (Knowledge and Skills) Students will be able to:	**Critical Thinking Skills**	**Linked to Program Outcome(s) #**
1. Describe components and operation of a reciprocatingengine and discuss the revolutionary changes of the engine, from early development, to today's modern design	Comprehension	
2. Identify how engine power is developed, measured andcalculated. Demonstrate a good understanding of brake,indicated and friction horsepower and how these parameters are calculated	Application	
3. Describe reciprocating engine reliability, durability,operating flexibility and streamline ability. Analyze and learn the ratio of the weight of an aircraftengine to its brake horsepower	Analysis	
4. Identify several aircraft engine configurations includingcylinder arrangement, cylinder numbering, firing order,cooling and lubrication systems. Reciprocating engine identification will also be discussed	Knowledge	
5. Analyze horizontally opposed and radial engine construction including the various internal componentswhich includes cylinders, valve assemblies, pistons, connecting rods, crankshaft and crankcase construction	Analysis	
6. Identify valve operating mechanisms, including the camshaft, valve lifters, hydraulic valve lifters, push rods and rocker arms. Analyze the difference between horizontally opposed engines and radial engines	Application	

Course Outline:

Content Topic	Subtopics
a.) Theory of the Aircraft Reciprocating engine	a.) Energy transformation and power b.) Horsepower, indicated, friction, brake c.) Factors effecting engine power d.) Engine thrust and power effects at altitude
b.) Reciprocating engine requirements	a.) Reliability, durability and operating flexibility b.) Specific weight c.) Streamline ability
c.) Reciprocating engine configurations	a.) Cylinder arrangement for various configurations b.) Cylinder numbering for various configurations c.) Cylinder firing order for various configurations d.) Cooling and Lubrication systems e.) Engine identification
d.) Horizontally opposed and Radial engine construction	a.) Cylinders, pistons and rings, wrist pins b.) Connecting rods, push rods, rocker arms c.) Crankshaft, crankcase bearings and oil seals d.) Propeller reduction gearing e.) Valve operation, lifters and hydraulic lifters

Performance Evaluation

Formative Assessments	Summative Assessments
a.) Lab participation grade b.) Classroom participation c.) Quizzes d.) Midterm exam e.) Homework assignments	a.) Final exam b.) Lab practical exam

Method of Instruction:

The methods of instruction that will be used in this course include but are not limited to:

a.) Lecture
b.) Required reading
c.) Lab instruction
d.) Watching assigned and in class videos
e.) Canvas usage

Instructional Facilities:

For this course a traditional classroom with audio/visual equipment is required as well as working lab space in the aviation labs.

Revision History:

Last recorded revision 09/27/2017
Associate Professor, Jeffrey Sullivan
Latest revision 06/27/2018
Associate Professor, Jeffrey Sullivan

Will this course be taught online? Yes___ No X__

If yes, please complete the Online Course Outline Form.

NASHUA COMMUNITY COLLEGE COURSE OUTLINE FORM

Course Title: Reciprocating Engines II			
Course Prefix & No. AVTN207N	**Lecture Hours: 3**	**Lab Hours: 6**	**Credit Hours: 5**
Department: Transportation			
Program: Aviation Technologies			
Revision Date: 7/2018			

Prerequisites/ Co-requisites:

A student must have completed all FAA General Section courses or possess an FAA Airframe Certificate to be eligible to take this course. Student must have also successfully completed course AVTN206N and must complete and pass the College Accuplacer exam.

Required Accuplacer Score:

Entrance Skills:

- Must be able to speak, read and write in English. Must be at least 18 years of age upon the completion on this 21-month course in order to test with the FAA to obtain Airframe and Powerplant licenses
- Basic math, writing skills and some mechanical skills are preferred
- An understanding of the basic use of tools, as related to engine disassembly and reassembly
- Knowledge and use of precision measurement equipment and related tools
- Proper use and knowledge of (PPE) Personal Protection Equipment, as related to the task
- An understanding of the safe use of equipment, along with the ability to follow safety instructions

Catalog Description: This course provides the student with a more enhanced knowledge and understanding of the aircraft internal combustion engine. To include engine disassembly and reassembly procedures. Performing detailed visual inspections, including (NDT) Non Destructive Testing, troubleshooting techniques, servicing and repair. Assuring powerplant conformity, airworthiness practices and inspections as mandated by the (FAA) Federal Aviation Administration, thru (FAR) Federal Aviation Regulations and manufactures procedures.

Course Competencies:

Competency (Knowledge and Skills) Students will be able to:	**Critical Thinking Level**	**Linked to Program Outcome(s) #**
1. Demonstrate an aircraft's reciprocating engine disassembly, inspection and the proper cleaningpractices of internal components and the variousengine systems.	Application	
2. Describe visual, dimensional, magnetic particle andfluorescent penetrant inspections and procedures.	Comprehension	
3. Apply engine reassembly procedures per manufacturesoverhaul manual and conducting this reassembly in a clean work area.	Application	
4. Demonstrate a good working knowledge of properengine maintenance and operation procedures, including engine run-up.	Application	
5. Define skilled troubleshooting skills for engine defectsand irregularities encountered, during the engine run- up.	Knowledge	
6. Demonstrate proper engine adjustments and parametersettings, both statically and during engine run-up.	Analysis	
7. Distinguish strict adherence to (FAR) Federal Aviation Regulations and FAA Advisory Circularpublications concerning maintenance practices, procedures and regulations. Recognize the repercussions in not following the established guidelines	Comprehension	
8. Execute proper annual and 100 hour inspection interval procedures and distinguish between the twoseparate inspections.	Knowledge	

Course Outline:

Content Topic	Subtopics
a.) Engine tear down, inspection and re-assembly	a.) Proper use of engine manuals to perform tasks b.) Visual and (NDT) inspections and procedures c.) Use of precision measuring equipment d.) Use of engine assembly and disassembly tools e.) Engine top and major overhaul procedures
b.) Engine run up / pre and post flight inspections	a.) Following manufactures overhaul engine manuals b.) Researching Airworthiness Directives (AD's) c.) Confirming compliance to Service Bulletins d.) Performing Pre and Post flight engine inspections e.) Adjusting and reading engine run up parameters f.) Proper engine log book entries and procedures
c.) Engine accessories	a.) Review accessories overhaul b.) Accessories installation c.) Accessories overhaul and installation manuals
d.) Engine safety procedures and safe operation	a.) Procedures both manufacturer and owner operator
e.) Record keeping	a.) Maintenance record entry b.) Description of overhaul c.) Service bulletins and Airworthiness Directives d.) Engine rework done by repair stations e.) Maintenance release f.) Work orders and copies

Performance Evaluation:

Formative Assessments	Summative Assessments
a.) Lab participation grade b.) Classroom participation c.) Quizzes d.) Midterm exam e.) Homework assignments	a.) Final exam b.) Lab practical exam

Method of Instruction:

The methods of instruction that will be used in this course include but are not limited to:

a.) Lecture

b.) Required reading

c.) Lab instruction

d.) Watching assigned and in class videos

e.) Canvas usage

Instructional Facilities:

For this course a traditional classroom with audio/visual equipment is required as well as working lab space in the aviation labs.

Revision History:

Last recorded revision 07/28/2017

Associate Professor, Jeffrey Sullivan

Latest revision 07/01/2018

Associate Professor, Jeffrey Sullivan

Will this course be taught online? Yes____ No X

If yes, please complete the Online Course Outline Form.

NASHUA COMMUNITY COLLEGE

COURSE OUTLINE FORM

Course Title: Engine Systems			
Course Prefix & No. AVTN208N	**Lecture Hours: 2**	**Lab Hours: 3**	**Credit Hours: 3**
Department: Transportation			
Program: Aviation Technologies			
Revision Date 12/2017			

Prerequisites / Co-requisites:

A student must have completed all FAA General Section courses or possess an FAA Airframe Certificate to be eligible to take this course. Student must have also successfully completed course AVTN206N Reciprocating Engines I

Required Accuplacer Score:

Entrance Skills:

- Basic math, reading and writing skills in English
- An understanding of basic tool usage as related to component disassembly and reassembly
- Knowledge and use of precision measurement equipment and related tools
- Proper use and knowledge of (PPE) Personal Protection Equipment, as related to the task
- An understanding on the safe use of tools and equipment, along with the ability to follow safety instructions

Catalog Description:

This course will provide the student with a detailed understanding of the many aircraft engine systems. These include the Lubrication, Exhaust, Cooling, Fire Detection and Extinguishing Systems. Also the Engines Instrument systems will be presented to provide the student with an in-depth knowledge on how all these systems work together to provide safe and efficient engine performance. The student will also have a hands–on knowledge of each of these systems, along with their many parts and components. The course will also discuss the importance of providing the pilot and technician with reliable and accurate engine parameters, at all times, for flight safety and effective troubleshooting and adjustments.

Course Competencies:

Competency (Knowledge and Skills) Students will be able to:	**Critical Thinking Level**	**Linked to Program Outcome(s) #**
1. 1. Describe the various aircraft reciprocating engine systems. To include Lubrication, Exhaust, Cooling, Fire Detection and Extinguishing Systems. Also the Engines Instrument systems will be discussed.	Knowledge and comprehension	
2. Identify how each system functions and its application on various engine configurations.	Knowledge, comprehension and application	
3. Analyze the various engine systems and describe their separate functions, relating to the engine.	Knowledge, comprehension and analysis	
4. Identify the external and internal parts and components of each system during disassembly and reassembly.	Knowledge and comprehension	
5. Demonstrate, troubleshoot and apply visual inspections on each of the aircraft reciprocating engine systems and components.	Knowledge, comprehension, application and analysis	

Course Outline:

Content Topic	Subtopics
a.) Functions of lubrication systems	a.) Reduces friction, seals and cushions b.) Cleans inside of engine c.) Performs hydraulic action d.) Protects against corrosion e.) Removes heat
b.) Reciprocating engine lubricating oils	a.) Characteristics of lubricating oil b.) Types of lubricating oils c.) Compatibility of lubricating oils
c.) Reciprocating engine lubrication systems	a.) Types of lubrication systems b.) Oil supply storage c.) Internal lubrication
d.) Evolution of reciprocating engine exhaust systems	a.) Cabin and carburetor heat provisions b.) Mufflers c.) Augmentor tubes d.) Power recovery devices e.) Exhaust system inspection and repair
e.) Evolution of reciprocating engine cooling systems	a.) Air cooled engines b.) Liquid cooled engines c.) Cooling system inspection and maintenance
f.) Fire protection systems	a.) Types of fires b.) Fire zones

Content Topic	Subtopics
g.) Fire Detection and Warning Systems	a.) Thermoswitch type fire detection system b.) Rate of temperature rise detection system c.) Continuous loop fire and overheat detection system
h.) Fire Extinguishing Systems	a.) Fire extinguishing agents b.) Powerplant fire extinguishing systems
i.) Complete Fire Protection System	a.) Maintenance and servicing of fire detection systems b.) Maintenance and service of fire extinguishing systems
j.) Types of Powerplant Instruments	a.) Pressure measurement b.) Types of pressures c.) Pressure measuring instruments d.) Temperature measurement e.) Mechanical Movement f.) Mechanical tachometers g.) electric tachometers
k.) Powerplant Instrument marking, Installation, and Maintenance	a.) Instrument range marking b.) Instrument installation c.) Instrument handling
l.) Electronic Instrumentation	a.) Digital Indicating and Control Systems b.) Computerized Fuel System c.) EICAS

Performance Evaluation

Formative Assessments	Summative Assessments
a.) Lab participation grade b.) Classroom participation c.) Quizzes d.) Midterm exam e.) Homework assignments	a.) Final exam b.) Lab practical exam

Method of Instruction:

The methods of instruction that will be used in this course include but are not limited to:
a.) Lecture
b.) Required reading
c.) Lab instruction
d.) Watching assigned and in class videos
e.) Blackboard usage

Instructional Facilities:

For this course a traditional classroom with audio/visual equipment is required as well as working lab space in the aviation labs.

Revision History:

Last recorded revision 08/01/2017
Associate Professor, Jeffrey Sullivan
Latest revision 12/30/2017
Associate Professor, Jeffrey Sullivan

Will this course be taught online? Yes____ No X__

NASHUA COMMUNITY COLLEGE

COURSE OUTLINE FORM

Course Title: Aircraft Propellers			
Course Prefix & No. AVTN209N	**Lecture Hours: 2**	**Lab Hours**: **3**	**Credit Hours**: 3
Department: Transportation			
Program: Aviation Technologies			
Revision Date: 5/2018			

Prerequisites/ Co-requisites:

A student must have completed all FAA General Section courses or possess an FAA Airframe Certificate to be eligible to take this course. Student must also complete and pass the College Accuplacer exam

Required Accuplacer Score:

Entrance Skills:

- Must be able to speak, read and write in English. Must be at least 18 years of age upon the completion on this 21-month course in order to test with the FAA to obtain Airframe and Powerplant licenses
- Basic math, writing skills and some mechanical skills are preferred
- An understanding of the basic use of tools
- Knowledge and use of precision measurement equipment and related tools
- Proper use and knowledge of (PPE) Personal Protection Equipment, as related to the task
- An understanding of the safe use of equipment, along with the ability to follow safety instructions

Catalog Description:

This course is a study of the physical laws and design characteristics governing propeller operation. Students receive instruction on propeller theory and maintenance, propeller control system components, types of propeller and propeller installations, identification and selection of propeller lubricants, inspecting, servicing and repairing of a fixed pitch, constant speed and feathering propellers, propeller governing systems, propeller synchronizing and ice control systems

Course Competencies:

Competency (Knowledge and Skills) Students will be able to:	**Critical Thinking Level**	**Linked to Program Outcome(s) #**
1. Explain propeller theory, propeller pitch, angle ofattack, speed and propeller efficiency.	Comprehension	
2. Apply proper maintenance inspections along withaccurate maintenance record entries.	Analysis	
3. Demonstrate the difference between a major repairand alteration with form 337.	Application	
4. Describe the proper weight and balance proceduresand the location of center of gravity points	Application	
5. Identify the weight and balance theory as it relates tolocating the balance point or CG and performing the solution and chart formulas	Knowledge	
6. Demonstrate the differences between single engineand multi-engine aircraft weight and balance computations.	Application	
7. Apply forward and aft CG checks and formulasneeded to commutate them.	Analysis	
8. Explain how to find the center of gravity after a repairor alteration	Comprehension	
9. Describe the procedures needed to determine if youneed to install a ballast	Application	
10. Identify in finding the maximum payload and the determination for large aircraft weight and balancecomputations.	Knowledge	
11. Demonstrate the use of and electronic computer in thecomputation of weight and balance.	Application	

Course Outline:

Content Topic	Subtopics
a.) Introduction to Aircraft propellers	a.) Propeller theory b.) Propeller pitch and angle of attack c.) Propeller tip Speed and efficiency d.) Forces acting on a propeller e.) Classifications of propellers
b.) Propellers for Reciprocating Engines	a.) Fixed pitch propellers including wood and metal b.) Ground adjustable propellers c.) Control pitch propellers d.) Two position propellers e.) Automatic propellers f.) Constant speed and counterweight propellers g.) Feathering Constant Speed propellers h.) Reversible Constant Speed propellers
c.) Propellers for Turbine Engines	a.) Turboprop Engines b.) Garrett and Pratt & Whitney engines c.) Propeller and engine controls d.) Composite Propeller Blades e.) UHB (Ultrahigh Bypass Ratio) Engines
d.) Propeller Installation, Inspection, and Maintenance	a.) Installation on a flanged shaft b.) Installation on a splined and tapered shaft c.) Propeller vibrations and track d.) Propeller balance and inspections e.) Propeller storage f.) Propeller repairs and alterations
e.) Propeller Auxiliary Systems	a.) Synchronizer systems b.) Synchrophasing system c.) Ice Control Systems

Performance Evaluation:

Formative Assessments	Summative Assessments
a.) Lab participation grade b.) Classroom participation c.) Quizzes d.) Midterm exam e.) Homework assignments	a.) Final exam b.) Lab practical exam

Method of Instruction:

The methods of instruction that will be used in this course include but are not limited to:

a.) Lecture

b.) Required reading

c.) Lab instruction

d.) Watching assigned and in class videos

e.) Canvas usage

Instructional Facilities:

For this course a traditional classroom with audio/visual equipment is required as well as working lab space in the aviation labs.

Revision History:

Last recorded revision 08/13/1991

Associate Professor, Jeffrey Sullivan

Latest revision 05/12/2018

Associate Professor, Jeffrey Sullivan

Will this course be taught online? Yes_____ No X

If yes, please complete the Online Course Outline Form.

NASHUA COMMUNITY COLLEGE

COURSE OUTLINE FORM

Course Title: Turbine Engine and Systems			
Course Prefix & No. AVTN210N	**Lecture Hours: 3**	**Lab Hours: 3**	**Credit Hours: 4**
Department: Transportation			
Program: Aviation Technologies			
Revision Date: 7/2018			

Prerequisites/ Co-requisites:

AVTN208N
A student must have completed all FAA General Section courses or possess an FAA Airframe Certificate to be eligible to take this course. Student must complete and pass the College Accuplacer exam.

Required Accuplacer Score:

Entrance Skills:

- Must be able to speak, read and write in English. Must be at least 18 years of age upon the completion on this 21-month course in order to test with the FAA to obtain Airframe and Powerplant licenses
- Basic math, writing skills and some mechanical skills are preferred
- An understanding of the basic use of tools
- Knowledge and use of precision measurement equipment and related tools
- Proper use and knowledge of (PPE) Personal Protection Equipment, as related to the task
- An understanding of the safe use of equipment, along with the ability to follow safety instructions

Catalog Description:

The theory and maintenance of gas turbine engine systems and installation are covered in this course. Topics include theory of operation, operating characteristics, axial and centrifugal flow compressors, combustion chambers, exhaust sections, fan and bypass turbine engines, thrust reversing systems, turbine section and turbine blade design. Inspection and adjustment of gas turbine engines are included. Exhaust systems, fuel metering systems, lubrication systems and cooling systems will be covered along with operation and maintenance procedures, for turbine engines.

Course Competencies:

Competency (Knowledge and Skills) Students will be able to:	**Critical Thinking Level**	**Linked to Program Outcome(s) #**
1. Explain the practical review of physics, as related topropulsion principles	Comprehension	
2. Apply formulas needed to calculate the many physicrelated definitions	Analysis	
3. Demonstrate the difference between non-air breathingengines and air breathing reaction engines	Application	
4. Describe what a turbojet, turboprop, turbo shaft, turbofan all have in common to produce the necessary thrust for the aircraft	Application	
5. Identify how thrust is produced in the aircraft gasturbine Engine	Knowledge	
6. Demonstrate engines station designations and whatthey mean	Application	
7. Apply design features of air inlet ducts andcompressors	Analysis	
8. Describe how the air flows through the gas turbine engine compressors and what happens at each stage ofcompression	Application	
9. Explain how to compute a turbofan engine bypassratio	Comprehension	
10. Describe blade design and attachment	Application	
11. Identify the components within a turbofan enginecombustion section	Knowledge	
12. Demonstrate how the turbine section operates and howit produces thrust and power	Application	
13. Apply terminology used to describe accessory drivecomponents and propeller reduction gears systems	Analysis	
14. Explain the difference between a wet sump lubricationsystem is and a dry sump lubrication System	Comprehension	
15. Apply procedures needed for oil analysis	Analysis	

16. Demonstrate the difference between a pressure subsystem, scavenge subsystem and vent subsystem	Application	
17. Describe how oil flows through the engine and its primary purpose for the engine to produce safe andefficient thrust	Application	
18. Identify the many systems and components thatcomprise the turbine engine lubrication system	Knowledge	
19. Demonstrate engines station designations and whatthey mean	Application	
20. Apply the procedure used when inspecting an enginechip detector	Analysis	
21. Describe the instrumentation needed to displaylubrication system parameters.	Application	
22. Explain how to compute a turbofan engine bypassratio	Comprehension	
23. Describe blade design and attachment	Application	
24. Identify the components within a turbofan enginecombustion section	Knowledge	
25. Demonstrate how the turbine section operates and howit produces thrust and power	Application	
26. Apply factors regarding jet fuel volatility and viscosity	Analysis	
27. Explain how it is determined that you have microbialgrowth in the jet fuel tanks and what procedures are used to eliminate that growth	Comprehension	
28. Apply safety procedures for fuel handling	Analysis	
29. Demonstrate the differences between hydro mechanical fuel control and electronic engine controlto supply the fuel for the powerplant	Application	
30. Describe components, both externally and internally,that make up an engine driven fuel pump	Application	
31. Identify the procedures needed to perform precisionfuel control adjustments	Knowledge	
32. Demonstrate how a full authority digital electroniccontrol (FADEC) works on an aircraft high bypassturbofan engine	Application	

33. Explain the many procedures necessary to perform thestarting of a gas turbine engine	Comprehension	
34. Apply the procedure for engine trimming	Analysis	
35. Demonstrate the differences between a hot start and ahung start	Application	
36. Describe the procedures for inspection using borescope's, fiberscope's and electronic imagingequipment	Application	
37. Identify the proper use of torque wrenches and otherprecision tooling needed for repair	Knowledge	
38. Demonstrate the proper and safe procedures to perform turbine engine troubleshooting and repairs	Application	
39. Describe the many components and operation ofturbine engine exhaust systems, including noise suppressors, thrust reversers, afterburners and vectored thrust Engines	Application	

Course Outline:

Content Topic	**Subtopics:**
a.) Propulsion Principles	a.) Theory and Construction b.) A Practical Review of Physics
b.) Aircraft Turbine Engines	a.) Non-Air Breathing (Rocket) Engines b.) Air Breathing Reaction Engines c.) Gas Turbine Engines
c.) Thrust	a.) The Production of Thrust b.) Measurement of Thrust c.) Factors Effecting Thrust
d.) Turbine Engine terms And Definitions	a.) Engine Station Designations
e.) The Cold Section	a.) Air Inlet Ducts b.) Compressors c.) Diffuser Section
f.) The Hot Section	a.) Combustion Section b.) Turbine Section
g.) The Accessory Systems	a.) Accessory drives b.) Propeller Reduction Gears Systems

h.) Requirements for Turbine Engines Lubricants	a.) Synthetic lubricating oil
i.) Turbine Engine Lubrication Systems	a.) Wet Sump Lubrication System b.) Dry sump Lubrication System c.) Lubrication System Subsystems d.) Bearings and Seals e.) Lubrication System Components f.) Lubrication System Instrumentation g.) Lubrication System Servicing h.) Oil analysis
j.) Turbine Engine Cooling Systems	a.) No Subtopics
k.) Turbine Engine Fuels	a.) Jet Fuel Volatility b.) Jet Fuel Viscosity c.) Microbial Growth in Jet Fuel Tanks d.) Fuel Anti-Icing e.) Fuel Handling
l.) Turbine Engine Fuel Systems	a.) Fuel System Components b.) Turbine engine fuel control

m.) Turbine Engine Exhaust	a.) Noise Suppressors b.) Thrust Reversers c.) Afterburners d.) Vectored Thrust Engines
n.) Turbine Engine Operation	a.) Starting Gas Turbine Engines b.) No Oil Pressure c.) Hot Start d.) Hung Start
o.) Turbine Engine Maintenance	a.) On–Condition Maintenance b.) Trend Monitoring c.) Types of Maintenance
p.) Turbine Engine Inspections and Repair	a.) Borescope, Fiberscope, Electronic Imaging b.) Routine Inspections c.) Non-Routine Inspections d.) Repair Considerations
q.) Turbine Engine testing	a.) Engine Trimming
r.) Turbine Engine Troubleshooting	a.) No Subtopics

Performance Evaluation:

Formative Assessments	**Summative Assessments**
a.) Lab participation grade b.) Classroom participation c.) Quizzes d.) Midterm exam e.) Homework assignments	a.) Final exam b.) Lab practical exam

Method of Instruction:

The methods of instruction that will be used in this course include but are not limited to:

a.) Lecture

b.) Required reading

c.) Lab instruction

d.) Watching assigned and in class videos

e.) Canvas usage

Instructional Facilities:

For this course a traditional classroom with audio/visual equipment is required as well as working lab space in the aviation labs.

Revision History:

Last recorded revision 08/13/1991
Associate Professor, Donald Vallerand
Latest revision 07/13/2018
Associate Professor, Jeffrey Sullivan

Will this course be taught online? Yes____ No X

If yes, please complete the Online Course Outline Form.

NASHUA COMMUNITY COLLEGE

COURSE OUTLINE FORM

Course Title: Carburetion and Fuel Systems			
Course Prefix & No. AVTN211N	**Lecture Hours: 2**	**Lab Hours: 3**	**Credit Hours: 3**
Department: Transportation			
Program: Aviation Technologies			
Revision Date: 5/2018			

Prerequisites/ Co-requisites:

A student must have completed all FAA General Section courses or possess an FAA Airframe Certificate to be eligible to take this course. Student must complete and pass the College Accuplacer exam.

Required Accuplacer Score:

Entrance Skills:

- Must be able to speak, read and write in English. Must be at least 18 years of age upon the completion on this 21-month course in order to test with the FAA to obtain Airframe and Powerplant licenses
- Basic math, writing skills and some mechanical skills are preferred
- An understanding of the basic use of tools
- Knowledge and use of precision measurement equipment and related tools
- Proper use and knowledge of (PPE) Personal Protection Equipment, as related to the task
- An understanding of the safe use of equipment, along with the ability to follow safety instructions

Catalog Description: This course provides the student with a working knowledge and understanding of the aircraft reciprocating engine fuel delivery system. This is to include carburation, engine fuel systems, fuel metering systems, float carburetors, pressure carburetors, fuel injection systems and air induction systems. The course will go over the proper disassembly and assembly of the various fuel delivery components and systems. Also will include inspection, servicing, troubleshooting and repair of the aircraft reciprocating fuel metering systems. Students will follow manufactures overhaul procedures along with airworthiness practices and inspections, as mandated by the (FAA) Federal Aviation Administration, thru (FAR) Federal Aviation Regulations.

Competency (Knowledge and Skills) Students will be able to:	**Critical Thinking Level**	**Linked to Program Outcome(s) #**
1. Describe the theory of energy transformation and its relationship to power the aircraft engine with the heat energy it produces. Thermal efficiency, specific fuel consumption and mixture ratios will also be discussed.	Knowledge	
2. Identify the various grades of engine fuels used alongwith their respective heat energy content, vapor ratio, critical pressures and temperatures. The use of properfuel grades and additives will also be discussed.	Analysis	
3. Describe the several configurations of engine fuel metering devices. These include float carburetors, pressure carburetors and fuel injection systems.	Comprehension	
4. Explain the many different fuel delivery systems. These include main and idling jet metering systems,power enrichment systems, acceleration and mixturecontrol systems.	Knowledge	
5. Apply knowledge to properly overhaul the variousengine fuel metering devices. Identify the various internal components and systems used in each application by performing tasks.	Application	
6. Demonstrate the proper disassembly, inspection and cleaning of various fuel metering devices. They will repair and replace components per the manufacturer procedures.	Application	
7. Identify skills learned to reassemble, adjust and tune the fuel metering device to the engine. Demonstrate sound troubleshooting skills and execute them.	Analysis	
8. Demonstrate the skills learned to install the fuel metering device, adjust the various engine parametersand perform an engine run-up.	Comprehension	
9. Describe reciprocating engine induction air systemsfor naturally aspirated engines and alternate air systems.	Application	
10. Analyze reciprocating engine turbocharger systems. This will include a look into internal and external supercharger systems and the various control systemsused for both variations.	Analysis	

11. Identify early vintage reciprocating and radial enginesequipped with anti-detonation systems, the theory behind them and the application on the various engines.	Knowledge	
12. Describe procedures for maintenance record entries,pertaining to fuel delivery systems.	Comprehension	
13. Demonstrate proper log book procedures with strictadherence to Airworthiness Directives and Service Bulletins.	Application	

Course Outline:

Content Topic	**Subtopics**
a.) Transformation of Energy	a.) Thermal efficiency b.) Specific fuel consumption c.) Mixture ratio and engine power d.) Detonation and preignition
b.) Reciprocating Engine Fuels	a.) Aviation gasoline and specifications b.) Heat energy content c.) Vapor pressure, critical pressure and temperatures d.) Gasoline additives and ratings, automobile grades e.) Importance of proper fuel grades
c.) Reciprocating Engine Fuel Metering Systems	a.) Float carburetors, Pressure carburetors b.) Fuel Injection systems both RSA and TCM c.) Main and idle metering systems d.) Acceleration, mixture and power enrichment e.) Various fuel metering device components f.) Service and maintenance of fuel delivery systems
d.) Antidetonation Injection Systems	a.) History, theory and applications b.) Effects on engine power and fuel air mixture c.) Cooling qualities for cylinder head temperatures
e.) Reciprocating Engine Induction Systems	a.) Naturally aspirated induction systems b.) Alternate air systems c.) Turbocharger control systems
f.) Overhaul Procedures of Fuel Delivery Devices	a.) Review of accessories and overhaul manuals b.) Proper procedures and maintenance practices c.) Disassembly, inspection and reassembly d.) Final return to service and engine installation
g.) Engine safety procedures and safe operation	a.) Following preflight run-up and safety procedures b.) Proper engine start up and safety procedures c.) Reading and adjusting engine parameters d.) Proper engine shut down and post flight checks e.) Proper engine log book entries and procedures

h.) Record keeping	a.) Maintenance record entry and compliance b.) Proper engine log book entries and procedures c.) Service Bulletins and Airworthiness Directives d.) Maintenance airworthiness release

Performance Evaluation:

Formative Assessments	Summative Assessments
a.) Lab participation grade b.) Classroom participation c.) Quizzes d.) Midterm exam e.) Homework assignments	a.) Final exam b.) Lab practical exam

Method of Instruction:

The methods of instruction that will be used in this course include but are not limited to:

a.) Lecture

b.) Required reading

c.) Lab instruction

d.) Watching assigned and in class videos

e.) Canvas usage

Instructional Facilities:

For this course a traditional classroom with audio/visual equipment is required as well as working lab space in the aviation labs.

Revision History:

Last recorded revision 07/25/2017

Associate Professor, Jeffrey Sullivan

Latest Revision 05/15/2018

Associate Professor Jeffrey Sullivan

Will this course be taught online? Yes____ No X

If yes, please complete the Online Course Outline Form.

NASHUA COMMUNITY COLLEGE

COURSE OUTLINE FORM

Course Title: Engine Electrical Systems			
Course Prefix & No. AVTN212N	**Lecture Hours: 2**	**Lab Hours: 6**	**Credit Hours: 4**
Department: Transportation			
Program: Aviation Technologies			
Revision Date: 7/2018			

Prerequisites/ Co-requisites:

AVTN202N, AVTN206N
A student must have completed all FAA General Section courses or possess an FAA Airframe Certificate to be eligible to take this course. Student must complete and pass the College Accuplacer exam.

Required Accuplacer Score:

Entrance Skills:

- Must be able to speak, read and write in English. Must be at least 18 years of age upon the completion on this 21-month course in order to test with the FAA to obtain Airframe and Powerplant licenses
- Basic math, writing skills and some mechanical skills are preferred
- An understanding of the basic use of tools
- Knowledge and use of precision measurement equipment and related tools
- Proper use and knowledge of (PPE) Personal Protection Equipment, as related to the task
- An understanding of the safe use of equipment, along with the ability to follow safety instructions

Catalog Description:

This course covers additional powerplant accessory systems including magnetos, high and low tension systems, reciprocating and turbine engine ignition systems. Included will be the turbine engine starting system, all its components, troubleshooting and servicing.

Course Competencies:

Competency (Knowledge and Skills) Students will be able to:	**Critical Thinking Level**	**Linked to Program Outcome(s) #**
1. Explain the difference between a battery ignitionsystem and a magneto ignition system	Comprehension	
2. Apply the proper procedures to follow, regardingimpulse coupling handling and assembly	Analysis	
3. Demonstrate the difference between high tension magneto systems and low tension magneto systems	Application	
4. Describe the difference between double magnetos inmagnetos with compensated cams	Application	
5. Identify the components and operation of the induction vibrator system	Knowledge	
6. Demonstrate the internal timing of a magneto and alsotiming the magneto to the engine	Application	
7. Apply the proper techniques for magneto overhaul,safety checks and engine run-up	Analysis	
8. Explain how to troubleshoot and install an ignitionharness	Comprehension	
9. Describe the design and construction of a reciprocating engine spark plug	Application	
10. Identify all the components of the aircraftreciprocating engines ignition system	Knowledge	
11. Demonstrate proper removal, inspection, cleaning,capping, testing and installation on the aircraft reciprocating engine	Application	
12. Apply proper procedures in the installation and servicing of the high-energy ignition system igniters	Analysis	
13. Demonstrate the operation, servicing and testing of theturbine engine ignition system	Application	
14. Identify all the varying turbine engine starting systemconfigurations and applications	Knowledge	

Course Outline:

Content Topic	**Subtopics:**
a.) Introduction to Reciprocating Engine Ignition Systems	a.) Battery Ignition Systems b.) Magneto Ignition Systems
b.) Auxiliary starting Systems	a.) Impulse Coupling b.) Induction Vibrator System c.) Inspection authorization
c.) Special Types of Magnetos	a.) Double Magnetos b.) Magnetos with Compensated Cams
d.) Magneto installation	a.) Internal Timing b.) Timing a Magneto to the Engine
e.) Magneto Inspection and Servicing	a.) Magneto Overhaul b.) Magneto Check on Engine Run-Up c.) Magneto Safety Check
f.) Ignition Harness	a.) No Subtopics
g.) Spark plugs	a.) Spark Plug Design b.) Spark Plug Construction
h.) Spark Plug Servicing	a.) Removal b.) Inspection c.) Cleaning d.) Gapping e.) Testing f.) Installation
g.) Turbine Engine Ignition systems	a.) High-energy ignition systems b.) Turbine Engine Ignition System Servicing
h.) Turbine Engine Starting Systems	a.) Air Turbine Starter b.) Electric Starter c.) Starter Generator d.) Combustion Starters e.) Air impingement Starter f.) Auxiliary Power Units

Performance Evaluation:

Formative Assessments	Summative Assessments
a.) Lab participation grade b.) Classroom participation c.) Quizzes d.) Midterm exam e.) Homework assignments	a.) Final exam b.) Lab practical exam

Method of Instruction:

The methods of instruction that will be used in this course include but are not limited to:

a.) Lecture

b.) Required reading

c.) Lab instruction

d.) Watching assigned and in class videos

e.) Canvas usage

Instructional Facilities:

For this course a traditional classroom with audio/visual equipment is required as well as working lab space in the aviation labs.

Revision History:

Last recorded revision 08/13/1991

Associate Professor, Donald Vallerand

Latest revision 07/10/2018

Associate Professor, Jeffrey Sullivan

Will this course be taught online? Yes____ No X

If yes, please complete the Online Course Outline Form.