NASHUA COMMUNITY COLLEGE
AVIATION TECHNOLOGY
NSUTO25K

GENERAL, AIRFRAME & POWERPLANT CURRICULUM

Revision: Change 18

Date: 03/20/08

Nashua Community College

Aviation Technology

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Instructor resumes, equipment list and student tool list are on file in the Aviation Technology office.

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LIST OF EFFECTIVE PAGES

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Department Chair (signature)

Maurice F. Long
FAA (signature)

Nashua Community College

Aviation Technology

CURRICULUM REVISION SHEET

Revision No.	Revision Description	Date	Signature
Change 1	Title page Policy and Procedures Powerplant Curriculum Facilities Inventory, Addendum	04/24/92	
Change2	Airframe outline Airframe hours Aircraft Fuel Systems	06/16/92	
Change 3	Powerplant required lab projects Equipment ordered Inventory,addendum	06/17/92	
Change 4	Table of Contents List of effected pages Curriculum revision sheet Aircraft Systems course outline Airframe Electrical Systems course Outline Delete Appendix H Delete Appendix I	07/21/92	
Change 5	List of Effected pages General and Airframe required lab projects	09/02/92	
Change 6	List of Effected pages Revise Policy and Procedures Revise Semester Breakdown Revise Course Descriptions Add course numbers to outlines Delete General, Airframe and Powerplant projects from manual Delete Appendices A, B, C, D, E, F, G	08/15/94	
Change 7	List of Effected Pages Revise Required Projects Revise Course Description		

	Revise Airframe Section Breakdown Revise Page Numbers .	
Change 8	List of Effected Pages Revised Required Projects	04/13/95
Change 9	List of Effective Pages Table of Contents Revised Policy and Procedures Revised Curriculum, Semester Breakdown Revised Course Description Revised Airframe Lecture/Lab Hours Revised Hydraulic and Pneumatic Course Outline Revised Aircraft Welding Course Outline Revised Aircraft Systems Course Outline Revised Airframe Electrical Course Outline Deleted Aircraft Fuel Systems Course	05/22/95
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Change 11	List of Effective Pages Revised Methods of grading Revised Course Description	12/01/95
Change 12	List of Effective Pages Revised Aviation Electronics Course Outline Revised Hydraulics & Pneumatics Systems Outline Revised Airframe Electrical Systems Course Outline Revised Course Descriptions	01/15/96
Change 13	List of Effective Pages Revised Required Projects	04/15/96

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Change 14	List of Effective pages Title page, College name change Table of Contents Curriculum revision sheet Policy & Procedures Course Descriptions College name change: Aviation Electronics I Aviation Drafting & Blueprint Reading Technical Mathematics I Technical Physics I Maintenance Forms & Records Materials & Processes 45b 46	09/16/97	
Change 15	Date corrections to the following: List of Effective pages iv v vi CmTiculum Revision Sheet ix		
Change 16	Page 4, Technical data reference and book list List of Effective pages, page iv, and vi Curriculum Revision Sheet, page ix Appendix Al Appendix A2 AppendixA3 Appendix A4-A7	06/30/99	
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NASHUA **COMMUNITY COLLEGE**

AVIATION TECHNOLOGY

POLICY AND PROCEDURES

GENERAL POLICIES

The Aviation Technology Program provides each student emolled a unique opportunity with two objectives. The first is to provide a student with the knowledge and skills to qualify them to take the FAA - General, Airframe and Powerplant certification tests. The second objective is to qualify them to receive an Associate in Applied Science degree. It is the College's philosophy that both of these objectives are equally important to the students success as an aviation technician. Therefore, an aviation student is required to successfully complete the general educational requirements in order to advance to the next semester's aviation courses. If a general educational requirement is failed that course(s) must be repeated the first semester that it is offered even if it conflicts with an aviation course.

The Aviation program is designed with the General Aviation Technician course requirements combined with the Airframe course requirements. A student must successfully complete all General Aviation Technician and Airframe course or possess an FAA Airframe Technician rating before he or she can emoll in the Powerplant Technician course. A N.H. Community Technical College student who has failed no more than two courses in the General and Airframe program may make a written request to the Department Chairperson for consideration to be allowed to advance to the Powerplant program provided that the individual is in good academic standing and has met all other College requirements.

Due to the high standards that are required by the aviation industry a student who completes the program and expects to be employed in the industry must meet these standards. Therefore, a student emolled in the Aviation program must demonstrate maturity and professionalism in classroom activities, attendance, and adhere to all College policies, FAA requirements and act in a collegiate manner at all times.

ADMISSION REQUIREMENTS

Applicants for admission must present evidence of satisfactory completion of an accredited high school or an acceptable equivalent (GED). Each applicant is required to make application for admission through the College Admission Office and follow all admission policies and procedures.

Applicants who have successfully completed work in accredited colleges or technical institutes within a period of ten years prior to application, will be considered for admission with advanced standing, upon request for credit for such work. An official transcript of record from the college or technical institute must be submitted with the application for admission. Credit will be granted only for work comparable to that offered at NH Community Technical College if of a "C" grade or better.

A request for a transfer of credit towards an FAA Part 147 aviation course at this College will be considered only if all course time has been completed prior to applying for transfer credit. Proof of course time completions must be provided by official written documentation from transferring institution certifying that all course time was completed or made up. A student must complete a minimum of 50% of the course work of a Part 147 program (general, airframe or powerplant) at this College in order to be eligible to receive a certificate of completion from this College. A student entering this College with an FAA Airframe certificate may enroll in the powerplant program if space is available.

CREDIT BY EXAMINATION (CBE)
A qualified student who wants to gain credit by exam can do so by following the policy as described in the student handbook.

BOOKS, TOOLS AND SUPPLIES
Each student must provide at his/her own expense, not later than one week after the beginning of classes, the specified textbooks, tools and supplies. The student must have these items available at all times through the semester.

GRADING SYSTEM
A student must meet all of the requirements below in order to graduate from the aviation program or be eligible to receive a certificate of completion.

1. Letter grades and numeric equivalent

A	94-100	B-	80-83	F	69- and below
A-	90-93	C+	77-79	WD	Withdrawn
B+	87-89	C	74-76	I	Incomplete
B	80-86	C-	70-73		

Grades below 70% for Aviation Technology (AV) courses will be recorded as "F" and do not fulfill graduation requirements.

2. The grade that is issued for an Aviation course is made up by the following percentages:
Hour and midterm exams - 25% (written, oral or practical)
Quizzes - 25% (written, oral or practical)
Lab Projects - 25% (written, oral or practical)
Final Exam - 25% (written, oral or practical)

3. All exams (quiz, hour, midterm, final and lab practical) and assigned lab projects must be passed with a minimum of 70% or an "F" grade will be issued for the course. Should a student fail to earn at least a 70% on a quiz, hour exam, midterm exam or lab project, he/she will be allowed to take <u>one</u> make-up per failure. The maximum grade issued for any make-up item will be a 70%. Failure to earn a minimum grade of 70% on the final exam, and on all quizzes, hour exam, midterm exams and lab projects (after one make up) will mean that the student will fail the entire course. There is <u>no make-up for the final exam</u>. Projects will be graded either pass/fail or numerically. A passing grade on a project will mean a grade of 70% but will not be calculated in the laboratory evaluation. A failed project grade not made up to a passing grade will mean the student will fail the entire. course.

ATTENDANCE AND ABSENCES
A student is responsible for keeping his or her absenteeism to a minimum and to follow all the following policies in order to graduate from the program:

1. In an FAA certified a&P training program a student must make up all time missed in all aviation courses with AV numbers in order to graduate and to be eligible to take the certification exams.

2. All classroom and laboratory time missed must be made up prior to the final exam period at the end of each semester or a failing grade will be given in each course where all time has not been made up.

3. The maximum total hours that a full time student is permitted to make up are as follows:
   a. First semester - 16 hours
   b. Second semester - 18 hours
   c. Third semester - 36 hours
   d. Forth semester - 31 hours
   e. Fifth semester - 28 hours

   A student missing in excess of the above hour limits will fail those courses in which the time missed has not been made up.

4. All time missed must be made up during the scheduled make-up classes posted each semester.

5. It is the student's responsibility to make arrangements with the instructor of the course in which the time was missed to get the proper make-up assignment prior to attending the make-up class

6. A student must have the instructor of the make-up class sign his/her verification sheet at the end of each make-up class.

7. A student should make-up any missed time at the first make-up class immediately after the absence in order to be prepared for the material being covered in the regular dass session and to avoid running out of make-up class time at the end of the semester.

Each student is required to sign in for each class attended. If the students signature is not on the roster for that class it will be counted as an absence. It is the students responsibility to insure that he/she has signed in for each class. The class rosters will be turned into the Department Head or his designee at the close of each day. The Department Head or his designee will maintain a master attendance and make-up record. Make-up verification sheets will be turned in to the Department Head or his designee at the end of each make-up session for recording.

EXAMINATIONS

The minimum number of exams that will be given in each subject will be a mid-term exam, and a final exam. In no case will a student receive credit for a course if he/she does not successfully pass these two exams plus the other project and course requirements as listed in the individual course outlines.

GRADUATION REQUIREMENTS

To graduate, a student must complete all courses in the prescribed curriculum and attain a cumulative grade point average of a least 1.90 \vi.thin his/her major program. Upon successfully passing all subjects and satisfactorily completing all of the required hours, the student is eligible for an FAA Certificate of completion and a diploma. Please consult the College Student Handbook for additional information regarding schoolpolicy.

CERTIFICATED INSTRUCTORS

A list of certified instructors and credentials is on file in the Aviation Technology office.

PRECISION TOOLS
Two torque wrenches will be calibrated annually (lea 1/4" drive, and lea 3/8" drive). Any precision tool will be removed from service should it become damaged and repaired or replaced as required.

INVENTORY
A list of instructional aids, mockups, aircraft, aircraft components, shop equipment, special tools is on file in the Aviation Technology office.

STUDENT HAND TOOLS
A list of required student hand tools is on file in the Aviation Technology office.

TECHNICAL DATA REFERENCE
The following technical data and reference materials are located in the Aviation department.

Subscription to Avantext, Inc for a CD-ROM service for the following:

1. Federal Aviation Regulations
2. Type Certificate Data Sheets
3. Airworthiness Directives
4. Supplemental Type Certificates
5. FAA Advisory Circulars

Other microfiche and hard copy references.

1. Coi:nplete Piper Maintenance/Parts catalogs
2. Complete Engine Maintenance, parts, and overhaul manuals
3. Vendor data.
4. Hard copies of all engine parts and overhaul manuals for engines currently in the program
5. Maintenance, parts, and wiring manuals for the A36TC Bonanza

BOOK LIST
Avotek Aircraft Maintenance Series
Introduction to Aircraft Maintenance
Aircraft Structural Maintenance
Aircraft System Maintenance
Aircraft Powerplant Maintenance
EA-AC 65-9A, A&P Mechanics General handbook
EA-AC 65-12A, A&P Mechanics Powerplant handbook
EA-AC 65-1SA, A&P Mechanics Airframe handbook
EA-FAR-MI A, FAR handbook
EA-AC 43.13-1B/2A, Acceptable Methods, Techniques & Practices
ASA-M-HBI, Aviation Mechanics Handbook
Text books will be the most current version available.

SECURITY
The Aviation department office will be locked when unoccupied in addition the department will maintain a 4-drawer file cabinet with external lock.

PROGRAM CERTIFICATES

The College has received the following FAA certificates:
General and Airframe - 1991
Powerplant - 1992

ENROLLMENT

The maximum number of students that the College will enroll in the Airframe and General curriculum is 15 students and in the Powerplant curriculum 15students for a total combined enrollment of 30 students at any one time.

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Nashua Community College

Aviation Technology

Curriculum, by semester

First Year

First Semester - Fall

Course Number	Course Title	Lecture	Lab	Credits
ENGN101	College Composition	4	0	4
AVTN101	Maintenance Forms & Records	2	3	3
AVTN102	Airframe Structures I	2	6	4
AVTN108	Aviation Drafting & Blueprint Reading	3	0	3
BCPNIOI	Introduction to Computers	2	2	3
LEXNlOl	Freshman Seminar	1	0	1
General Education: Group E Elective		4	0	1
				22

Second Semester - Spring

AVTN106	Aviation Electronics	2	2	3
AVTN104	Materials & Processes	2	3	3
AVTN103	Airframe Structures II	3	6	5
PSYN130	Human Relations	3	0	3
General Education: Group A Elective		3	0	3
				17

Third Semester- Summer (9 Weeks)

AVTN105	Aircraft Systems	3	3	4
AVTN202	Airframe Electrical Systems	2	4	3
AVTN203	Hydraulics & Pneumatics	3	5	2
				12

Second Year

Fourth Semester - Fall

AVTN107	Digital Logic	2	2	3
AVTN204	Assembly & Rigging	2	6	4
AVTN206	Reciprocating Engines I*	3	6	5
AVTN208	Engine Systems*	2	3	3
AVTN209	Aircraft Propellers*	2	3	3
SCIN150	Physical Science I	3	2	4
				22

Nashua Community College

Aviation Technology

Curriculum, by semester

Second Year

Fifth Semester - Spring

Course Number	Course Title	Lecture	Lab	Credits
AVTN207	Reciprocating Engines II*	3	6	5
AVTN210	Turbine Engines & Systems*	3	3	4
AVTN211	Carburetion & Fuel Systems *	2	3	3
AVTN212	Engine Electrical Systems*	2	6	4
General Education: Group D Elective		3	0	3
General Education: Group F or F Elective		3	0	.1
				22

*A student must have completed all FAA General Section courses or possess an FAA Airframe Certificate in order to be eligible to take these courses.

AVTN101 Maintenance Forms & Records 2-3-3
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

AVTN102 Airframe Structures I 2-6-4
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.

AVTN103 Airframe Structures II 2-6-4
The various materials and processes used in constructing aircraft are covered in this course. The proper use and selection of materials, rivets, fasteners and special purpose fasteners for structural and non-structural applications and welding are covered. In addition the following materials and their repair procedures will be covered: honeycomb, fiberglass, plastic and laminated surfaces. Prerequisite: AVTNl 02, AVTNl 08

AVTN104 Materials and Processes 2-3-3
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 non-destructive tests and interpretation of the results. Ground operation and servicing, as well as corrosion control will also be presented.

AVTNl05 Aircraft Systems 3-3-4
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.

AVTN106 Aviation Electronics 2-2-3
An introduction to DC and AC motors, 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 electro-mechanical problems.

AVTNl07 Digital Logic .2-2-3
Digital logic gates, flip-flops, PLAs and memory are studied as microprocessor support chips. Gate reduction techniques are introduced. Logic and control circuits using relay logic are a part of this course . Prerequisite: AVTNl 06

AVTN108 Aviation Drafting and Blueprint Reading 3-0-3
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.

AVTN202 Airframe Electrical Systems 2-4-2
The application and use of the principles of basic electricity to troubleshoot and repair aircraft electrical systems in accordance with the manufacturer's service instructions; and fundamentals of navigation-communication equipment, antenna installation and theory, and the operation of autopilot systems will be covered in the course Prerequisite: AVTN106

AVTN203 Hydraulics and Pneumatics Systems 3-5-5
This course is a study of the theory of operation, maintenance requirements, and adjustments of various hydraulic and pneumatic components. Testing, inspecting, troubleshooting, and servicing hydraulic and pneumatic system components in accordance with FAA and manufacturers' specifications as well as troubleshooting and repairing wheel and brake systems in accordance with manufacturers' specifications will also be covered.

AVTN204 Assembly & Rigging 2-6-4
Assembly and rigging of fixed and rotary winged 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 aircraft. Students also receive instruction in airworthiness inspection procedures. Prerequisite: AVTNl01, AVTN203

AVTN206 Reciprocating Engines I 3-6-5
This course is a study of construction, operation, and timing mechanisms associated with aircraft reciprocating powerplants. Disassembly, cleaning, measuring, inspecting and re-assembly of a powerplant in accordance with appropriate FAA and manufacturers' regulations and practices will be covered. Additionally, engine oil systems and oil system maintenance practices will be studied. Prerequisite:AVTNl 04, AVTN203

AVTN207 Rcciprocating Engines II 3-6-5
More advanced areas of internal combustion engines are presented including: inspections, troubleshooting technique, servicing and repairing opposed aircraft engines. Powerplant conformity and airworthiness inspections will also be accomplished. Prerequisite: AVTN206

AVTN208 Engine Systems 3-3-3
Lubrication, induction, cooling and exhaust systems, identifying and selecting lubricants are covered. Inspecting, checking, servicing, troubleshooting and repairing engine, lubricating, induction, cooling and exhaust systems; fire detection and extinguishing systems are presented. Prerequisite: AVTN206

AVTN209 Aire.raft PropeUe:rs 2-3-3
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 propellers and propeller installations, identification and selection of propeller lubricants, inspecting, checking, servicing and repairing, fixed pitch, constant speed and feathering propellers, propeller governing systems, propeller synchronizing and ice control systems

AVTN210 Turbine Engine & Systems 3-3-4

The theory and maintenance of gas turbine engines, their systems and turbine engine 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. Prerequisite: AVTN208

AVTN211 Carburetion & Fuel Systems 2-3-3

This course is a study of the accessory systems used in aircraft powerplants. Carburetion, engine fuel systems, fuel metering systems, inspection, checking, servicing, troubleshooting and repair of reciprocating and turbine engine fuel metering systems are covered.

AVTN212 Engine Electrical Systems 2-6-4

This course covers additional powerplant accessory systems including magnetos, high and low tension systems, reciprocating and turbine engine ignition systems and engine electrical systems and components. Engine Fire protection systems will also be discussed. Prerequisite: AVTN202, AVTN206

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REQUIRED PROJECTS

General Subjects		Crnlfse #	Teaching Level	Required Project
A.	BASIC ELECTRICITY			
1.	Calculate and measure capacitance and inductance	AVTN106	2	BE-1
2.	Calculate and measure electrical power	AVTN106	2	BE-2
3.	Measure voltage, current, resistance, continuity	AVTN106	3	BE-3
4.	Determine the relationship of voltage, current, and resistance in electrical circuits	AVTN106	3	BE-4
5.	Read and interpret electrical circuit diagrams, including solid state devices and logic functions	AVTN107	3	BE-5
6.	Inspect & service aircraft batteries	AVTN202	3	BE6
B.	AIRCRAFT DRAWINGS			
7.	Use aircraft drawings, symbols, and schematic diagrams	AVTN108	2	AD-1
8.	Draw sketches of repairs and alterations	AVTN108	3	AD-2
9.	Use blueprint information	AVTN108	3	AD-2
10.	Use graphs and charts	AVTN108	3	AD-3
C.	WEIGHT & BALANCE			
11.	Weigh aircraft	AVTN204	2	WB-1
12.	Perform complete weight & balance check and record data	AVTN204	3	WB-2
D.	FLUID LINES & FITTINGS			
13.	Fabricate and install rigid & flexible fluid lines and fittings	AVTN203	3	HY-2
E.	MATERIALS & PROCESSES			
14.	Identify and select appropriate nondestructive testing methods.	AVTN104	1	

General Subjects		Camse #	Teaching T,evel	Required Project
15.	Perform dye penetrant, eddy current, ultrasonic, and magnetic particle inspections	AVTVI04	2	MP-4
16.	Perform basic heat-treating processes	AVTV104	1	
17.	Identify & select aircraft hardware & materials	AVTV104	3	MP-1
18.	Inspect & check welds	AVTV104	3	MP-2
19.	Perform precision measurements	AVTV104	3	MP-3
F.	GROUND OPERATION & SERVICING			
20	Start, ground operate, move, service, & secure aircraft & identify typical ground operation hazards	AVTN104	2	G0-1
21.	Identify & select fuels	AVTN105	2	AF-7
G.	CLEANING & CORROSION CONTROL			
22.	Identify & select cleaning materials	AVTN104	3	CC-1
23.	Inspect, identify, remove & treat aircraft corrosion & perform aircraft cleaning	AVTN104	3	CC-2
H.	MATHEMATICS			
24.	Extract roots & raise numbers to a given power	AVTN101	3	MA-1
25.	Determine areas & volumes of various geometrical shapes	AVTNlOl	3	MA-2
26.	Solve ratio, proportion, & percentage problems	AVTN101	3	MA-3
27.	Perform algebraic operations involving addition, subtraction, multiplication, & division of positive and negative numbers	AVTNlOl	3	MA-4
I.	MAINTENANCE FORMS & RECORDS			
28.	Write description of work performed including aircraft discrepancies & corrective actions using typical aircraft maintenance records	AVTNlOl	3	PB-1

General Subjects		Course#	Teaching Te:ve]	Required Project
	29. Complete required maintenance forms, records, & inspection reports	AVTNlOl	3	PB-2
J.	PHYSICS			
	30. Use & understand the principles of simple machines; sound, fluid, & heat dynamics; basic aerodynamics; aircraft structures; & theory of flight	AVTN203	2	PH-3
K.	MAINTENANCE PUBLICATIONS			
	31. Demonstrate ability to read, comprehend, & apply information contained in FAA & manufacturers' aircraft maintenance specifications, data sheets, manuals, publications, and related Federal Aviation Regulations, airworthiness Directives, & Advisory material	AVTN101	3	PB-4
	32. Read technical data	AVTNIOl	3	PB-5
L.	MECHANIC PRIVILEGES & LIMITATIONS			
	33. Exercise mechanic privileges within the limitations prescribed by Part 65 of the code of Federal Regulations	AVTNlOl		PB-6

General Subjects		Course#	Teaching T.evel	Required Project
I.	**Airframe Structures**			
A.	WOOD STRUCTURES			
1.	Service & repair wood structures	AVTN102	1	
2.	Identify wood defects	AVTN102	1	
3.	Inspect wood structures	AVTN102	1	
B.	AIRCRAFT COVERING			
4.	Select & apply fabric & fiberglass covering materials	AVTN102	1	
5.	Inspect, test, & repair fabric & fiberglass	AVTN102	1	
C.	AIRCRAFT FINISHES			
6.	Apply trim, letters, & touch up paint	AVTN102	1	
7.	Identify & select aircraft finishing materials	AVTNI02	2	FS-1
8.	Apply finishing materials	AVTN102	2	FS-1
9.	Inspect finishes & identify defects	AVTN102	2	FS-1
D.	SHEET METAL & NON-METALLIC STRUCTURES			
10.	Select, install, & remove special fasteners for metallic, bonded, & composite structures	AVTN103	2	CS-2
11.	Inspect bonded structures	AVTN103	2	CS-I
12.	Inspect, test, & repair fiberglass, plastics, honeycomb, composite, & laminated primary & secondary structures	AVTN103	2	CS-1
13.	Inspect, check, service, & repair windows, doors, and interior furnishings	AVTN103	2	SM-3
14.	Inspect & repair sheet metal structures	AV1NI03	2	SM-1
15.	Install conventional rivets	AVTN103	2	SM-1
16.	Form, lay out, & bend sheet metal	AV1NI03	2	SM-2
E.	WELDING			
17.	Weld magnesium & titanium	AVTN103	1	
18.	Solder stainless steel	AVTN103	1	
19.	Fabricate tubular structures	AVTN103	1	
20.	Solder, braze, gas-weld, and arc-weld steel	AVTN103	1	WD-1
21.	Weld aluminum & stainless steel	AVTN103	1	

Genera) Snl:yects		Course#	Teaching Teve)	Required Project
F.	ASSEMBLY & RIGGING			
22.	Rig rotary-wing aircraft	AVTN204	1	
23.	Rig fixed-wing aircraft	AVTN204	2	RG-1
24.	Check alignment of structures	AVTN204	2	RG-2
25.	Assemble aircraft components, including flight control surfaces	AVTN204	3	RG-3
26.	Balance rig, & inspect movable primary & secondary flight control surfaces	AVTN204	3	RG-4
27.	Jack aircraft	AVTN204	3	RG-5
G.	AIRFRAME INSPECTION			
28.	Perform airframe conformity & airworthiness inspections	AVTN204	3	RG-6
n.	Airframe Systems & Components			
A.	AIRCRAFT LANDING GEAR SYSTEMS			
29.	Inspect, check, service, & repair landing gear, retraction systems, shock struts, Brakes, wheels, tires, & steering systems	AVTN203	3	GR-1, 2, 3, 4, 5,6, 7
B.	HYDRAULIC & PNEUMATIC POWER SYSTEMS			
30.	Repair hydraulic & pneumatic Power system components	AVTN203	2	HY-1, PN-1
31.	Identify & select hydraulic fluids	AVTN203	3	HY-4
32.	Inspect, check, service, troubleshoot, & repair hydraulic & pneumatic power systems	AVTN203	3	HY-5, 6
C.	CABIN ATMOSPHERE CONTROL SYSTEMS			
33.	Inspect, check, service, troubleshoot, & repair heating & cooling, air conditioning pressurization systems, & air cycle machines	AVTN105	1	
34.	Inspect, check, troubleshoot, service & repair heating, cooling, air conditioning, and pressurization systems	AVTN105	1	
35.	Inspect, check, troubleshoot, service, & repair oxygen systems	AVTN105	2	OX-1

General Subjects		Course#	Teaching Level	Required Project
D.	AIRCRAFT INSTRUMENT SYSTEMS			
36.	Inspect, check, service, troubleshoot, & repair electronic flight instrument systems & both mechanical & electrical heading, speed altitude temperature, pressure, & position Indicating systems to include the use of built-in test equipment	AVTN105	1	
37.	Install instruments & perform a static pressure system leak test	AVTN105	2	IS-I
E.	COMMUNICATION & NAVIGATION SYSTEMS			
38.	Inspect, check, & troubleshoot autopilot, servos & approach coupling systems	AVTN202	1	
39.	Inspect, check, and service aircraft electronic communication & navigation systems, including VHF passenger address interphones & static discharge devices, aircraft VOR, ILS, LORAN, radar beacon transponders, :flight management computers, and GPWS	AVTN202	1	
40.	Inspect & repair antenna & electronic equipment installations	AVTN202	2	CN-1
F.	AIRCRAFT FUEL SYSTEMS			
41.	Check & service fuel dump system	AVTN105	1	
42	Perform fuel management ·transfer & refueling	AVTN105	1	
43.	Inspect, check, & repair pressure fueling systems	AVTN105	1	
44.	Repair aircraft fuel system components	AVTN105	1	AF1, 2, 3
45.	Inspect & repair :fluid quantity indicating systems	AVTN105	1	AF-4
46.	Troubleshoot, service, & repair :fluid pressure & temperature warning systems	AVTN105	1	AF-5
47.	Inspect, check, service, troubleshoot, & repair aircraft fuel systems	AVTN105	1	AF-6

General Subjects	Course#	Teaching T.evel	Required Project
G. AIRCRAFT ELECTRICAL SYSTEMS			
48. Repair & inspect aircraft electrical System components; crimp & splice wiring to manufacturers' specifications; & repair pins & sockets of aircraft connectors	AVTN202	2	AE-1
49. Install, check, & service airframe electrical wiring, controls, switches, indicators, & protective devices	AVTN202	2	AE-2
50. a. Inspect, check, troubleshoot service,& repair alternating & direct current electrical systems	AVTN202	3	AE-3
b. Inspect, check, & troubleshoot constant speed & integrated speed drive generators	AVTN202	1	
H. POSITION AND WARNING SYSTEMS			
51. Inspect, check, & service speed & Configuration warning systems, electrical brake controls, & anti-skit systems	AVTN203	2	AS-1
52. Inspect, check, troubleshoot, & service landing gear position indicating & warning systems	AVTN202	3	AS-2
I. ICE & RAIN CONTROL SYSTEMS			
53. Inspect, check, troubleshoot, service, & repair airframe ice & rain control systems	AVTN202	3	AS-3, 4
J. FIRE PROTECTION SYSTEMS			
54. Inspect, check & service smoke & carbon monoxide detection systems	AVTN202	1	
55. Inspect, check, & service, troubleshoot, & repair aircraft fire detection & extinguishing systems	AVTN202	3	AS-5

General Subjects		Course#	Teaching Level	Required Project
I.	**Powerplant Theory & Maintenance**			
A.	RECIPROCATING ENGINES			
1.	Inspect & repair a radial engine	AVTN206	1	
2.	Overhaul reciprocating engine	AVTN206	2	RE-1
3.	Inspect, check, service, & repair Reciprocating engines & engine installations	AVTN207	3	RE-2, 3, 4, 5 6, 7
4.	Install, troubleshoot, & remove reciprocating engines	AVTN207	3	RE-8, 9, 10, 11, 12
B.	TURBINE ENGINES			
5.	Overhaul turbine engine	AVTN210	2	TE-1
6.	Inspect, check, service, & repair turbine engine& turbine engine installations	AVTN210	3	TE-1
7.	Install, troubleshoot, & remove turbine engines	AVTN210	3.	TE-2
C.	ENGINE INSPECTION			
8.	Perform powerplant conformity & airworthiness inspection	AVTN206	3	RE-13
II.	**Powerplant Systems & Components**			
A.	ENGINE INSTRUMENT SYSTEMS			
9.	Troubleshoot, service, & repair electrical & mechanical :fluid rate-of-flow indicating systems	AVTN208	2	ES-1
10.	Inspect, check, service, troubleshoot, & repair electrical & mechanical engine temperature, pressure, & r.p.m. indicating systems	AVTN208	3	ES-1
B.	ENGINE FIE PROTECTION SYSTEMS			
11.	Inspect, check, service, troubleshoot, & repair engine fire detection & extinguishing systems	AVTN208	3	ES-3

General Subjects		Course#	Teaching Level	Required Project
C.	ENGINE ELECTRICAL SYSTEMS			
12.	Repair engine electrical system components	AVTN212	2	EE-1
13.	Install, check, & service engine electrical wiring, controls, switches, indicators, & protective devices	AVTN212	3	EE-2
D.	LUBRICATION SYSTEMS			
14.	Identify & select lubricants	AVTN208	2	ES-12
15.	Repair engine lubrication system components	AVTN208	2	ES-13
16.	Inspect, check, service, troubleshoot, & repair engine lubrication systems	AVTN208	2	ES-4, 5, 6
E.	IGNITION & STARTING SYSTEMS			
17.	Overhaul magneto & ignition harness	AVTN212	2	EE-3
18.	Inspect, service, troubleshoot, & repair reciprocating & turbine engine ignition systems & components	AVTN212	2	EE-4
19.	a. Inspect, service, troubleshoot & repair turbine engine electrical starting systems	AVTN212	3	EE-4
	b. Inspect, service, & troubleshoot turbine engine pneumatic starting system	AVTN210	1	
F.	FUEL METERING SYSTEMS			
20.	Troubleshoot & adjust turbine engine fuel metering systems & electronic engine fuel controls	AVTN211	1	
21.	Overhaul carburetor	AVTN211	2	EF-1
22.	Repair engine fuel metering system components	AVTN211	2	EF2
23.	Inspect, check, service, troubleshoot, & repair reciprocating & turbine engine fuel metering system	AVTN211	3	EFA

General Subjects	Course#	Teaching T.eve)	Required Project
G. ENGINE FUEL SYSTEMS			
24. Repair engine fuel system components	AVTN211	2	EF-4
25. Inspect, check, service, troubleshoot, & repair engine fuel systems	AVTN211	3	EF-5
H. INDUCTION & ENGINE AIRFLOW SYSTEMS			
26. Inspect, check, troubleshoot, service, & repair engine ice & rain control systems.	AVTN208	2	ES-8
27. Inspect, check, service, troubleshoot & repair heat exchanges, superchargers, & turbine engine airflow & temperature control systems	AVTN208	1	
28. Inspect, check, service,& repair carburetor air intake & induction manifolds	AVTN208	3	ES-9
I. ENGINE COOLING SYSTEMS			
29. Repair engine cooling system components	AVTN208	2	ES-10
30. Inspect, check, troubleshoot, service & repair engine cooling systems	AVTN208	3	ES-7
J. ENGINE EXHAUST & REVERSER SYSTEMS			
31. Repair engine exhaust system components	AVTN208	2	ES-11
32 a. Inspect, check, troubleshoot, service, & repair engine exhaust systems	AVTN208	3	ES-8
b. Troubleshoot & repair engine thrust reverser systems & related components	AVTN208	1	
K. PROPELLERS			
33. Inspect, check, service, and repair propeller synchronizing & ice control system	AVTN209	1	
34. Identify & select propeller lubricants	AVTN209	2	PS-1
35. Balance propellers	AVTN209	1	

Genera] Subjects		Course#	Teaching T,evel	Required Project
36.	Repair propeller control system components	AVTN209	2	PS-2
37.	Inspect, check, service, & repair fixed pitch constant-speed, & feathering propellers, & propeller governing systems	AVTN209	3	PS-3
38.	Install, troubleshoot, & remove propellers	AVTN209	3	PS-4
39.	Repair aluminum alloy propeller blades	AVTN209	3	PS-5
L.	UNDUCTED FANS			
40.	Inspect & troubleshoot unducted fan systems & components	AVTN210	1	
M.	AUXILIARY POWER PLANTS			
41.	Inspect, check, service& troubleshoot turbine-driven auxiliary power units	AVTN210	1	

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Nashua Community College

Aviation Technology

General Section

Course Hours

Course No.		Lecture hrs	Lab hrs	Total hrs
AVTNIOI	Maintenance Forms & Records	32 hrs	48 hrs	80 hrs
AVTN104	Materials & Processes	32 hrs	4811...rs	80 hrs
AVTN106	Aviation Electronics	48 hrs	16 hrs	64 hrs
AVTN108	Technical Drawing I	32 hrs	48 hrs	80 hrs
SCIN150	Physical Science I (Physics)	48 hrs	16 hrs	64 hrs
		192 hrs	176 hrs	368 hrs

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Nashua Community College

Aviation Technology

Aviation Electronics I
AVTN106

Lecture hours	32 hours
Lab hours	32 hours
Total hours	64 hours

OBJECTIVES:

Upon successful completion of this course, the student will demonstrate an ability to:

1. Become proficient in the use of meters to measure resistance, current and voltage.
2. Develop and understanding of current, voltage and power theory.
3. Familiarize the student with fundamental concepts of magnetism, direct and alternating electrical current theory and circuit design.
4. Develop confidence in the ability to calculate and understand the functions of complex circuits.

PERFORMANCE:

Students should be familiar with electrical circuit design and be able to compute, using Ohm's Law, unknown quantities in a given application. He/She should have a working knowledge of battery maintenance practices and procedures and be able to use electrical devices satisfactory.

REFERENCES:

ASA AMT - General textbook
AC 65-9A
ASA AMA - Airframe textbook
AC 43.13-lA
Federal Aviation Regulations

INSTRUCTIONAL AIDS:

'Whlteboard
Overhead projector
AudioNisual aids as applicable

STUDENT PREPARATION:

Reading assignment

HANDOUT MATERIAL:

Pertinent information as provided by the instrnctor.

METHODS OF TEACHING:

1. Lecture
2. Demonstrations
3. Laboratory experience (projects, practice and graded)
4. Class discussion
5. Homework assignments

METHODS OF EVALUATION:

1.	Tests and quizzes	25% (written, oral, and practical)
2.	Lab projects	25% (written, oral, and practical)
3.	Final exam	25% (written, oral, and practical)
4.	Lab projects	25% (written, oral, and practical)

INTRODUCTION:

1. Outline the lesson for the students.
2. Explain the importance of the lesson.
3. State the objective of the lesson.

PRESENTATION:

1. Introduction to electronics
   a. Conductors and insulators
   b. Voltage, current and resistance
   c. Resistors and the color code

2. Ohm's law and power

3. Use of meter and power supply
   a. Measuring resistance, current and voltage
   b. Setting voltage and current limits

4. Series circuits

5. Parallel circuits

6. Series-parallel circuits

7. Resistors
   a. Types of resistors
   b. Power ratings
   c. Potentiometers and trimmers

8. Voltage and current dividers

9. Meters
   a. Internal functioning of meters
   b. Intelligent use of meters
   c. Limitations

10. Kirchoffs laws
    a. The current and voltage laws
    b. Method of node voltages
    c. Method of mesh currents

11. Network theorems
    a. Thevenin's theorem
    b. Norton's theorem
    c. Other theorems

12. Batteries
    a. Principles
    b. Characteristics of various types

13. Magnetism

SUMMARY:

Summarize all major points covered

HOMEWORK ASSIGNMENTS:

At instructor's discretion

Nashua Community College

Aviation Technology

Aviation Drafting & Blueprint Reading
AVTN108

Lecture hours 48 hours

Lab hours O hours

Total hours 48 hours

OBJECTIVES:

A student will develop skills and knowledge in the following areas:

1. Communication through drafting and blueprint reading
2. Blueprint reading.
3. Developing drafting skills.
4. Understand aircraft drawings, symbols and schematic diagrams.
5. Make drawings of aircraft repairs and alterations.
6. Read and interpret aircraft blueprints.
7. Read and use aircraft graphs and charts.

PERFORMANCE:

A student will be able to read and interpret aircraft drawings required to make typical repairs or alterations. In addition a student will be able to make a drawing required to perform a typical aircraft alteration.

REFERENCES:

AC 65-9A
ASAAMT-G
Giesecke, Mitchell et al. Technical Drawing, 7th edition,
MacMillan
Machnery's Handbook, Industrial Press, Latest Edition

INSTRUCTIONAL AIDS:

Whiteboard
Overhead projector
Audio/Visual aids as applicable

STUDENT PREPARATION:

Reading assignment

HANDOUT MATERIAL:

Pertinent information as provided by the instructor.

METHODS OF TEACHING:

1. Lecture
2. Demonstrations
3. Laboratory experience (projects, practice and graded)
4. Class discussion

METHODS OF EVALUATION:

1.	Exams & Mid Term exam	25% (written, oral & practical)
2.	Quizzes	25% (written, oral & practical)
3.	Lab projects	25% (written, oral & practical)
3.	Final exam	25% (written, oral & practical)

INTRODUCTION:

1. Outline the lesson for the students.
2. Explain the importance of the lesson.
3. State the objective of the lesson.

PRESENTATION:

1. Introduction to Drafting, as the language of Industry
   a. Communication by drawings
   b. The need for standardization
   c. Methods used to describe objects
      1. Orthographic projection
      2. Pictorial drawings
      3. Dimensions and other information on drawings
      4. Charts and graphs

2. Freehand Technical Sketching
   a. Line types used in drafting
   b. Sketching in proportion
   c. Sketching orthographic drawings, and pictorials

3. Mechanical Drafting
   a. Use and care of drafting tools
   b. Graphic geometry
   c. Drawing to scale, English and Metric

4. Shape description of objects
   a. Selecting proper views
   b. Section views
   c. Auxiliary views

5. Dimensioning and Tolerances
   a. Basic dimensioning. What needs to be dimensioned. How and Where to dimension it.
   b. True positional tolerancing and Geometric form control

6. Sheet-metal drafting and layout
   a. Drawings and symobols
   b. Bend allowance

7. Welding drawings and symbols

8. Charts and Graphs

Note: All of the units in this outline will include interpretation of blueprints appropriate to the area of study.

Required Special Projects:

1. AD-1 Develop working drawings of an aircraft component.
2. AD-2 Demonstrate understanding of aircraft wiring charts.
3. AD-3 Demonstrate use of drawings, symbols and diagrams.

SUMMARY:

Summarize all major points covered

HOMEWORK ASSIGNMENTS:

At instructor's discretion

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Nashua Community College

Aviation Technology

Physical Science I
SCIN150

Lecture hours 48 hours

Lab hours 32 hours

Total hours 80 hours

OBJECTIVES:

Upon completion of this course, the student will be able to:

1. Describe linear and circular motion in terms of the pertinent variables.
2. Compute fundamental and derived quantities based on motion equations.
3. Describe the conditions of equilibrium and compute quantities responsible for it.
4. Identify the laws of motion and apply them to practical problems of linear and circular motion.
5. Use dimensional analysis in the solution of physical problems.
6. Define and formulate work energy and power and apply these concepts to the solution of problems and to the principle of conservation.
7. Describe the application of the work principle to simple machines, their mechanical advantage and their transmission of torque.
8. Discuss the properties of solids and apply formulas dealing with elasticity.
9. Describe the properties of :fluids both static and dynamic.
10. Demonstrate and understanding of the nature of heat and temperature and of the methods of measuring these.
11. Discuss and compute the thermal expansion of materials (solids, liquids. and gases) and describe the unusual expansion of water.
12. Distinguish between sensible and latent heat and apply these to familiar systems.
13. Discuss the principles of heat transfer.
14. Relate heat engines to the laws of thermodynamics.

PERFORMANCE:

Each student should understand Newton's Laws, the Gas Laws and solve problems in fluid mechanics, heat, pressure, and sound properties.

REFERENCES:

AC 65-9A
ASAAMT-G
CONCEPTUAL PHYSICS, Fourth edition, Hewitt

INSTRUCTIONAL AIDS:

Whiteboard
Overhead projector
AudioNisual aids as applicable

STUDENT PREPARATION:

Reading assignment

HANDOUT MATERIAL:

Pertinent information as provided by the instructor.

METHODS OF TEACHING

1. Lecture
2. Demonstration
3. Discussion of questions and problems

METHODS OF EVALUATING

1.	Exams & Midterm exam	25% (written, oral & practical)
2.	Quizzes	25% (written, oral & practical)
3.	Lab projects	25% (written, oral & practical)
4.	Final exam	25% (written, oral & practical)

INTRODUCTION:

1. Outline the lesson for the students.
2. Explain the importance of the lesson.
3. State the objective of the lesson.

PRESENTATION:

1. MOTION
   - A. Description of
     1. speed, velocity, acceleration
     2. scalar and vector quantities
     3. straight line motion
     4. projectile motion
     5. rotational motion
   - B. Causes that effect motion
     1. Newton's laws
     2. gravity and free fall
     3. friction
     4. torque

2. ENERGY TRANSFORMATIONS
   - A. Conservation of momentum
     1. momentum and impulse
     2. conservation in explosions
     3. conservation in collisions
        - a. elastic
        - b. inelastic
   - B. Conservation of energy
     1. work and energy defined
     2. mechanical energy
        - a. potential
        - b. kinetic
     3. comparisons of momentum and kinetic energy
     4. energy transformations
   - C. Power
     1. defined: units of
     2. applications
   - D. Power production

3. PROPERTIES OF SOLIDS
   - A. Crystal structure
   - B. Elasticity
     1. stress and strain
     2. Hooke's law
     3. Young's modules of elasticity

PROPERTIES OF FLUIDS

- A Liquids
  1. pressure

2. buoyancy -- Archimedes' principle
3. hydraulics -- Pascal's principle
4. velocity and rate of flow -- Bernoulli's principle
5. adhesive and cohesive forces
   a. capillary action
   b. surface tension
   c. viscosity

B. Gases
1. density
2. pressure -- atmospheric
3. gas laws
   a. Boyle's
   b. Charles'
   c. combined

5. HEAT

A. heat, temperature, and expansion
1. heat vs. temperature
   a. measurement of
2. expansion
   a. linear, area and volume expansion
   b. abnormal expansion of water
3. specific heat

B. Heat transfer
1. conduction
   a. R-values
2. convection
   a. natural
   b. forced
3. radiation
   a. electromagnetic spectrum
   b. reflection of
   c. absorption and emission of

C. Change of state
1. evaporation and condensation
2. vapor pressure
3. boiling and freezing
4. T-H diagrams

SUMMARY:

Summarize all major points covered

HOMEWORK ASSIGNMENTS:

At instructor's discretion

Nashua Community College

Aviation Technology

Maintenance Forms and Records
AVTNIOI

Lecture hours 32 hours

Lab hours 48 hours

Total hours 80 hours

OBJECTIVES:

Upon successful completion of this course, the student will demonstrate an ability to:

1. Develop a working knowledge of maintenance publications.
2. Develop the knowledge to exercise mechanic privileges within the limitations prescribed by FAR part 65.
3. Develop a working knowledge of maintenance forms and records.

PERFORMANCE:

Students should be thoroughly familiar with Federal Aviation Regulations, data sheets, and all other FAA maintenance publications. The student should be familiar with all maintenance forms and records and be able to fill out all required paper work properly.

REFERENCES:

AC 65-9A
ASAAMT-G
EA-FAR-MO
AC 43.13-lA
AC 43.13-2A

INSTRUCTIONAL AIDS:

Whiteboard
Overhead projector
Audio/Visual aids as applicable

STUDENT PREPARATION:

Reading assignments

HANDOUT MATERIAL:

Pertinent information as provided by the instructor

METHODS OF TEACHING:

1. Lecture
2. Demonstrations
3. Laboratory experience (projects, practice)
4. Class discussion
5. Homework assignments

METHODS OF EVALUATION:

1.	Exams & Midterm exam	25% (written, oral & practical)
2.	Quizzes	25% (written, oral & practical)
3.	Lab projects	25% (written, oral & practical)
4.	Final exam	25% (written, oral & practical)

INTRODUCTION:

1. Introduce to lesson
2. Explain the importance of the lesson
3. State the objective of this lesson

PRESENTATION:

1. FEDERAL AVIATION ADMINISTRATION
   a. Operational levels of the FAA
   b. The guidelines of the FAA
   c. The FAA involvement in civil aviation

2. PERSONNEL CERTIFICATION
   a. Mechanic certificate
      1. Requirements for issuance
      2. Privileges
      3. Limitations
   b. Inspection authorization
   c. Repairman certificate

3. MAINTENANCE AND INSPECTION REQUIREMENTS
   a. Types of maintenance
      1. Major alterations
      2. Major repairs
      3. Minor alterations
      4. Minor repairs
      5. Preventive maintenance
   b. Types of inspections
      1. Preflight inspections
      2. Conformity inspection
      3. One-hundred hour inspection
      4. Annual inspection
      5. Progressive inspections
      6. Continuous airworthiness inspection programs
      7. Special inspections
         a. Altimeter check
         b. Static system check
         c. Transponder check
         d. Emergency locator transmitter check
         e. Inspection following overweight or hard landing
         f. Inspection following flight into severe turbulence

4. PERIV1ANENT RECORDS
   1. Log book entries
      a. What is required in a log book
      b. How to end a log book entry
      c. How to use a log book for troubleshooting

5. **TEMPORARY RECORDS**

6. **FORMS**
   - **a. Malfunction or defect report**
   - b. Major repair and alteration form (FAA form 337)
   - c. Certificate of registration
   - **d. Bill of sale**
   - **e. Standard aircraft airworthiness certificate**
   - f. Special flight permit

7. FEDERAL AVIATION PUBLICATIONS
   - **a. Airworthiness directives**
   - b. Advisory circulars
   - c. Type certificate data sheets
   - d. Aircraft specifications and Aircraft listings
   - e. General aviation airworthiness alerts
   - f. Manufacturer's maintenance manuals
   - g. Manufacturer's service manuals
   - **h. Manufacturer's parts manuals**
   - 1. Microfiche
   - J. ATA specification 100

8. AIRCRAFT WEIGHT AND BALANCE
   - a. Information required for computations
     - 1. Aircraft type ce l iificate data sheets
     - 2. Manufactures maintenance manual
     - 3. Manufactures flight manual
     - 4. Aircraft required equipment list
   - b. Type Certificate Data Sheets
     - 1. Purpose
     - 2. Information
       - a. Location of datum
       - b. Max weight of the aircraft
       - c. Empty weight CG range
       - d. Loaded CG range for the various categories
       - e. Leveling means for the aircraft
       - f. Max baggage and location
       - g. Seat location
       - h. Fuel capacity and location
       - **i. Engine horsepower**
   - c. Manufactmes maintenance manual
     - 1. Purpose
     - 2. Information
       - a. Aircraft dimensions, arms
       - b. Procedures for weighing
       - c. Procedures for leveling aircraft
   - d. Manufactures flight manual
     - 1. Purpose
     - 2. Information

a. Generally the same as in TCDS
b. Flight characteristics at various weights and center ofgravity

e. Required equipment list
   1. Purpose
   2. Information
f. Weight and balance report
   1. Purpose
   2. Information

9. EMPTY WEIGHT AND EMPTY WEIGHT CG
   a. Definition
   b. Formulas used
   c. Examples
   d. Practice problems

10. LOADED WEIGHT AND LOADED ·wEIGHT CG COMPUTATIONS
   a. Definition
   b. Formula used
   c. Items used in the calculations
      1. Aircraft empty weight
      2. Usable fuel
      3. Weight of removable equipment carried on board the aircraft
      4. Weight of pilot and passengers
      5. Weight of cargo and/or baggage
   d. Addition and removal of equipment
      1. Formulas used
      2. Added weight
      3. Removed weight
      4. Signs for arm in relation to datum
   e. Center of gravity envelope graph
      1. Purpose
      2. Design
      3. Straight line deviation
      4. Loading graph
      5. Purpose
      6. Usage
      7. CG envelope graph
   f. Load adjuster
      1. Purpose
      2. Description
      3. Application
   g. Practice problems

11. ADVERSE LOADING CG CHECKS
   a. Purpose
   b. Most forward computation
      1. Formula

c. METO fuel
   1. Definition
d. Required items regardless of arm
e. Most rearward computations
   1. Formula
f. Practice problems

12. BALLAST
   a. Definition
   b. Purpose
   c. Permanent ballast
   d. Temporary ballast
   e. Required placards
   f. Formula
   g. Practice problems

13, REVIEW OF ALL COMPUTATIONS

SUMMARY:

Summarize all major points covered

HOMEWORK ASSIGNMENT:

At instructor's discretion

Nashua Community College

Aviation Technology

Materials and Processes
AVTN104

Lecture hours 32 hours

Lab hours 48 hours

Total hours 80 hours

OBJECTIVES:

Upon successful completion of this course, the student will demonstrate an ability to:

1. Familiarize the student with the proper tools, methods and techniques of construction, inspecting and maintaining an aircraft in an airworthy condition.

2. Familiarize the students with the basics of aircraft safety, fire protection, flight line safety, tie down procedures, jacking and hoisting, ground movement of aircraft, ground servicing equipment, aircraft fueling, and engine starting procedures.

3. Familiarize the students with the principles of non-destructive testing methods.

PERFORMANCE:

Students will understand the proper use of hand tools. They will be able to recognize potential aircraft hazards and exercise proper safety practices, understand fire hazards, identify the proper extinguishing agents, be able to fuel, tie down and service aircraft and understand the use of ground servicing equipment and engine starting procedures. The student will tmderstand the proper procedures of non-destructive testing.

REFERENCES:

AC 65-9A
ASAAMT-G
AC 43.13-IA

INSTRUCTIONAL AIDS:

Whiteboard
Overhead projector
Audio/Visual aids as applicable

STUDENT PREPARATION:

Reading assignments

HANDOUT MATERIAL:

Pertinent **information as provided by the** instructor

METHODS OF TEACHING:

1. Lecture
2. Demonstrations
3. Laboratory experience (projects, practice)
4. Class discussion
5. Homework assignments

METHODS OF EVALUATION:

1.	Exams & Midterm exam	25% (written, oral & practical)
2.	Quizzes	25% (written, oral & practical)
3.	Lab projects	25% (written, oral & practical)
3.	Final exam	25% (written, oral & practical)

INTRODUCTION:

1. Introduce the lesson
2. Explain the importance of the lesson
3. State the objective of this lesson

PRESENTATION:

1. PRINCIPLES OF MATERIALS AND PROCESSES
2. AIRCRAFT HARDWARE
   - a. Identification
     1. Threaded fasteners
     2. Aircraft bolts
     3. Special-purpose bolts
     4. Aircraft nuts
     5. Aircraft washers
     6. Aircraft screws
     7. Repair of damaged internal threads
     8. Repair of damaged holes with Acres fastener sleeves
     9. Turnlock fasteners
     10. Control cables
     11. Push-pull tube linkage
     12. Pins
3. SAFETY METHODS
   - a. Safety wire
   - b. Cotter pins
   - c. Snaprings
4. SOLID RIVETS
   - a. Identification
   - b. Material
   - c. Use
5. SPECIAL RIVETS
   - a. Identification
   - b. Material
   - c. Use
6. SEALS, GASKETS AND OTHER MANMADE COMPOUNDS
   - a. Plastics
   - b. Rubber
   - c. Seals
   - d. Gaskets
   - e. Wipers
   - f. Sealing compounds
7. FERROUS METALS
8. NON-FERROUS METALS
9. METAL WORKfl\TG PROCESSES
10. HEAT TREATMENT OF FERROUS METALS
11. HEAT TREATMENT OF NON-FERROUS METALS
12. TESTING OF METALS
13. HAND TOOLS

a. Torque wrenches
b. Standard hand tools

14. PRECISION MEASURING EQUIPMENT
    a. Dial indicator
    b. Micrometer
    c. Calipers
        1. Dial
        2. Vernier
    d. Cylinder bore gage
15. INSPECTION
    a. Magnetic particle inspection
    b. Dye-penetrant inspection
    c. Radiography
        1. X-ray
        2. Gamma radiation
    d. Ultrasonic
    e. Eddycurrent
    f. Visual
16. HANGER SAFETY
17. FIRE PROTECTION
18. SAFETY ON THE FLIGHT LINE
19. TIE-DOWN PROCEDURES
    a. Weather conditions
    b. Equipment
20. JACKING AND HOISTING OF AIRCRAFT
    a. Safety
    b. Equipment
21. GROUND MOVEMENT OF AIRCRAFT
    a. Taxiing
    b. By use of tug
    c. By hand
22. GROUND SERVICING OF AIRCRAFT
    a. Preparation
    b. Safety
    c. Equipment
23. AIRCRAFT FUELING
    a. Preparation
    b. Safety
    c. Equipment
    d. Types of fuels
24. ENGINE STARTING PROCEDURES
    a. Pre-flight inspection
    b. Safety
    c. Proper starting
    d. What to look for on engine start
    e. Proper engine shutdown
    f. Proper aircraft securing after engine shut down

25. CLEANfNG AND CORROSION CONTROL INTRODUCTION

26. CORROSION AS AN ELECTROCHEMICAL ACTION

27. TYPES OF CORROSION
    a. Oxidation
    b. Uniform surface corrosion
    c. Pitting corrosion
    d. Intergranular corrosion
    e. Exfoliation corrosion
    f. Galvanic corrosion
    g. Concentration cell corrosion
        1. Oxygen concentration cell corrosion
        2. Metallic ion concentration cell corrosion
    h. Stress corrosion
    i. Fretting corrosion
    j. Filiform corrosion

28. CORROSIVE AGENTS
    a. Acids and alkalis
    b. Salts
    c. Mercury
    d. Water
    e. Air
    f. Organic growths

29. DETECTION OF CORROSION
    a. Visual inspection
    b. Dye penetrant inspection
    c. Ultrasonic inspection
    d. Radiologic inspection

30. CORROSION-PRONE AREAS
    a. Engine exhaust area
    b. Lavatories and food service areas
    c. Battery compartment and vents
    d. Wheel well and landing gear
    e. External skin
        1. Seams and lap joints
        2. Engine inlet areas
    f. Inaccessible areas
        1. Fuel tanks
        2. Piano hinges
        3. Control surface recesses
        4. Bilge areas
        5. Landing gear boxes
    g. Engine mount structures
    h. Control cables
    i. Welded areas
    j. Electronic equipment

31. REMOVAL AND TREATMENT OF CORROSION
    a. Surface preparation
        1. Cleaning
        2. Paint removal
    b. Treatment of aluminum alloys
        1. Mechanical corrosion removal
        2. Chemical neutralization
        3. Protective coatings
            a. Cladding
            b. Surface oxide film
                1. Electrolytic treatment
                2. Chemical treatment
            c. Organic film
    c. Treatment of fenous metals
        1. Mechanical removal of conosion
        2. Surface treatment
            a. Plating
                1. Nickel or chrome plating
                2. Cadmium plating
                3. Galvanizing
                4. Metal spraying
            b. Organic coating
        3. Treatment of magnesium alloys
            a. Mechanical removal of corrosion
            b. Surface treatment

32. CORROSION PREVENTION
    a. Cleanliness
    b. Corrosion-inhibiting film
    c. Dissimilar metal insulation
        1. Fasteners
        2. Skin lap joints
        3. Sealers and sealants

SUMMARY:

Summarize all major points covered

HOME"WORK ASSIGNMENT:

At instructor's discretion

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AVIATION TECHNOLOGY

AIRFRAME SECTION

COURSE HOURS

Course Number	Course Title	Lecture hrs	Lab hrs	Total hrs
AVTN102	Airframe Structures I	32 hrs	96 hrs	128 hrs
AVTN103	Airframe Structures II	32 hrs	96hrs	128 hrs
AVTN105	Aircraft Systems	32 hrs	48 hrs	80 hrs
AVTN107	Digital Logic	48 hrs	16 hrs	64 hrs
AVTN202	Airframe Electrical Systems	48 hrs	16 hrs	64 hrs
AVTN203	Hydraulic & Pneumatic Sys.	32 hrs	96 hrs	128 hrs
AVTN204	Assembly & Rigging	32 hrs	96 hrs	128 hrs
		272 hrs	512 hrs	784 hrs

Nashua Community College

Aviation Technology

Hydraulic & Pneumatic Power Systems
AVTN203

Lecture hours 48 hours

Lab hours 80 hours

Total hours 128 hours

OBJECTIVES:

1. The objective of this lesson is to understand the principles and applications of hydraulic and pneumatic power systems, fluid characteristics, and system components.

2. To understand landing gear systems, wheels, brakes, tires, and tubes, The construction, maintenance, and inspection of these systems and components.

PERFORMANCE:

1. Students should understand the principles and applications of hydraulic and pneumatic power systems and the operation of both systems.

2. Students should understand and have a working knowledge of landing gear systems, wheels, brakes, tires, and tubes. Students should be able to perform maintenance and inspection procedures.

REFERENCES:

AC65-15A
AC 43.13-1A
FEDERAL AVIATION REGULATIONS
EA-ITP-A

INSTRUCTIONAL AIDS:

Whiteboard
Overhead projector
Audio/Visual aids as applicable

STUDENT PREPARATION:

Reading assignment

HANDOUT MATERIAL:

Pertinent information as provided by the instructor.

JMETHODS OF TEACHING:

1. Lecture
2. Demonstrations
3. Laboratory experience (projects, practice and graded)
4. Class discussion

METHODS OF EVALUATION:

1.	Quizzes	25% (written, oral and practical)
2.	Exams	25% (written, oral and practical)
2.	Lab projects	25% (written, oral and practical)
3.	Final exam	25% (written, oral and practical)

INTRODUCTION:

1. Outline the lesson for the students.
2. Explain the importance of the lesson.
3. State the objective of the lesson.

PRESENTATION:

1. AIRCRAFT HYDRAULIC SYSTEMS
   - a. Laws of physics relating to the hydraulic system
     1. Pascal's law
     2. The hydrostatic paradox
     3. Relationship between pressure, force, and area
     4. Relationship between area, distance, and volume
     5. Mechanical advantage in a hydraulic system
   - b. Basic hydraulic systems
     1. Open hydraulic systems
     2. Closed hydraulic systems
   - c. Hydraulic power systems
     1. Evolution of the hydraulic system
     2. Special types of aircraft hydraulic systems
        - a. Open-center system
        - b. Hydraulic power pack system
   - d. Hydraulic system components
     1. Fluid
        - a. Viscosity
        - b. Chemical stability
        - c. Flash point
        - d. Fire point
        - e. Intermixing of fluids
        - f. Compatibility with aircraft materials
        - g. Health and handling
        - h. Types
          1. Vegetable base fluid
          2. Mineral base fluid
          3. Synthetic fluid
        - i. Hydraulic fluid contamination
          1. Contamination check
          2. Contamination control
     2. Filters
     3. Reservoirs
        - a. Unpressurized reservoirs
        - b. Pressurized reservoirs
     4. Pumps
        - a. Hand pumps
        - b. Powered pumps

1. Constant displacement pumps
   a. Gearpump
   b. Gerotor pump
   c. Piston pump
   d. Vanepump
2. Variable displacement pump

5. Valves
   a. Flow control valves
      1. Selector valves
         a. Open center valve
         b. Closed center valve
      2. Check valves
      3. Sequence valves.
      4. Priority valves
      5. Hydraulic fuses
   b. Pressure control valves
      1. Relief valves
      2. Pressure regulators
      3. Pressure reducer
6. Accumulators
7. Actuators
   a. Liner actuators
   b. Rotary actuators
8. Fluid lines and fittings
9. Seals
   a. One-way seals
   b. Two-way seals
   c. Seal materials
   d. 0-ring installation
   e. Wipers

e. Large aircraft hydraulic systems

2. AIRCRAFT PNEUMATIC SYSTEMS
   a. Full pneumatic system
   b. Emergency backup system
   c. Pneumatic systems for air conditioning
   d. Pneumatic systems for ice control
   e. Low pressure pneumatic systems for instruments

3. AIRCRAFT LANDING GEAR SYSTEMS
   a. Evolution of the aircraft landing gear
   b. Classifications of landing gear
      1. \Vheel arrangement
         a. Tailwheel type landing gear
         b. Tricycle type landing gear
         c. Tandem landing gear

2. Fixed landing gear
3. Retractable landing gear

c. Shock absorbers

d. Wheel alignment

e. Nose wheel steering and shimmy dampers

f Retraction systems

1. Small aircraft
2. Large aircraft

4. AIRCRAFT WHEELS

a. Wheel construction

1. Inboard wheel half
2. Outboard wheel half

b. Wheel inspection

1. On the aircraft
   a. Check for proper installation
   b. Check for axle nut torque
   c. Check for proper inflation
   d. Check for tire surface condition
2. Off the aircraft
   a. Make sure tire is deflated
   b. Loosen the tire from the rim
   c. Disassemble the wheel
   d. Clean the bearings
   e. Clean the wheel assembly
   f. Inspect the bearings
   g. Grease the bearings
   h. Inspect the wheel halves
   i. Inspect the wheel bolts
   J. Inspect the key and key screws
   k. Check the fusible plugs
   l. Check the balance weights

5. AIRCRAFT BRAKES

a. Types of brakes

1. Single disk brake
2. Multiple disk brake

b. Brake construction

1. Single disk brake
   a. Fixed disk brake
   b. Floating disk brake
2. Multiple disk brake

c. Brake actuating systems

1. Independent master cylinders
2. Boosted brakes
3. Power brakes

a. Power brake control valves
b. Deboosters
4. Emergency brake system

d. Brake inspection and service
1. On the aircraft
a. Check for lining wear
b. Check for air in the system
1. Master cylinder brakes
2. Power brakes
2. Off the aircraft
a. Check the thread condition
b. Check the disk condition
c. Check the automatic adjusters
d. Check the torque tube condition
e. Check the housing and the piston condition
f. Check the condition of the seals
3. Replacement of brake linings
a. Goodyear single disk brakes
b. Cleveland single disk brakes

e. Brake malfunctions and damage
1. Overheating
2. Dragging
3. Chattering
4. Squealing

f. Antiskid brake control systems
1. System operation
2. System components
a. Wheel speed sensors
b. Control valves
c. Control box
3. System tests
a. Ground test
b. In flight test
4. System maintenance
a. Wheel speed sensor
b. Control box
c. Control valve

6. AIRCRAFT TIRES AND TUBES
a. Tire classification
1. Type
2. Ply rating
3. Tube or tubeless

b. Tire construction

1. The bead
2. The carcass
3. The tread
    a. Plain tread
    b. All weather tread
    c. Rib tread
    d. Deflector
4. The sidewall

c. Tire inspection on the aircraft
    1. Inflation
    2. Tread condition
        a. Tread depth
        b. Tread wear pattern
        c. Tread damage

d. Tire removal

e. Tire inspection off the aircraft

f. Tire repair

g. Tire retreading

h. Tire storage

i. Aircraft tubes
    1. Tube construction
    2. Tube selection
    3. Tube inspection
    4. Tube storage

j. Tire mounting
    1. Safety
    2. Tubeless tires
    3. Tube type tires

k. Tire balancing

SUMMARY:

Summarize all major points covered

HOMEWORK ASSIGNMENT:

At instructor's discretion

Pages 146-149 Intentionally Left Blank

Nashua Community College

Aviation Technology

Assembly and Rigging
AVTN204

Lecture hours 32 hours

Lab hours 96 hours

Total hours 128 hours

OBJECTIVES:

1. The objective of this lesson is to familiarize the students with the components of the aircraft control system and the proper rigging of the control system for safe operation of the aircraft.

2. To understand the airworthiness requirements for aircraft structures, the requirements for inspection, and the regulations which set the inspection procedures.

PERFORMANCE:

1. Students should understand the operation of the control system and be able to rig the aircraft control system to the proper specifications.

2. Students should understand the regulations and requirements for inspection, and have a working knowledge of the inspection procedures.

REFERENCES:

AC 65-15A
AC43.13-1A
FEDERAL AVIATION REGULATIONS
INSPECTION HANDBOOK
EA-ITP-A

INSTRUCTIONAL AIDS:

Whiteboard
Overhead projector
AudioNisual aids as applicable

STUDENT PREPARATION:

Reading assignment

HP\NDOUT II\TERIAL:

Pertinent information as provided by the instructor.

METHODS OF TEACHING:

1. Lecture
2. Demonstrations
3. Laboratory experience (projects, practice and graded)
4. Class discussion

METHODS OF EVALUATION:

1. Quizzes 25% (written, oral and practical)
2. Exams 25% (written, oral and practical)
2. Lab projects 25% (written, oral and practical)
3. Final exam 25% (written, oral and practical)

INTRODUCTION:

1. Outline the lesson for the students.
2. Explain the importance of the lesson.
3. State the objective of the lesson.

PRESENTATION:

I. AERODYNAMICS
   - a. The atmosphere
     1. Pressure
     2. Ternperature
     3. Density
     4. Humidity
   - b. Laws of physics pe l laining to aerodynamics
     1. The law of conservation of energy
     2. Newton's laws of motion
     3. Bernoulli' principle
     4. Motion
        - a. Velocity
        - b. Acceleration
   - c. Airfoils
     1. Angle of attack
     2. Angle of incidence
   - d. Aerodynamic lift
     1. Surface area
     2. Shape
     3. Center of gravity
     4. Lift coefficient
        - a. Weight
        - b. Lift
        - c. Drag
          1. Parasite
          2. Profile
          3. Induced
        - d. Thrust
     5. Dynamic pressure
     6. Boundary layer and the stall
     7. The lift formula
     8. Center of pressure travel
   - e. Axies of an aircraft
     1. Longitudinal axis
     2. Lateral axis
     3. Vertical axis
   - f. Aircraft stability
     1. Types of stability
        - a. Static stability
        - b. Dynamic stability
     2. Conditions of stability
        - a. Positive stability
          1. Positive static stability
          2. Positive dynamic stability
        - b. Negative stability
          1. Negative static stability
          2. Negative dynamic stability

c. Neutral stability
1. Neutral static stability
2. Neutral dynamic stability

3. Stability about the axes
a. Longitudinal stability
b. Lateral stability
c. Directional stability
d. Dutch roll and spiral instability

2. CONTROLS

a. Primary group
1. Ailerons
2. Elevators
3. Rudder

b. Secondaty group
1. Trim tabs
2. Balance tabs
3. Anti-servo tabs
4. Servo tabs
5. Spring tabs
6. Adjustable stabilizer

c. Auxiliary group
1. Flaps
a. Plain flaps
b. Split flaps
c. Slotted flaps
d. Fowler flaps

2. Leading edge devices
a. Slots
b. Slats
c. Leading edge flaps
d. Stall strips

3. Special wing tips
4. Vortex generators

d. Longitudinal control
e. Lateral control
f. Directional control
g. Control systems for large aircraft
1. Roll control
2. Pitch control
3. Yaw control

h. Spoilers

3. FORCES ACTING ON A HELICOPTER

a. Torque
b. Dissymmetry of lift
c. Blade flapping
d. Coning
e. Ground effect
f. Autorotation
g. Axes of flight
1. Veitical
2. Longitudinal
3. Lateral

h. Controls
    1. Directional-control pedals
    2. Cyclic control
    3. Collective control
        a. Throttle

4. HIGH-SPEED AERODYNAMICS
    a. Compresibility effects
    b. [mportance of the speed of sound
    c. Realms of flight
        1. Subsonic flight
        2. Transonic flight
        3. Supersonic flight
    d. Supersonic flow patterns
        I. Oblique shock waves
        2. Normal shock waves
        3. Expansion waves
    e. Airfoil sections for high-speed flight
    f. Critical mach number

5. FLIGHT CONTROL SYSTEMS
    a. Cable system
        l. Types of cable
            a. Material
            b. Construction
        2. Turnbuckles
        3. Cable connectors
        4. Hydraulic operated control systems
        5. Manual control
        6. Gust lock
        7. Cable guides
            a. Fairleads
            b. Pressure seals
            c. Pulleys
    b. Mechani,;al linkage
        1. Torque tubes and push-pull rod systems
        2. Stops
    c. Surface snubbers and locking devices
        1. Internal locking devices
        2. Control surface snubbers
        3. External control surface locks
        4. Tension regulators

6. AIRCRAFT RIGGING
    a. Measuring cable tension
        1. Tensiometer
        2. Cable rigging chart
    b. Surface travel measurement
        1. Propeller protractor
        2. Rigging fixtures
        3. Contour templates
        4. Rulers
    c. Rigging checks

1. Wing dihedral angle
2. Wing incidence angle
3. Engine alignment
4. Horizontal stabilizer incidence
5. Horizontal stabilizer dihedral
6. Verticality of the fin
7. A symmetry check

d. Adjustment of control surfaces

e. Aircraft assembly
1. Wing alignment
2. Aileron installation
3. Flap installation
4. Empennage installation

7. CONTROL SURFACE BALANCING

a. Out-of-balance condition
1. Flutter
2. Buffeting

b. Formula
1. W2 x D2 = W1 x D1

8. RE-BALANCING

a. Static balance
b. Dynamic balance
c. Requirements
d. Methods

9. HELICOPTER RIGGING

a. Procedures
b. Adjustments
c. Clearances
d. Tolerances
e. Static rigging
f. Functional check
g. Vibration
1. Types of vibration
a. Frequency ranges
1. Low frequency vibration
2. High frequency vibration
b. Vibration modes
c. Conditions of vibration
2. Measurement of vibration
3. Correction of vibration
a. Blade balancing
b. Blade tracking
c. Track adjustment

10, PURPOSE OF INSPECTION PROGRAMS

11. REQUIRED INSPECTIONS

a. Preflight
b. Periodic maintenance inspections

1. FAR part 91, Subpart E, inspections
   a. Annual inspection
   b. Progressive inspection
   c. 100 hour inspection
   d. Altimeter and static system inspection
   e. ATC transponder inspection
   f. ELT inspection

12. THE ANNUAL INSPECTION
   a. Scope of an annual inspection
   b. Preparation for an annual inspection
      1. Paperwork requirements
         a. The work order
         b. Maintenance information
         c. Aircraft records
      2. Initial run-up
      3. Cleaning
      4. Removal of panels and other required equipment
      5. The actual inspection
      6. Service and repair
      7. Post-inspection run-up
      8. Cleanup and close-up
      9. Final paperwork
         a. Research of all AD notes and service bulletins for compliance
         b. Log book entries
         c. FAA form 337 compilation

SUMMARY:

Summarize all major points covered

HOMEWORK ASSIGNMENT:

At instructors discretion

Nashua Community College

Aviation Technology

AVTN105 Aircraft Systems

Lecture hours 48 hours

Lab hours 48 hours

Total hours 96 hours

OBJECTIVES:

The objective of this lesson is to understand and familiarize students with the principles and operation of the basic position indicating and warning systems, ice and rain protection and control systems, aircraft fire protection systems, aircraft fuel systems, cabin atmosphere and control systems and aircraft instrument systems.

PERFORMANCE:

Students should understand the basic principals and operation of the position indicating and warning systems, ice a..11d rain protection and control systems, aircraft fire protection systems, aircraft fuel systems, cabin atmosphere and control systems and aircraft instrument systems.

REFERENCES:
AC 65-15A
EA-ITP-A
Federal Aviation Regulations
Jeppesen Airframe Textbook

INSTRUCTIONAL AIDS:

Whiteboard
Overhead projector
Audio/Visual aids as applicable

STUDENT PREPARATION:

Reading assignment

HANDOUT MATERIAL:

Pertinent information as provided by the instructor.

METHODS OF TEACHING:

1. Lecture
2. Demonstrations
3. Laboratory experience (projects, practice and graded)
4. Class discussion

METHODS OF EVALUATION:

1. Exams 25%
2. Quizzes 25%
3. Lab projects 25%
4. Final exam 25%

INTRODUCTION:

1. Outline the lesson for the students.
2. Explain the importance of the lesson.
3. State the objective of the lesson.

PRESENTATION:

1. POSITION INDICATING SYSTEMS
   - a. Direct current system
   - b. Alternating cu l Tent system
     1. Autosyn system
     2. Magnesyn systems

2. WARNING SYSTEMS
   - a. Stall warning indicator
   - b. Angle of attack system
   - c. Accelerometer
   - d. Anti-skid system

3. ICE AND RAIN CONTROL SYSTEMS
   - a. Types of ice
     1. Rime ice
     2. Glaze ice
   - b. Icing effects
     1. Lift
     2. Drag
     3. Thrust
     4. Weight
   - c. Anti-icing systems
     1. Thermal anti-icing
     2. Electric anti-icing
     3. Chemical anti-icing
   - d. De-icing systems
     1. Rubber de-icer boot system
        - a. Principle of operation
        - b. Source of operating air
        - c. Construction and installation of de-icer boots
        - d. Inspection and maintenance of rubber de-icer boots
     2. Electrothermal propeller de-icing
     3. Ground de-icing of aircraft
        - a. Frost removal
        - b. Removing ice and snow deposits
     4. Windshield icing control systems
        - a. Electrical heating system
        - b. Alcohol system
        - c. Defrost system
     5. Pitot tube anti-icing system
     6. ¥later and toilet drain heaters

4. RAIN ELIMINATING SYSTEMS
   - a. "Windshield wipers
     1. Electrical windshield wipers

2. Hydraulic windshield wipers
b. Pneumatic rain removal systems
c. Windshield rain repellant
d. Maintenance of rain eliminating systems
1. Windshield wiper systems
2. Pneumatic systems

5. PRINCIPLES OF FIRE PROTECTION SYSTEMS
a. Classes of fires
1. Class A
2. Class B
3 Class C
4. Class D
b. Requirements for fire
1. Heat
2. Oxygen
3. Fuel
c. Fire zone classification
1. Class A zone
2. Class B zone
3. Class C zone
4. Class D zone
5. Class X zone

6. FIRE DETECTION METHODS
a. Rate of temperature rise detectors
b. Radiation sensing detectors
c. Smoke detectors
d. Overheat detectors
e. Carbon monoxide detectors
f. Combustible mixture detectors
g. Fiber-optic detectors
h. Observation of crew or passengers

7. FIRE DETECTION SYSTEM REQUIREMENTS

8. FIRE DETECTION SYSTEMS
a. Thermal switch system
b. Fenwal spot detector system
c. Thermocouple system
d. Continuous loop detector system
1. Kidde sensing element
2. Fenwal sensing element
f Overheat warning system
g. Smoke detector system
1. Photoelectric
2. Visual

9. EXTINGUISHING AGENT CHARACTERISTICS
a. Halogenated hydrocarbon agents
1. Halon 1301
2. Halon 1211
3. Halon 1011

4. Halon 1001
5. Halon 1202
6. Halon 104

b. Inert cold gas agents
1. Carbon dioxide
2. Nitrogen

c. Life hazards

d. Human reactions to carbon monoxide poisoning

10. FIRE PREVENTION AND PROTECTION

a. Cockpit and cabin interiors
1. Extinguisher types
a. Water
b. Carbon dioxide
c. Dry chemical
d. Halogenated hydrocarbons
2. Extinguishers unsuitable as cabin or cockpit equipment

11. FIRE DETECTION SYSTEM MAINTENANCE PRACTICES

12. FIRE DETECTION SYSTEM TROUBLESHOOTING

13. FIRE EXTINGUISHER SYSTEM MAINTENANCE PRACTICES

a. Container pressure check

b. Freon discharge caiiridges

c. Freon containers

d. Carbon dioxide cylinders

14. AIRCRAFT INSTRUMENTS

a. General
1. Instrument cases
2. Dials

15. CLASSIFICATION OF INSTRUMENTS

a. Flight instruments
1. Pitot-·static instruments
a. Airspeed indicators
1. True airspeed indicator
2. Macl:1111eter
3. Maximum allowable airspeed indicator
4. Combination airspeed indicator
b. Altimeter
1. Types of altitude measurement
2. Required tests for altimeters
c. Vertical speed indicator
1. Instantaneous vertical speed indicator
d. Pitot-static systems
1. Pitot system
2. Static system
2. Gyroscopic instruments
a. Attitude gyros
1. Gyro horizon
2. Attitude director indicator

3. Directional gyro
b. Rate gyros
1. Turn and slip indicator
2. Turn coordinator
c. Power for gyros
1. Pneumatic gyros
a. Venturi systems
b. Vacuum pump systems
c. Positive pressure systems
d. System filters
2. Electric gyros
3. Direction indicating instruments
a. The navigational grid system
b. The aircraft magnetic compass
c. Compass compensation
b. Auxiliary instruments
1. Clock
2. Outside air temperature indicator
3. Pressure indicators
4. Fuel quantity indicator

16. INSTRUMENT PANEL
a. Materials
b. Layout
c. Bonding

17. INSTRUMENT INSTALLATION AND REMOVAL
a. Maintenance
b. Installation
c. Removal

18. RANGE MARKINGS
a. Type certificate data sheets
b. Aircraft specifications
c. Radial line
d. Arc
e. Colors
1. Red
2. Yellow
3. Green
4. Blue
5. White
f. Index marker

19. CABIN ATMOSPHERE CONTROL SYSTEM
a. Composition of the atmosphere
b. Pressure of the atmosphere
c. Temperature and altitude
d. Human respiration and circulation
1. Hypoxia
2. Hyperventilation
3. Carbon monoxide poisoning

20. AIRCRAFT PRESSURIZATION SYSTEMS
    a. Pressurization problems
        1. The fuselage
    b. Terms and definitions
        1. Absolute pressure
        2. Aircraft altitude
        3. Ambient pressure
        4. Standard barometric pressure
        5. Cabin altitude
        6. Differential pressme
        7. Gage pressure
    c. Basic requirements
        1. Source
        2. Control
        3. Limiting maximum pressure differential
            a. Pressure relief valves
            b. Negative relief valves
            c. Dump valves
    d. Sources of cabin pressure
        1. Reciprocating engine powered aircraft
            a. Supercharger
            b. Turbocharger
            c. Positive displacement cabin compressors
                1. Reciprocating compressors
                2. Vane type compressors
                3. Roots type compressor
            d. Centrifugal cabin compressors
        2. Turbine powered aircraft
            a. Compressor bleed air
            b. Turbocompressor
            c. Jet pump flow multiplier
    e. Pressurization valves
    f. Cabin pressure control system
        1. Pressurization controller
        2. Cabin pressure regulator
        3. Outflow valve
        4. Cabin air pressure safety valve

21. AIRCRAFT AIR CONDITIONING SYSTEMS
    a. Air distribution system
        1. Air ducts
            a. Circular
            b. Rectangular
            c. Elliptical
            d. Profiled
        2. Filters
        3. Heat exchangers
        4. Silencers
        5. Nonretum (check) valves
        6. Humidifiers
        7. Mass flow control sensors
        8. Mass flow meters

b. Air cycle air conditioning
    1. Compressor bleed air
    2. Mixing chamber
    3. Primary heat exchanger
    4. Secondary heat exchanger
    5. Gasper
    6. Anti-ice valve
    7. Water separator
    8. Air cycle machine
    9. Off and pressure regulator
    10. Cross feed
    11. Flow control
    12. Temperature control
    13. APU bleed air
c. Vapor cycle air conditioning
    1. Theory of refrigeration
        a. Transfer of heat
        b. Definition of terms
            1. Heat
            2. Ternperature
                a. Rankin
                b. Kelvin
                c. Fahrenheit
                d. Celsius
            3. Hot
            4. Cold
        c. Basic vapor cycle of refrigeration
    2. Components of a vapor cycle air conditioning system
        a. Refrigerant
        b. Refrigeration oil
        c. Receiver dryer
        cl. Thermal expansion valve
            1. Internally equalized thermal expansion valve
            2. Externally equalized expansion valve
        e. Evaporator
        f. Compressor
        g. Condenser
        h. Service valves
            1. Schrader valves
            2. Compressor isolation service valves
    3. Air-conditioning servicing equipment
        a. Manifold set
            1. Low side gage
            2. High side gage
            3. Manifold
            4. Charging hoses
        b. Refrigerant source
        c. Vacuum pump
        d. Leak detector
    4. Air conditioning system servicing
        a. Tests and inspection

1. Visual inspection
2. Leak test
3. Performance test
4. Feel test

b. Purging the system
c. Checking compressor oil
d. Evacuating the system
e. Charging the system

22. AIRCRAFT HEATERS
a. Types of heaters
1. Exhaust shroud heaters
2. Compressor bleed air heaters
3. Combustion heaters
a. Combustion air system
b. Fuel system
c. Ventilation air system
d. Controls
e. Safety features
1. Duct limit switch
2. Overheat switch
3. Maintenance

23. AIRCRAFT OXYGEN SYSTEMS
a. Characteristics of oxygen
b. Forms of oxygen
1. Gaseous oxygen
2. Liquid oxygen
3. Chemical or solid oxygen
4. Mechanically separated oxygen
c. Oxygen systems and components
1. Gaseous oxygen systems
a. Storage cylinders
1. Low pressure cylinders
2. High pressure cylinders
b. Regulators
1. Continuous flow regulators
a. Manual continuous flow regulator
b. Automatic continuous flow regulator
2. Demand regulators
3. Diluter demand regulators
4. Pressure demand regulators
c. Masks
1. Continuous flow masks
2. Demand type masks
d. Plumbing and valves
1. Plumbing
2. Valves
e. Typical installed oxygen systems
1. Continuous flow system
2. Diluter demand system for crew, with continuous flow system for passengers

2. Liquid oxygen system
3. Chemical oxygen systems
    d. Oxygen system servicing
        1. Filling a gaseous oxygen system
        2. Purging a gaseous oxygen system
        3. Filling a liquid oxygen system
4. Inspecting the masks and hoses
5. Replacing tubing, valves, and fittings

SUMMARY:

Summarize all major points covered

HOMEWORK ASSIGNMENT:

At instrnctor's discretion

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Nashua Community College

Aviation Technology
Airframe Electrical Systems
AVTN202

Lecture hours 32 hours

Lab hours 64 hours

Total hours 96 hours

OBJECTIVES:

1. To familiarize the students with the aircraft electrical systems and components.

2. To familiarize the students with the general requirements for communication and navigation systems.

PERFORMANCE:

1. Students should understand and have a working knowledge of the proper function, adjustment, and operation of the aircraft electrical system.

2. Students should understand the general requirements for communication and navigation systems for aircraft.

REFERENCES:

AC 65-9A
AC 65-15A
AC 43.13-1A
EA-ITP-A
Federal Aviation Regulations

INSTRUCTIONAL AIDS:

Whiteboard
Overhead projector
Audio/Visual aids as applicable

STUDENT PREPARATION:

Reading assignment

HANDOUT MATERIAL:

Pertinent information as provided by the instructor.

METHODS OF TEACHING:

1. Lecture
2. Demonstrations
3. Laboratory experience (projects, practice and graded)
4. Class discussion

METHODS OF EVALUATION:

1. Exams.....25%
2. Quizzes.....25%
3. Lab projects.....25%
3. Final exam.....25%

INTRODUCTION:

1. Outline the lesson for the students.
2. **Explain the importance of the** lesson.
3. State the objective of the lesson.

PRESENTATION:

1. REVIEW OF ELECTRICAL TERMS AND PRINCIPLES
   - a. Ohm's law
   - b. Electromagnetic generation of power
   - c. DC power
     1. Power
     2. Current
     3. Resistance
   - d. AC power
     1. Resistance
     2. Inductive reactance
     3. Capacitive reactance
     4. Impedance
     5. Power factor
     6. True power
     7. Apparent power
   - e. Frequency
2. ELECTRICAL SYSTEMS
   - a. The difference between wire and cable
   - b. Wire size
     1. Factors affecting the selection of wire size
     2. Factors affecting selection of conductor material
   - c. Voltage drop in aircraft wire and cable
     1. Use of the electric wire chart
   - d. Conductor insulation
   - e. Identifying wire and cable
   - f. Electrical wiring installation
     1. Wire groups and bundles
     2. Spliced connections in wire bundles
     3. Slack in wiring bundles
     4. Bend radii
     5. Routing and installations
     6. Protection against chaffing
     7. Protection against solvents and fluids
     8. Protection of wires in wheel well area
     9. Routing precautions
     10. Installation of cable clamps
   - g. Lacing and tying wire bundles
     1. Single-cord lacing
     2. Lacing branch-off
     3. **Tying**
     4. The use of tie-wraps

h. Cutting wire and cable
    1. Stripping wire and cable
    2. Solderless terminals and splices
    3. Copper wire terminals
    4. Crimping tools
    5. Aluminum wire terminals
    6. Emergency splicing repairs
        a. Splicing with solder and potting compound
    7. Shrinkwrap
i. Connecting terminal lugs to terminal blocks
j. Bonding and grounding
    1. General bonding and grounding procedures
    2. Testing grounds and bonds
k. Connectors
    1. Types of connectors
        a. Class A
        b. Class B
        c. Class C
        d. Class D
        e. Class K
    2. Connector identification
    3. Connector installation
l. Conduit
    1. Metallic
    2. Nonmetallic
    3. Rigid
    4. Flexible

3. ELECTRICAL EQUIPMENT INSTALLATION
    a. Electrical load limits
    b. Controlling or monitoring the electrical load
    c. Circuit protection devices
        1. Fuses
        2. Circuit protection devices
    d. Switches
        1. Types
            a. Toggle switches
            b. Rocker switches
            c. Rotary switches
            d. Precision switches
        2. Switch ratings
        3. Switch installation and protection
        4. Relays
        5, Solenoids

4. WIRING INSTALLATION
    a. Wiring diagrams
        1. Block diagrams
        2. Pictorial diagrams
        3. Schematic diagrams

5. AIRCRAFT LIGHTING SYSTEMS
   a. Exterior lights
      1. Navigation lights
      2. Anti-collision lights
      3. Landing lights
      4. Taxi lights
      5. Wing inspection lights
      6. Strobe lights
   b. Interior lights
      1. Instrument lights
      2. Map light
      3. Panel lights
   c. Inspection of lighting systems
   d. Maintenance of lighting systems

6. ELECTRJC MOTORS
   a. DC motors
      1. The almature
      2. The field
         a. Series field
         b. Shunt field
         c. Compound field
      3. Motor controls
         a. Reversible motors
         b. Motor brake
   b. AC motors
      1. Universal motors
      2. Induction motors
         a. Three-phase induction motor
         b. Single-phase induction motor

7. INVERTERS
   a. AC to DC
   b. DC to AC
   c. Maintenance and troubleshooting
8. BASIC RADIO PRINCIPLES
   A. Frequency bands
9. BASIC EQUIPMENT COMPONENTS
   a. Transmitters
   b. Receivers
   c. Antenna
   d. Microphones
10. RADIO COMMUNICATIONS
   a. Radio waves
      1. Amplitude modulated
      2.. Frequency modulated

b. Radio receivers
    1. AM
    2. FM
    3. HF
    4. VHF
c. Power supply
d. Transmitting
e. Receiving

11. ANTENNAS
    a. Principles of operation
    b. Length
    c. Polarization and field pattern
    d. Types
        1. Hertz
        2. Marconi
        3. Loop

12. TRANSMISSION LINES

13. RADIO NAVIGATION
    a. Very high frequency omnirange navigation system (VOR)
    b. Automatic direction finder (ADF)
    c. Instrument landing system (ILS)
        1. Localizer
        2. Compass locator
        3. Marker beacons
        4. Glide slope
    d. Distance measuring equipment (DME)
    e. Radar beacon transponder
    f. Radio altimeter
    g. Weather radar
    h. Area navigation (RNAV)
    i. Radio magnetic indicator
    j. Emergency locator transmitter (ELT)
        1. Transmitter
        2. Batteries
        3. Testing
        4. False alarms
        5. Test equipment
    k. Doppler navigation systems
    l. Inertial navigation systems

14. INSTALLATION OF COMMUNICATION AND NAVIGATION EQUIPMENT
    a. Cooling
    b. Moisture
    c. Vibration isolation

15. REDUCING RADIO INTERFERENCE
    a. Bonding jumpers
    b. Static discharger wicks
    c. Isolation

17. INSTALLATION OF AIRCRAFT ANTENNA SYSTEMS

18. LOCATION OF AIRCRAFT ANTENNAS

19. MAINTENANCE PROCEDURES OF ELECTRONIC EQUIPMENT

20. STORAGE BATTERIES
    - a. Lead-acid batteries
      1. Lead-acid cell constmction
      2. Operation of lead-acid cells
      3. Lead-acid battery ratings
    - b. Factors affecting lead-acid battery life
      1. Lead-acid battery testing methods
      2. Lead-acid battery charging methods
         - a. Constant-current
         - b. Constant-voltage
    - c. Nickel-cadmium batteries (NI-CAD)
      1. Nickel-cadmium cell construction
      2. Nickel-cadmium battery servicing
         - a. Storage and maintenance area
         - b. Electrolyte
         - c. Cleaning
         - d. Adding water
         - e. Testing
         - f. Equalization
         - g. Charging
           1. Constant-voltage
           2. Constant-current
      3. Troubleshooting

SUMMARY:

Summarize all major points covered

HOMEWORK ASSIGNMENT:

At instructor's discretion

Nashua Community College

Aviation Technology

Digital Logic
AVTN107

Lecture Hours 32 hours

Lab Hours 32 hours

Total Hours 64 hours

OBJECTIVES:

The student will develop an understanding of logic elements in bistable elements, logic families and logic diagrams. The student will also learn about relay contacts and switches and how they relate to AND and OR gates, inverters, power amplifiers, latches and relay logic to logic and control circuits, In addition a student will be able to interpret system drawings of simple controls.

PERFORMANCE:

Upon successful completion of this course, the student will demonstrate an ability to:

1. Identify the different types of logic systems.
2. Describe the operation of various relays, switches and gate control systems.
3. Student will be able to interpret logic system drawings of a control circuit.

REFERENCES:

Digital Electronic

INSTRUCTIONAL AIDS:

Whiteboard
Overhead projector
Audio/Visual aids as applicable

STUDENT PREPARATION:

Reading assignments

HANDOUT MATERIALS:

Pertinent information as provided by instructor

METHODS OF TEACHING:

1. Lecture
2. Demonstration
3. Laboratory experiments
4. Class discussion
5. Homework assignments

METHODS OF EVALUATION:2

1.	Final Exam	25%
2.	Midterm Exam	25%
3.	Quizzes	25%
4.	Homework/Lab	25%

INTRODUCTION:

1. Administrative Duties
2. Course Overview
3. Instructor Expectations

PRESENTATION:

1. Logic Elements
   a. AND, OR, XOR and inverters
2. Bistable Elements
   a. Flip-flops and latches
3. Logic Families
   a. TTl and CMOS characteristics
4. Logic Diagrams and Number Systems
   a. Binary, hex and ASCII
5. Relay Contacts and Switches
   a. AND and OR gates and inverters
6. Relay as Power Amplifiers and Latches
   a. Logic and control circuits
   b. Tracing problems
   c. System drawings and control diagrams

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Nashua Community College

Aviation Technology

Airframe Structures I
AVTN102

Lecture hours 32 hours

Lab hours 96 hours

Total hours 128 hours

OBJECTIVES:

1. The objective of this lesson is to develop a working knowledge of proper sheet metal procedures.

2. Familiarize the students with wood defects and inspection techniques used to determine the airworthiness of a wood structure aircraft.

3. Familiarize the students with methods of application of aircraft fabric and inspection techniques used to determine the airworthiness of fabric covering.

4. Familiarize the students with methods of application, and types of aircraft finishes.

PERFORMANCE:

1. The students should learn the proper use of an air powered riveting gun and drill motor. How to select rivets and rivet sets. The selection of the proper bucking bar and its use. Metal layout, edge distance, rivet spacing, metal bending,and will be introduced to basic sheet metal repairs.
2. Students should understand inspections of vvood structure, internal inspection, and external inspection.
3. The students should:
   a. Know types offabric.
   b. Know how to test and inspect aircraft fabric.
   c. Know how to apply fabric.
   d. Know special requirements for fabric.
4. The students should:
   a. Know types offinishes.
   b. Know how to apply registration numbers.
   c. Know how to test and inspect aircraft finishes.
   d. Know special requirements for finishes.

REFERENCES:

AC 65-15A
AC 43.13-lA
EA-ITP-A

INSTRUCTIONAL AIDS:

Whiteboard
Overhead projector
AudioNisual aids as applicable

STUDENT PREPARATION

Reading assignment

HANDOUT MATERIAL:

Pertinent information as provided by the instructor.

METHODS OF TEACHING:

1. Lecture
2. Demonstrations
3. Laboratory experience (projects, practice and graded)
4. Class discussion

METHODS OF EVALUATION:

1.	Exams	25%
2.	Quizzes	25% (written, oral and practical)
2.	Lab projects	25% (written, oral and practical)
3.	Final exam	25% (written, oral and practical)

INTRODUCTION:

1. Outline the lesson for the students.
2. Explain the importance of the lesson.
3. State the objective of the lesson.

PRESENTATION:

I. TOOLS FOR SHEET METAL CONSTRUCTION ANDREPAIR
   - a. Layout tools
     1. Scales
     2. Combination square
     3. Dividers
   - b. Marking tools
     1. Scribers
     2. Lead pencil
   - c. Punches
     1. Prick punch
     2. Center punch
     3. Transfer punch
     4. Pin punch
   - d. Cutting tools
     1. Shop tools
        - a. Squaring shear
        - b. Throatless shear
        - c. Rotary press
        - d. Band saw
        - e. Disc sander
     2. Hand cutting tools
        - a. Sheet metal shears
        - b. Aviation snips
        - c. Files
        - d. Burring tools
   - e. Drills
     1. Drill motors
        - a. Electric
        - b. Pneumatic
     2. Attachments and special drills
        - a. Right-angle attachment
        - b. Snake attachment
        - c. Extension dri°lls
     3. Drill press
     4. Twist drills
   - f. Forming tools
     1. Tools that produce straight bends
        - a. Press brake
        - b. Cornice brake
        - c. Bar folding machine
        - d. Box or finger brake
        - e. Slip roll former

2. Tools that produce compound curves
    a. Stretch press
    b. Drop hammer
    c. Hydropress
    e. Shrinker
    f. Stretcher
g. Riveting tools
h. Special assembly tools
    1. Clamps and sheet fasteners
        a. Cleco fasteners
        b. Wing **nut** fasteners
        c. C-clamps
    2. Hole finders
    3. Chip chasers

2. SPECIAL TOOLS AND DEVICES FOR SHEET METAL
    a. Dollies and stakes
    b. V-blocks
    c. Hardwood form blocks
    d. Shrinking blocks
    e. Sandbags
3. STRESSES IN STRUCTURAL MEMBERS
    a. Tension
    b. Compression
    c. Shear
    d. Bending
    e. Torsion
4. INSPECTION OF DAMAGE
    a. Definition of defects
    b. Classification of damage
5. PRINCIPLES OF SHEET METAL REPAIR
    a. Maintaining original strength
    b. Maintaining original contour
    c. Keeping weight to a minimum
6. GENERAL STRUCTURAL REPAIR
    a. Structural design
    b. Objective of repair
7. STRUCTURAL FASTENERS
    a. Solid rivets
        1. Head shapes
        2. Alloy types
        3. Dimensions
        4. Rivet identification
    b; SPECIAL FASTENERS
        a. Friction lock Cherry rivets
        b. Mechanical lock Cherry rivets
    2. High strength pin rivets
    3. Threaded rivet
8. INSTALLATION OF SOLID RIVETS
    a. Selection of the proper rivet

a. Layout of rows
    1. Edge distance
    2. Pitch
    3. Gage, or transverse pitch
    4. Rivet layout

c. Hole preparation for protruding head rivets
    1. Drill size
    2. Drilling the hole
    3. Deburring the hole

d. Hole preparation for flush rivets
    1. Countersinking
    2. Dimpling
        a. Coin dimpling
        b. Radius dimpling
        c. Hot dimpling
    3. Stacking of sheets for flush riveting

e. Rivet installation
    1. Hand riveting
    2. Compression riveting
    3. Gun riveting
        a. Types of rivet guns
        b. Rivet sets
        c. Bucking bars
        d. Set-up and adjustment of the rivet gun
        e. Driving the rivet
        f. Evaluating the rivet
        g. Removal of bad rivets
        h. N.A.C.A. method of flush riveting
        i Team riveting

9. LAYOUT AND FORMING

a. Terminology
    1. Grain of the metal
    2. Bend radius
    3. Neutral axis
    4. Mold line
    5. Mold point
    6. Bend tangent line
    7. Setback
    8. Flat
    9. Bend allowance

b. Making the layout

c. Making the bends

d. Fonning compound curves

e. Bumping

f. Flanging lightening holes

g. Joggling

10. WOOD AIRCRAFT CONSTRUCTION AND REPAIR

a. Strength-to-weight ratio

b. Inspections
c.
1. External inspection
2. Internal
d. Repairs
1. Materials
a. Suitable wood
b. Glues
2. Wing rib repairs
3. Wing spar repairs
4. Plywood skin repairs

11. FABRIC COVERINGS
a. Types
b. Inspection
c. Testing
d. Application
e. Special requirements
f. Protection

12. AIRCRAFT FINISHES
1. Types
2. Inspection
3. Testing
4. Application of finishes
5. Application of dope
6. Special requirements
7. Application of registration numbers

13. Transparent Plastic Materials
a. Types of transparent plastic
b. Storage and handling
c. Inspection procedures
d. Forming procedures and technigue
e. Repaire procedures
f. Protection
g. Windshield installation

SUMMARY:

Summarize all major points covered

HOMEWORK ASSIGNMENT:

At instructor's discretion

Nashua Community College

Aviation Technology

Airframe Structures II
AVTN103

Lecture hours 32 hours

Lab hours 96 hours

Total hours 128 hours

OBJECTIVES:

1. The objective of this lesson is to develop student knowledge of the proper procedures for structural sheet metal repairs in aircraft.

2. Give the students a basic working knowledge of composite structure repair, and the basic understanding of working with plastic.

PERFORMANCE:

1. Students should learn the proper procedure for assessment and repair of sheet metal structures.

2. Students should be able to make repairs to composite material, identify composite materials, and accomplish basic repairs to plastics.

REFERENCES:

AC 65-lSA
AC 43.13-lA
EA-ITP-A
Handbook of Composites
Composite construction for homebuilt aircraft

INSTRUCTIONAL AIDS:

Whiteboard
Overhead projector
Audio/Visual aids as applicable

STUDENT PREPARATION:

Reading assignment

HANDOUT MATERIAL:

Pertinent information as provided by the instructor.

METHODS OF TEACHING:

1. Lecture
2. Demonstrations
3. Laboratory experience (projects, practice and graded)
4. Class discussion

METHODS OF EVALUATION:

1.	Exams	25% (written, oral and practical)
2.	Quizzes	25% (written, oral and practical)
2.	Lab projects	25% (written, oral and practical)
3.	Final exam	25% (written, oral and practical)

SUMMARY:

Summarize all major points covered

HOMEWORK ASSIGNMENT:

At instructor's discretion

INTRODUCTION:

1. Outline the lesson for the students.
2. Explain the importance of the lesson.
3. State the objective of the lesson.

PRESENTATION:

1. REPAIR OF SHEET METAL STRUCTURES
   - a. Repairability of sheet metal structures
   - b. Assessment of damage
   - c. Inspection of riveted joints
   - d. Inspection for corrosion
   - e. Repair of negligible damage
   - f. Repair of stressed skin structures
     1. Approval of the repair
     2. Criteria of a repair
     3. Replacement of a panel
     4. Design of a patch for a stressed skin
     5. Stringer repair
     6. Waterproof repair for water craft
     7. Trailing edge repair
     8. Corrugated skin repair
     9. Inspection openings
     10. Repair to pressurized structures
     11 Specialized repairs
2. RAW MATERIALS
   - a. Unsaturated polyester resins
   - b. Vinyl ester resins
   - c. Polybutadiene resins
   - d. Epoxy resins
   - e. High-temperature resins
   - f. Glass-filled thermoplastics
   - g. Fiberglass reinforcement
   - h. High silica and quartz
   - 1. Boron and other high-strength, high-modulus, low-density :filamentary reinforcing agents
   - J. Graphite fibers and composites
   - k. Aramid fibers and composites
3. PROCESSING METHODS
   - a. Hand lay-up techniques
   - b. Bag molding processes
   - c. Thermoset matched die molding
   - d. Filament winding
   - e. Continuous manufacturing processes
   - f. Cabrication of advanced composites
   - g. Environmental effects on propel lies of composites

4. TESTING OF REINFORCED PLASTICS
5. NONDESTRUCTIVE TEST METHODS
6. BONDED STRUCTURE CONSTRUCTION INSPECTION AND REPAIR
   a. Laminated structural materials
      1. Fiberglass structure
         a. Fiberglass
         b. Polyester resin
         c. Epoxy resin
         d. Thixotropic agents
      2. Laminated construction
         a. Fiberglass lay-up
         b. Honeycomb
         c. Wood core sandwich
      3. Inspection procedures
         a. Tap testing
         b. Magnifying glass
         c. Eddy current
         d. Ultrasound
      4. Repair of laminated structure
         a. Assessment of damage
         b. Criteria of a good repair
         c. Equipment needed
      5. Specific repairs to laminated structure
         a. Damage to fiberglass laminated structure
            1. Surface scratches
            2. Delamination
               a. Scarf method
               b. Step-joint method
         b. Damage to honeycomb structure
            1. Dents
            2. Surface scratches
            3. Surface delamination
            4. Skin penetrated, but no core damage
            5. Skin penetrated and core damaged
            6. Both skins penetrated and core damaged
            7. Riveted repairs to bonded structure
         c. Radome repair
         d. General considerations for repair to bonded structure
            1. Cutting information
            2. Surface treatment
            3. Types of adhesives
            4. Application of heat and pressure for curing
   6. Gas welding and cutting
      a. Safety

b. Equipment
c. Equipment set-up
d. Lighting and adjusting the torch
e. Shutting down procedures
f. Gas welding procedures and techniques
    1. Types of flames
    2. Types of rods
    3. Running a puddle
    4. Types of joints
    5. Inspection of weld beads
g. Oxyacetylene welding of ferrous metals
    1. Steel
    2. Chrome molybdenum steels
    3. Stainless steel
h. Oxyacetylene welding of nonferrous metals
    1. Aluminum
    2. Magnesium
    3. Titanium,
i. Oxyacetylene cutting procedures

7. Brazing and soldering
    a. Torch brazing of steel
    b. Torch brazing of aluminum
    c. Torch soldering
        1. Soft soldering
        2. Hard soldering
        3. Silver soldering
        4. Stainless Steel soldering
8. Electric arc welding
    a. Safety
    b. Equipment set-up
    c. Rod selection
    d. Striking an arc and run a bead
    e. Types of joints
    f. Types of positions
9. Gas shielded arc welding (TIG and MIG)
    a. Welding aluminum
    b. Welding magnesium
    c. Welding titanium
    d. Welding stainless steel
10. Plasma arc welding
11. Inspection
    a. Radiography
    b. Ultrasonic
    c. Visual
12. Heat treatment
    a. Ferrous metals
    b. Nonferrous metals

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AU airframe curriculum lab projects are on file in the Aviation Technology department office

Nashua Community College

Aviation Technology

Powerplant Section

Course Hours

Course Number	Course Title	Lecture	Lab	Total
AVTN206	Reciprocating Engines I	48 hrs	96 hrs	144 hrs
AVTN207	Reciprocating Engines II	48 hrs	96 hrs	144 hrs
AVTN208	Engine Systems	32 hrs	48 hrs	80 hrs
AVTN209	Aircraft Propellers	32 hrs	48 hrs	80 hrs
AVTN210	Turbine Engines & Systems	48 hrs	48 hrs	96 hrs
AVTN211	Carburetion & Fuel Systems	32 hrs	48 hrs	80hrs
AVTN212	Engine Electrical Systems	32 hrs	86 hrs	128 hrs
		272 hrs	480 hrs	752 hrs

Nashua Community College

Aviation Technology

Reciprocating Engines I
AVTN206

Lecture hours 48 hours

Lab hours 96 hours

Total hours 144 hours

OBJECTIVES:

The objective of this lesson is for the student to develop a working knowledge of reciprocating engines, including types of construction, theory of operational characteristics, and component identification.

PERFORMANCE:

Upon successful completion of this course, the student will demonstrate an ability to:

1. Recognize all engine parts and understand their relationship.
2. Understand the Otto cycle and its relationship to the engine.

REFERENCES:

AC 65-12A
EA-ITP-P
EA-FAR-MO
AC 43.13-IA
AC 43.13-2A
Manufacturer's Parts Catalog
Manufacturer's Maintenance Manual

INSTRUCTIONAL AIDS:

Whiteboard
Overhead projector
AudioNisual aids as applicable

STUDENT PREPARATION:

Reading assignments

HANDOUT MATERIAL:

Pertinent information as provided by the instructor

METHODS **OF** TEACHING:

1. Lecture
2. Demonstrations
3. Laboratory experience (projects, practice)
4. Class discussion
5. Homework assignments

METHODS OF EVALUATION:

1. Exams 25%
2. Quizzes 25%
2. Lab projects 25%
3. Final exam 25%

INTRODUCTION:

1. Introduce the lesson
2. Explain the importance of the lesson
3. State the objective of this lesson

PRESENTATION:

1. Types of Reciprocating Engines
   - a. Vee type, upright, inverted
   - b. Inline
   - c. Radial
   - d. Horizontally Opposed
2. Otto cycle
   - a. Two stroke
   - b. Four stroke
3. Mixing of air/fuel/ignition to create heat energy
4. Basic components
   - a. Cylinder
   - b. Piston
   - c. Connecting rod
   - d. crankshaft
   - e. Ignition
5. Criteria
   - a. Efficiency
   - b. Economy
     1. Fuel economy
        - a. Fuel flow (llbs./hr.)

          BHP Thrust
   - c. Durability - (TBO)
   - d. Operating flexibility
   - e. Ability to run smoothly
   - f. Reliability
     1. Power/Weight
        - a. Horsepower (IHP-BHP)
        - b. Horsepower (THP)
     2. Durability/reliability
     3. Operation flexibility
     4. Compactness
6. Level Unaccelerated Flight
   - a. Thrust/drag
7. Newton's Law
   - a. Relationship to heat engine
8. Powerplant selection
   - a. Engine to airframe
9. Terminology
   - a. Power
   - b. Piston displacement
   - c. Compression ratio
   - d. Indicated horsepower
   - e. Brake horsepower
   - f. Take-off poser
   - g. Torque
   - h. METO power

i. Manifold pressure
j. Critical altitude
k. Volumetric efficiency
l. Naturally aspirated
m. Weight/power ratio
n. Balance
o. Detonation
p. Pre-ignition
q. Density altitude

10. Engine Structures
    a. Crankcase (Radial)
        1. Nose or front section
        2. Power or main section
        3. Blower or diffuser section
        4. Accessory or rear section
    b. What are the functions of the crankcase?
        1. Material
    c. Crankcase (Opposed/Inline)
        1. Castings
        2. Types
    d. Crankshafts
        1. Types of construction
            a. Radial
            b. Opposed/Inline
        2. Crankshaft parts
            a. Main journal
            b. Crankpin
            c. Crank cheek
            d. Counter weights and dampeners
            e. Inspection requirements
        3. Types
            a. Single throw
            b. Double throw
            c. Four throw
            d. Six throw
    e. Connecting rods
        1. Definition
        2. Construction
        3. Parts
            a. Bushing
            b. Bushing (inserts)
        4. Types
            a. Plain
            b. Fork & blade
            c. Master/Articulated
            d. Inspection requirements
    f. Pistons
        1. Cross sections/parts
        2. Piston Speed
        3. Piston TSNP/pressure
        4. Wear/clearance
        5. Types of pistons
        6. Inspection requirements

g. Piston rings
   1. Construction
      a. High grade gray cast iron
      b. Spring action
      c. Chrome and plain rings
      d. When chrome and plain rings are used
   2. Type of ring joints
      a. Butt
      b. Step
      c. Angle
   3. Gap clearance
      a. Allows for heat expansion
      b. Table of limits
      c. Cause of seizure and damage to cylinder
      d. Staggering and blow-by
   4. Type of piston rings
      a. Compression
      b. Oil control
      c. Oil wiper

h. Cylinders
   1. Purpose
   2. Heat dissipation
   3. Parts
      a. Barrel
         1. Construction
      b. Cylinder head
         2. Construction
   4. Method of attachment

i. Valves & valve operating mechanism
   1. Review Cycles
   2. Definitions
      a. TDC
      b. BDC
   3. Engine timing
      a. Valve overlap
      b. Valve lead and lag
         1. Valve lead - opening or closing of valve BTDC or BBDC
         2. Valve lag - opening or closing of valve ATDC or ABDC
   4. Firing order
      a. Provides balance
      b. Determined by position of throws of the crank and lobes on the cam
      c. Review firing order for each engine

5. Valve mechanism
   a. Purpose
      1. Controls timing of valves
   b. Types
      1. Overhead valves - Radial and Opposed
   c. Parts
      1. Mechanical System
      2. Hydraulic System - Zero lash and oil flow

SUMMARY:

Summarize all major points covered.

HOMEWORK ASSIGNMENTS:

At Instructor's discretion.

Nashua Community College

Aviation Technology

Reciprocating Engines II
AVTN207

Lecture hours 48 hours

Lab hours 96 hours

Total hours 144 hours

OBJECTIVES:

This course is a continuation of Reciprocating Engines I. The objective of this lesson is for the student to develop a working knowledge of reciprocating engines, including engine disassembly, inspection requirements, proper use of manufacturer's parts catalog and overhaul instructions, engine reassembly, and test procedures.

PERFORMANCE:

Upon successful completion of this course, the student will demonstrate an ability to:

1. Understand basic engine inspection requirements.
2. Be able to use the manufacturer's parts catalog and overhaul instructions properly.
3. Understand the procedures required to properly overhaul a reciprocating engine, as well as the test procedures.

REFERENCES:

AC 65-12A
EA-ITP-P
EA-FAR-MO
AC 43.13-1A
AC 43.13-2A
Manufacturer's Parts Catalog
Manufacturer's Overhaul Manual

INSTRUCTIONAL AIDS:

Whiteboard
Overhead projector
AudioNisual aids as applicable

STUDENT PREPARATION:

Reading assignments

HANDOUT MATERIAL:

Pertinent information as provided by the instructor

METHODS OF TEACHING:

1. Lecture
2. Demonstrations
3. Laboratory experience (projects, practice)
4. Class discussion
5. Homework assignments

METHODS **OF** EVALUATION:

1. Exams 25%
2. Quizzes 25%
2. Lab projects 25%
3. Final exam 25%

INTRODUCTION:

1. Inspect an engine for compliance with airworthiness directives.
2. Inspect an engine for conformity with the Type Certificate Data Sheet.
3. The 100 hour inspection.
   a. FAA regulations
   b. Checklist (FAR 43, Appendix D)
   c. Maintenance record requirements
4. Engine overhaul
   a. FAA regulations
      1. Engine overhaul
      2. Engine repair
      3. Remanufactured
   b. Required replacement parts
      1. Manufacturer's overhaul manual
      2. Manufacturer's service bulletins
      3. Manufacturer's parts catalog
      4. Superseded part numbers
      5. Table.oflimits
   c. Cleaning
      1. Cleaning materials
      2. Bead blasting
   d. Inspections
      1. Visual
      2. Dimensional
      3. Magnetic particle inspection
      4. Zyglo
      5. Dye penetrant
      6. X-ray
   e. Assembly procedures
      1. Manufacturer's requirements
      2. Work area
      3. Pre-oiling
   f. Engine accessories
      1. Review accessories overhaul
      2. Accessories installation
      3. Engine manufacturer's recommendations or accessory manufacturer's recommendations?
   g. Preparation for test
      1. Engine installation
      2. Manufacturer's requirements
      3. Choice of propellers
         a. Club prop
         b. Standard prop
      4. Engine instrumentation
         a. FAA requirements
         b. Manufacturer's requirements

h. Engine test
    1. Engine run-up procedures
    2. Safety procedures
    3. Engine limits
    4. Manufacturer's recommendations

1. Engine troubleshooting
    1. Safety considerations
    2. Procedures
    3. Rough engine
        a. Mag drop
            1. Cold cylinder check
            2. Magic wand
        b. Fouled plug
            1. Clearing an engine
        c. Fuel leaks
            1. Safety
        d. Induction system leaks
        e. Exhaust system leaks
    4. Adjusting engine oil pressure
    5. Adjusting engine mixture and idle speed

J. Record keeping
    1. Maintenance record entry
    2. Description of overhaul
    3. Service bulletin compliance
    4. AD note compliance
    5. Engine rework done by repair stations
        a. Maintenance release
        b. Copy of work order

SUMMARY:

Summarize all major points covered.
Review safety procedures
Review major points of 100 hour and annual inspection pertaining to the mechanic.

HOMEWORK ASSIGNMENT:

At instructor's discretion

Nashua Community College

Aviation Technology

Engine Systems
AVTN208

Lecture hours 32 hours

Lab hours 48 hours

Total hours 80 hours

OBJECTIVES:

The objective of this lesson is to acquaint the student with thetheory, components, inspection requirements, servicing requirements, repair and maintenance procedures for properly maintaining engine lubrication systems, engine cooling systems, engine exhaust systems, engine fire protection systems, and engine instrument systems.

PERFORMANCE:

Each student should understand the theory, components, inspection requirements, servicing requirements, repair and maintenance procedures for properly maintaining engine lubrication systems, engine cooling systems, engine exhaust systems, engine fire protection systems, and engine instrument systems.

REFERENCES:

AC 65-12A
EA-ITP-P
EA-FAR-MO
AC 43.13-lA
AC 43.13-2A
Manufacturer's Parts Catalog
Manufacturer's Overhaul Manual

INSTRUCTIONAL AIDS:

Whiteboard
Overhead projector
AudioNisual aids as applicable

STUDENT PREPARATION:

Reading assignments

HANDOUT MATERIAL:

Pertinent information as provided by the instructor

METHODS OF TEACHING:

1. Lecture
2. Demonstrations
3. Laboratory experience (projects, practice)
4. Class discussion
5. Homework assignments

METHODS OF EVALUATION:

1.	Exams	25%
2.	Quizzes	25%
2.	Lab projects	25%
3.	Final exam	25%

INTRODUCTION:

1. Introduction of different types of oil lubricating systems
   a. Pressure lubrication
   b. Combination splash and pressure
   c. Wet sump lubrication
2. Pressure lubrication
   a. Mechanical pump
      1. Scavenge
      2. Pressure
   b. Purpose
      move large amounts of oil for cooling and pressure lubrication
   c. Advantages
      1. Positive introduction of oil to the beatings
      2. Cooling effect caused by large quantities
      3. Satisfactory lubrication in various attitudes
3. Combination splash and pressure lubrication
   a. Splash never used by itself
   b. Cooling effect
4. Wet-sump lubrication
   a. Self contained
   b. Disadvantages
      1. Supply limited by oil sump size
      2. Cooling limited because of sump location
      3. Oil temperatures are higher
      4. Sump location
      5. System not adapted to inverted flight
5. Dry sump system
   a. Larger oil supply
   b. Systems
      1. Cooler
      2. Regulators
      3. Valves
      4. Lines
      5. Pump - r;pes
      6. Filters
      7. Relief valves
      8. Gage connectors
      9. Vents
      10. Check valves
      11. Bypass valves
      12. Oil coolers
   c. Summary on lube system
   d. Oil pressure system maintenance
   e. Oil filter maintenance
   f. Scavenge
   g. Breather system

6. Reciprocating engine lubricating systems
   a. Dry sump
   b. Oil tank
      1. Construction
      2. Cleaning
      3. Inspection
      4. Repair
      5. Testing
   c. Oil pumps
      1. Types
         a. Gear type
         b. Gearotor type
         c. Material
         d. Inspection
   d. Oil filters
      1. Types
      2. Construction
      3. Inspection
      4. Cleaning
      5. Testing
   e. Oil pressure relief valves
      1. Types
      2. Operation
      3. Problems
      4. Inspection
      5. Repair/replacement
   f. Oil pressure indicators
      1. Inspection
      2. Troubleshooting
      3. Repair/replacement
   g. Oil temperature regulators
      1. Function
      2. Location
      3. Inspection
      4. Troubleshooting
      5. Repair/replacement
   h. Oil temperature indicators
      1. Normal location
      2. Care and removal
      3. Inspection
      4. Troubleshooting
      5. Repair/replacement
   i. Oil cooler
      1. Construction
      2. Inspection
      3. Cleaning
      4. Repair

7. Draining oil
8. Troubleshooting system
    a. Leakage
    b. Correcting pressure problems
9. Lubricants
    a. Friction
    b. Cooling
    c. Seals
    d. Corrosion protection
10. Types of lubricants
    a. Animal
    b. Vegetable
    c. Mineral
        1. Solid, semi-solid, fluid
    d. Synthetic
11. Cooling systems
    a. Cooling system development
    b. Radial engines
        1. Lowest weight per horsepower
        2. Large frontal area
            a. Difficult to streamline
            b. Difficult to cool compounded engines
            c. Cooling problems arising during low air speeds, taxing and run-up
    c. Inline engines
        1. Air cooled inlines
            a. Inverted 6 and 12 cylinders
        2. Liquid cooled inlines
            a. water
            b. Alcohol
            c. Ethylene glycol
    d. Opposed engines
        1. Horsepower range
        2. Flat shape and relatively low weight per horsepower, well adapted for streamlining, good visibility and short landing gear
        3. Lends itself well to good cooling as there are only two or three cylinders on each side
    e. Reasons for having a cooling system
        1. Powerplant is a heat engine
            a. Heat energy into mechanical energy
        2. Each gallon of fuel releases about 80,000 BTU's
            a. Heat transfer to cylinder walls, if not cooled, could lead to preignition and detonation. This could result in severe strain on the engine
            b. Heat transfer to oil
            c. Heat transfer to fins or liquid coolant

1. Heat exchanger for liquid coolant

f. Air cooling

1. Deflector baffles
   a. Baffles form a venturi effect. The air travels faster around the cylinder heads, thus more rapid cooling.
2. Overcoming disadvantages of air cooled engines
   a. High cylinder temperatures at low speeds and while taxing
   1. Open - creates low pressure behind cylinders
   2. Closed - during high speed, decreases airflow through cylinders and streamlines the engine installation
   3. Pressure cooling for inline and opposed engines
      a. Cowling directs ram air to baffles and fins for cooling
      b. Rubber, plastic, and leather are used to provide air seals
   4. Augmenter tubes - used to increase the airflow through cylinders

g. Liquid cooling
   1. Ethylene Glycol - higher boiling point permits higher and more efficient operating temperature than water
   2. Because of higher operating temperature, there is a greater difference between the coolant and the sunounding air. The greater difference results in more rapid cooling
   3. Faster cooling allows a smaller radiator to be used
   4. Ethylene glycol and water mixture
      a. Use distilled water
      b. If tap water is used, scale and rust will form quickly. This could clog radiator

12. Introduction to reciprocating engine exhaust systems
   a. Turbo-compound engine
   b. Reciprocating engine exhaust systems
      1. Development
      2. Opposed engine exhaust systems
      3. Radial engine exhaust systems
      4. Augmenters
   c. Reciprocating exhaust system maintenance practices
      1. Inspection
      2. Exhaust systems with turbo-chargers and turbo-superchargers
      3. Muffler and muffler internal failures
      4. Heat exchangers
13. Fire detection systems
   a. Fire zones

1. Class A, B, C, D, X

b. Types of fire detection systems

1. Thermal switch fire detection system
2. Thermocouple type firedetection system
3. Continuous fire detection system

14. Fire extinguishing systems

a. Types of fires

1. Class A, B, C fires

b. Fire extinguishing agents

1. Overview
2. Water
3. Dry powder
4. Inert gas
   a. Carbon dioxide
   b. Liquid nitrogen
   c. Halogenated hydrocarbonagents

c. Complete fire protection system

15. Introduction to powerplant instruments

a. Evolution of powerplant instruments

1. Digital electronics

b. Pressure measuring instruments

1. Types of pressure
   a. Absolute pressure
   b. Manifold pressure gage
   c. Gage pressure
   d. Temperature measurement with a pressure gage
   e. Differential fuel pressure
   f. Engine pressure ration
   g. Pressure switches

c. Temperature measuring instruments

1. Overview
   a. Non-electrical temperature measurement
   b. Electrical measurement oftemperature
   c. Resistance type themlometers
   d. Thermocouple instrument systems
   e. Cylinder head temperature gage for reciprocating engines
   f. Exhaust gas temperature gage for reciprocating engmes
   g. Exhaust gas temperature system for turbine engmes

d. Mechanical measurement

1. Tachometers
   a. Non-electrical tachometers
   b. Electric tachometers
   c. AC electrical tachometers
      1. Reciprocating enginetachometers

2. Turbine engine tachometers
3. Helicopter tachometers

d. Synchroscopes

e. Fuel flow instruments

1. Pressure types

a. Fuel injected horizontally opposed engine type
b. Volume-flow type remote indicating flow meters
c. Turbine engine mass flow measurement
d. Fuel flow computer

f. The measurement of torque

16. Instrument installation and marking

a. Installation
b. Range marking

1. Carburetor air temperature
2. Cylinder head temperature
3. Manifold pressure
4. Fuel pressure
5. Oil pressure
6. Oil temperature
7. Tachometer (reciprocating engine)
8. Tachometer (turbine engine)
9. Tachometer (turboshaft helicopter)
10. Dual tachometer (helicopter)
11. Torque
12. Exhaust gas temperature (turbine engines)

SUMMARY:

Summarize all major points covered

HOMEWORK ASSIGNMENT:

At instructor's discretion

Nashua Community College

Aviation Technology

Gas Turbine Engines & Systems
AVTN210

Lecture hours 32 hours

Lab hours 48 hours

Total hours 80 hours

OBJECTIVES:

The objective of this lesson is to give students the basic theory of turbine engine operation, construction, and basic inspection procedures.

PERFORMANCE

Upon successful completion of this course, the student will demonstrate an ability to:

1. Understand the basic principles of turbine engine operation.
2. Understand the Brayton cycle and its relationship to the turbine engine.
3. Understand basic turbine engine inspection requirements.

REFERENCES:

AC 65-12A
EA-ITP-P
EA-FAR-MO

INSTRUCTIONAL AIDS:

Whiteboard
Overhead projector
AudioNisual aids as applicable

STUDENT PREPARATION:

Reading assignments

HANDOUT MATERIAL:

Pertinent information as provided by the instructor

METHODS OF TEACHING:

1. Lecture
2. Demonstrations
3. Laboratory experience (projects, practice)
4. Class discussion
5. Homework assignments

METHODS OF EVALUATION:

1. Exams 25%
2. Quizzes 25%
2. Lab projects 25%
3. Final exam 25%

INTRODUCTION:

1. Introduce the lesson
2. Explain the importance of the lesson
3. State the objective of this lesson

PRESENTATION:

1. Introduction
   a. Jet propulsion is considered a device that takes in air, adds energy (fuel) to that air, burns the fuel/air mixture, and from that combustion produces thrust from the accelerated gases.
   b. Newton's third law - for every action there is an equal and opposite reaction.
2. Presentation
   a. Parts of a turbine engine (sections)
      1. Air entrance (compressor inlet case)
      2. Compressor section
      3. Turbine section
      4. Combustion section
      5. Accessory section
   b. Types of turbine engines
      1. Turbojet
      2. Turbofan
      3. Turboshaft
         a. Helicopter application
      4. Turboprop
         a. Small aircraft application
   c. Turbine engine classification
      1. Compressor type
         a. Centrifugal flow
            1. Single side
            2. Double entrance
            3. Two-stage
         b. Axial flow
            1. Single spool
            2. Split spool
            3. Fan
3. Air entrance
   a. Designed for maximum efficiency. Air volume depends on compressor speed, aircraft speed, and density of air.
4. Compressor
   a. Centrifugal
   b. Axial flow (single & dual spool)
   c. Compressor stall
      1. Loss of compressor air velocity
      2. Bleed valves
      3. Variable inlet guide vanes
      4. Variable stator vanes

a. Automatically regulated in pitch angle by the fuel control unit. It is to provide a means of controlling the direction of the interstage airflow thus ensuring a correct angle of attack.

5. Foreign object damage
   a. Loss of aerodynamic efficiency
   b. Corrosion pitting
   c. Galling
   d. Cracks

5. Accessory
   a. Attached to compressor section
   b. Generator
   c. Oil
   d. Fuel control
   e. Pumps

6. Diffuser section
   a. Reduces velocity of air
   b. Prepares compressor discharge air for entry into combustion chamber.
   c. Point of highest pressure

7. Combustion chamber
   a. Can type
   b. Can-annular
   c. Annular
   d. Air distribution
      1. 25% used in combustion process
      2. 75% used for cooling
   e. Fuel nozzles
      1. Cleaning
      2. Testing
   f. Hot section inspection requirements
      1. Hot spots, distortion, leaks
      2. Liner inspection
         a. Cracks
         b. Thermal stress
         c. Burned or buckled areas
      3. Inspection and repair
         a. Dye and/or fluorescent penetrate
         b. Magnetic particle

8. Turbine nozzle diaphragm
   a. Impulse type
   b. Reaction type
   c. Impulse/reaction type
   d. Hot section inspection requirements
      1. Manufacturer's recommendation
      2. Clearances

9. Turbines
    a. Turbine disk (wheel)
    c. Construction
    d. Shrouded and unshrouded
    e. Stretch
    f. Creep
    g. Hot section inspection requirements
        1. Disk inspection
        2. Turbine blade inspection
            a. Stress
            b. Rupture
            c. Cracks
            d. Deformation
            e. Slot removal
            f. Outer shroud inspection
        3. Blade replacement
            a. Replace due to moment weight
            b. Replace I/A/W manufacturer's recommendation
    h. Approved marking methods
        1. Chalk
        2. Permanent markers
10. Exhaust section
    a. Exhaust nozzle
    b. Control velocity and temperature of exhaust gases
    c. Increased velocity - directed flow
    d. Change of nozzle areas
    e. Change of thrust
    f. Thrust reversers
    g. Hot section inspection requirements
        1. Buckling
        2. Warping
        3. Hot spots
11. Engine Noises
    a. Sound
    b. Noise
    c. Reduction
12. Turbo-prop engines
    a. Operating limits
    b. Trouble shooting procedures
13. Ignition system
    a. High and low energy
    b. Location of ignition units
    c. Why more energy to an igniter?
    d. What level of energy is used?
    e. How is ignition voltage measured?
    f. Why is the spark gap on an igniter greater?

14. Introduction to turbine engine operation
    a. Inspection before startup
        1. Determine type of starter
    b. Engine start sequence
        1. Rotate compressor
        2. Turn ignition "on"
        3. Open engine fuel valve
        4. If hot start - turn off ignition and fuel
    c. Ground operation
        1. Check engine fuel
        2. Engine checks
        3. Idle checks
        4. Checking take-off thrust
        5. Ambient conditions
    d. Engine shut-down
    e. Trouble shooting turbine engines
        1. Guidelines for trouble shooting
    f. Turbo-prop operations
        1. Engine operating limits
    g. Trouble shooting procedures for turbo-prop engines
    h. Turbine calibration test units
        1. Introduction
        2. Description
        3. Usage
        4. Operating instructions
        5. Safety precautions
        6. Continuity check/EGT
        7. Function check/EGT
        8. Functional check of thermal switches
        9. EGT indicator check
        10. Resistance and insulation check
        11. Tachometer check
        12. Trouble shooting EGT systems
        13. Thermocouples
        14. EGT circuit error.
        15. Circuit resistance out of tolerance
        16. Shorts
    i. Trouble shooting tachometer systems
    j. Spectrometric oil analysis
        1. What it does
        2. How it works
        3. Application
        4. Advantages
    k. Turbine engine removal
        1. Review manufacturer's procedures

a. Methods
1. Lowering
2. Hoisting
b. Preliminary steps
c. Engine removal
d. Removal of Q.E.C. and accessories

l. Installation
1. With hydraulic stand
2. With hoist
a. Two cable hoist
3. Completion

m. Rigging, inspection and adjustments
1. Inspections and procedures
2. Rigging power controls
3. Adjusting the fuel control (trimming)

n. Turbo-prop engine removal

o. Engine mounts

p. Preservation and storage

SUMMARY:

Summarize all major points covered.

HOMEWORK ASSIGNMENT:

At the Instructor's discretion

Nashua Community College

Aviation Technology

Aircraft Propellers
AVTN209

Lecture hours 32 hours

Lab hours 48 hours

Total hours 80 hours

OBJECTIVES:

The objective of this lesson is to explain the operation, maintenance, inspection, and repair of aircraft propellers.

PERFORMANCE:

Each student should learn the operation, inspection, and repair requirements for aircraft propellers.

REFERENCES:

AC 65-12A
EA-ITP-P
EA-FAR-MO
AC 43.13-lA
AC 43.13-2A

INSTRUCTIONAL AIDS:

Whiteboard
Overhead projector
Audio/Visual aids as applicable

STUDENT PREPARATION:

Reading assignments

HANDOUT MATERIAL:

Pertinent information as provided by the instructor

METHODS OF TEACHING:

1. Lecture
2. Demonstrations
3. Laboratory experience (projects, practice)
4. Class discussion
5. Homework assignments

METHODS OF EVALUATION:

1. Exams 25%
2. Quizzes 25%
2. Lab projects 25%
3. Final exam 25%

INTRODUCTION:

1. State what is to be covered
2. Explain the importance of the lesson.
3. State the objective of this lesson.

PRESENTATION:

1. Propellers
   - a. Definition
   - b. Propeller nomenclature
   - c. Propeller fundamentals
     1. Propeller pitch
     2. Forces acting on blades
        - a. Centrifugal force
        - b. Thrust bending force
        - c. Torque bending force
        - d. Aerodynamic twisting force
        - e. Centrifugal twisting force
        - f. Propeller vibration
   - d. Types of Propellers
     1. Fixed pitch propellers
     2. Adjustable pitch propellers
     3. Controllable pitch propellers
     4. Constant speed propeller principles
     5. Method of control
     6. Propeller efficiency
     7. Engine efficiency
     8. Summary - general advantages
        - a. Feathering
        - b. Counterweight type, constant speed propellers
          1. Pitch changing mechanism
          2. Constant speed governor
             a. Operation of counterweight type, constant speed propellers
             b. Starting
             c. Pre-flight check
             d. Take-off, climb and cruise
             e. Descent
             f. Approach
             g. Taxing and stopping
          3. Reverse thrust
   - e. Hydromatic constant speed and feathering propellers
     1. Overview
     2. Pitch changing mechanism
     3. Hydromatic propeller governor
     4. Feathering oil system
        - a. Feathering operation
        - b. Unfeathering operation
   - f. McCauley propellers
     1. Overview
     2. Two series of propellers

3. McCauley governors
    a. Oil released from propeller to decrease blade angle (opposite from Hamilton-Standard governors)
4. Installation and adjustment

g. Hartzell propeller
1. Overview
2. Propellers
3. Hartzell governors
4. Installation and adjustments

h. Fixed pitch propellers]
1. Wood propellers
    a. Construction
    b. Inspection, maintenance and repair
2. Aluminum alloy propellers and blades
    a. Construction
    b. Inspection, maintenance and repair
3. Fixed-pitch propeller designation system
    a. McCauley designation system
    b. Sensenich designation system
    c. Hartzell designation system

i. Propeller installations
1. Flanged shaft installation
    a. Preparation for installation
    b. Installation
    c. Removal
2. Tapered shaft installation
    a. Pre-installation checks
    b. Installation
    c. Removal
3. Splined shaft installations
    a. Pre-installation checks
    b. Trial installation
    c. Installation
    d. Tracking the propeller
    e. Safetying the propeller

j. Feathering propeller systems
1. Overview
2. McCauley feathering system
    a. Propellers
    b. Governors
    c. Accumulator
    d. System operation
    e. System maintenance
3. Hartzell feathering system
    a. Propellers
    b. Governors
    c. System operation
    d. System maintenance

4. Hamilton-Standard Hydromatic system
    a. Propellers
    b. Governors
    c. Feathering system components
    d. System operation
    e. System maintenance

2. Reversing propeller systems
    a. Overview
    b. Hartzell reversing propeller system used on the Garrett Airesearch TPE-331 engine
        1. Overview
        2. Propellers
        3. System operation
        4. Installation and adjustments
        5. System maintenance
    c. Hartzell reversing propeller system on the P&W of Canada PT6 engine
        1. Overview
        2. Propeller
        3. Governor
        4. System components
        5. Cockpit controls
        6. System operation
        7. System installation and maintenance

3. Propeller auxiliary systems
    a. Propeller synchronizing systems
    b. Synchrophasing system
    c. Automatic feathering system
        1. Overview
        2. System components
        3. System operation
        4. System maintenance

4. Summary
    a. Propeller requirements (FAR's)
    b. Propeller requirements for aircraft certification
        1. Static RPM
        2. Cockpit controls and instruments
        3. Minimum terrain and structural clearances
        4. Feathering system requirements
    c. Propeller maintenance regulations
        1. Authorized maintenance personnel
        2. Preventive maintenance
            a. Major alterations and repairs
            b. Annual and 100 hour inspections

SUMMARY:

Summarize all major points covered

HOMEWORK ASSIGNMENT:

At instructor's discretion

Nashua Community College

Aviation Technology

Engine Electrical Systems
AVTN212

Lecture hours 32 hours

Lab hours 96 hours

Total hours 128 hours

OBJECTIVES:

The objective ofthis lesson is to familiarize the students with the function and components of ignition systems, and the principles of generators, alternators, and starters.

PERFORMANCE:

Students should understand the function of the ignition systems, be able to recognize ignition system components, and have a working knowledge of the overhaul and maintenance of the ignition system components. The students should also understand the basic operating principles of generators, alternators, and starters. The students should be able to disassemble and identify all parts and reassemble generators, alternators, and starters.

REFERENCES:

AC 65-12A
EA-ITP-P
EA-FAR-MO
AC 43.13-lA
AC 43.13-2A

INSTRUCTIONAL AIDS:

Whiteboard
Overhead projector
AudioNisual aids as applicable

STUDENT PREPARATION:

Reading assignments

HANDOUT MATERIAL:

Pertinent information as provided by the instructor

METHODS OF TEACHING:

1. Lecture
2. Demonstrations
3. Laboratory experience (projects, practice)
4. Class discussion
5. Homework assignments

METHODS OF EVALUATION:

1. Exams 25%
2. Quizzes 25%
2. Lab projects 25%
3. Final exam 25%

INTRODUCTION:

1. Introduce the lesson
2. Explain the importance of the lesson
3. State the objective ofthis lesson

PRESENTATION:

1. DC generators and controls
   - a. Generator theory
     1. Left-hand rule
   - b. Construction of a generator
     1. Field poles
     2. Field coil
     3. Commutator
     4. Brushes
        - a. Neutral plane
     5. Field frame
   - c. ShunHype generator
   - d. Operation of the generator
   - e. Voltage-control systems
     1. Vibrator-type regulator
     2. Three-unit regulator
        - a. Reverse-current relay
        - b. Current regulator
        - c. Voltage regulator
     3. Carbon-pile voltage regulator
     4. Electronic voltage controls
        - a. Transistor voltage regulators
     5. Differential reverse-current relay
        - a. Pilot points
2. Maintenances and adjustment of generator-control units
3. Polarizing the generator field (flashing the field)
4. Generator troubleshooting
5. Generator troubleshooting
6. Alternators
   - a. Types of alternators
     1. Single-phase alternator
     2. Two-phase alternator
     3. Three-phase alternator
     4. Altemator-rectifier unit
     5. Brushless alternator
   - b. Alternator frequency
   - c. Alternator rating
   - d. Voltage refulation of altemators
     1. Alternator transistorized regulators
     2. Magnetic amplifier regulator
   - e. Alternator constant-speed drive
     1. Hydraulic transmission (CSD)
   - f. Synchronizing alternators
   - g. Alternator protective circuits
   - h. Alternator maintenance

i. Alternator troubleshooting
J. Combined AC and DC electrical systems
1. Inverters
a. Rotary inverters
b. Permanent magnet rotary inverter
c. Inductor-type rotary inverter
d. Static inverters

7. Aircraft starters
a. Starters for reciprocating engines
1. Direct-cranking starters
a. Direct hand-cranking starters
b. Direct-cranking electric starter
2. Inertia starters
a. Hand inertia starter
b. Combination hand and electric inertia starter
c. Electric motors for inertia starters
3. Direct-cranking starters for light aircraft engines
a. Starter motor
b. Overrunning clutch
c. Complete starter assembly
d. Starter assembly with 90 degree adapter drive
e. Starter with Bendix drive
4. Starters for medium and large aircraft engines
a. Bendix type 756 starter
5. Electric circuits for starting systems
a. System for electric inertia starter
b. Starter circuit for a light twin aircraft
6. Typical starting procedure for large engines
a. Procedure
7. Troubleshooting and maintenance
a. Failure of starter motor to operate
1. Electrical power source
2. Starter-control switch
3. ..Starter solenoid
4. Electric wiring
5. Starter motor
b. Failure of starter to engage

8. Starters for gas turbines
a. Low-pressure air-turbine starter
1. Rotating assembly
2. Heat barrier
3. Oil seal
4. Oil-seal assembly
5. Bearing carrier
6. Reduction-gear assembly
a. Gear carrier
b. Gear carrier assembly
c. Spur-gear-shaft assemblies
7. Engagement mechanism
8. Operation of the low-pressure air-turbine starter

a. Ground-start selector switch
b. Starter low-pressure air shutoff valve

b. High-pressure air-turbine starters
c. Combustion starters
1. Fuel-air combustion starter
2. Cartridge-type starter (shot gun starter)
d. Inspection and maintenance of turbine engine starters
e. Starting system for large turbofan engines
1. Control and indicating system
a. Engine start switch
b. Starter shutoff valve
c. RPM indicator speed switch
d. Position indicating switch
e. Running engagements
2. Operation

9. Principles of ignition (reciprocating engines)
a. Ignition event in the four-stroke cycle
b. Essential parts of an ignition system
c. Battery ignition system
d. Magneto ignition system
1. The magnetic circuit
a. Rotating permanent magnets
b. Pole pieces and pole shoe extensions
c. Stationary permanent magnets
d. Soft iron core
2. Primary circuit
a. Breaker points and ignition switch
b. Condenser
c. Primary coil
3. Secondary circuit
a. Secondary coil
b. Distributor
c. Ignition harness
d. Spark plugs
e. Safety gap
e. Principles of the rotating-type of magneto
1. Current induced in a coil
2. Lenz's law
3. Left-hand rule
f. Elements of magneto operation
1. Full register position
2. Neutral position
3. E-gap
g. Construction characteristics of magnetos
h. Magneto speed
1. $\frac{\text{No. of cylinders}}{\text{2 X no. of poles}} = \frac{\text{Magneto shaft speed}}{\text{Engine crankshaft speed}}$
i. High-tension ignition system
1. Distributor
a. Distributor rotor

2. Magneto sparking order
3. Corning-in speed of the magneto
4. Harness assembly
5. Ignition switch and the primary circuit
6. Magneto safety gap

10. Types of magnetos
    a. Low-tension
    b. High-tension
    c. Rotating-magnet
    d. Inductor-rotor
    e. Single-type magnetos
    f. Double-type magnetos
    g. Base mounted
    h. Flange mounted
    i. Symbols used to describe magnetos

1. Order of Designation	Symbol	Meaning
(1)	S	Single type
	D	Double type
(2)	B	Base mounted
	F	Flange mounted
(3) 4,6,7,9,etc		Number of dist electrodes
(4)	R	Clockwise rotation
	L	Counterclockwise rotation
(5)	G	General Electric
	N	Bendix
	A	Delco
	U	Bosch
	C	Delco Remy (Bosch design)
	D	Edison-Splitdorf

J. Ignition boosters
    1. Booster coil
    2. Induction vibrator
    3. Impulse coupling
    4. High-tension retard breaker vibrator
    5. Low-tension retard breaker vibrator

11. Bendix high-tension magnetos for light aircraft engines
    a. S-20 magnetos
    b. S-200 magnetos
    c. S-1200 magnetos
    d. D-2000 magnetos
    e. D-3000 magnetos

12. General description
    a. The magneto
    b. Ignition booster used
    c. System operation
    d. Magneto timing
        1. Internal
        2. Magneto to engine

3. With cast-in timing marks and without
e. Installation of magnetos to the engine
f. The timing light and "P"-lead

13. Slick magnetos for light aircraft engines
a. 4200 magnetos
b. 6200 magnetos
c. General description
1. The magneto
2. The impulse coupling
3. Timing the magneto
a. Internal timing
b. Magneto to engine
4. Installation on the engine

14. Low-tension system for light aircraft engines
a. Reason for a low-tension ignition system
1. Flashover
2. Moisture
3. High-voltage corona
4. Capacitance
b. Operation of the low-tension ignition system
c. The transformer coil
d. S-600 series magneto
1. General description of the system
2. The magneto
3. Harness assembly
4. Transformer coils
5. Spark plug leads
6. Timing the magneto
7. Adjusting retard breakers
8. Timing magnetos with timing marks in the breaker compartments
9. Installation
10. S-600 maintenance

15. Low-tension ignition systems for large aircraft engines
a. General description
b. DLN-10 magnetos
c. Harness and primary leads
d. Distributor assemblies
e. Transformer coils and high-tension leads
f. Magneto operation
g. Harness and distributors
h. Distribution of the magneto output

16. The compensated cam
a. Reason for compensated cam
b. Design of the compensated cam

17. Breaker points
a. Breaker point inspection
1. Oiler pad
a. Proper cam follower oiling
2. Spreading of the points

a. Never spread more than 1/16" (0.0625")
3. Float or bounce4
4. Breaker point wear
a. Frosting
b. Pitting
c. Crowned
d. Built-up
e. Oily

18. Dressing breaker points
a. Manufacturer'srecommended procedure
b. Using the contact point dressing stone
c. Checking breaker contact area

19. Ignition harness maintenance
a. Types
1. Old type
2. New type
b. High-tension ignition harness faults
1. Harness testing
a. Testing high-tension ignition harness
1. Types of testers
b. DC insulation tester

20. Engine analyzer

21. Spark plugs
a. Function of the spark plug
b. Constrnction of the spark plug
1. Ceramic insulator
2. Metal shell
3. Terminal contact
4. Cement
5. Spring
6. Resistor
7. Glass seal
8. Copper sleeve
9. Copper-cored electrode
c. Unshielded spark plugs
d. Shielded spark plugs
e. Resistor type plugs
f. Massive electrode type
1. Two prong
2. Three prong
3. Four prong
g. Platinum fine wire
h. Spark plug heat range
1. Hot
2. Normal
3. Cold
4. Preignition
5. Detonation
6. Fouling of spark plugs
a. Carbon fouling

b. Lead fouling
c. Graphite fouling
d. Copper nmout
e. Gap erosion

i. Spark plug servicing
1. Removal
2. Preliminary inspections
a. One plug with broken ceramic tip
b. Two plugs form same cylinder with broken ceramic tip
3. Degreasing
4. Drying
5. Cleaning
6. Regapping
7. Final inspection
8. Testing
9. Installation
a. Always use a new gasket
b. Never install a plug that has been dropped

22. Turbine engine ignition systems
a. Requirements for turbine engine ignition systems
b. Special handling
c. Joule ratings
1. $J=WxT$
J = Joule rating
W = Watt expended
T = Time for spark to jump gap
d. Types of ignition systems
1. Low voltage DC input system
a. Sequence of events
2. High voltage AC input system
a. High capacitor discharge
b. Sequence of events
3. AC vs. DC
4. Igniter plug types
a. High voltage air surface gap
b. High voltage surface gap
c. High voltage recessed surface gap
d. Low voltage surface gap
e. Low voltage glow coil
5. Cleaning and inspection of igniter plugs
a. High voltage igniter plugs
b. Low voltage igniter plugs
e. Troubleshooting ignition systems
f. Removal, maintenance, and installation of ignition system components
1. Ignition system leads
2. Igniter plugs

SUMMARY:

Summarize all major points covered

HOMEWORK ASSIGNMENT:

At instructors discretion

Nashua Community College

Aviation Technology

Carburetion & Fuel Systems
AVTN211

Lecture hours 32 hours

Lab hours 48 hours

Total hours 80 hours

OBJECTIVES:

The object of this lesson is the introduction and understanding of the fuel metering systems and components. The student is to be able to recognize the parts of a fuel metering system and the overhaul and service of the fuel metering system.

PERFORMANCE:

Students should become familiar with the theory of energy transformation, engine performance charts, basic fuel metering, float carburetors, pressure carburetors, and fuel injection system service and maintenance.

REFERENCES:

AC 65-12A
EA-ITP-P
EA-FAR-MIA
AC 43.13-lA
EA-FMS

INSTRUCTIONAL AIDS:

Whiteboard
Overhead projector
Audio/Visual aids as applicable

STUDENT PREPARATION:

Reading assignments

HANDOUT MATERIAL:

Pertinent information as provided by the instructor

METHODS OF TEACHING:

1. Lecture
2. Demonstrations
3. Laboratory experience (projects, practice)
4. Class discussion
5. Homework assignments

METHODS OF EVALUATION:

1.	Exams	25%
2.	Quizzes	25%
2.	Lab projects	25%
3.	Final exam	25%

INTRODUCTION:

1. Explain the importance of the lesson
2. .State the objective of this lesson
3. State reference areas to be covered

PRESENTATION:

1. Theory of energy transformation
   - a. Source of energy
   - b. Release of energy
   - c. Mixture requirements for efficient transformation
   - d. Thermal efficiency
   - e. Brake Specific Fuel Consumption
   - f. Production of power
   - g. Factors affecting manifold pressure
     1. Density altitude
     2. Humidity
     3. Carburetor air temperature
     4. Exhaust back pressure
     5. Supercharging
     6. Compression ratio
     7. Detonation
     8. Pre-ignition
     9. Fuel-air mixture ratio
     10. Ignition timing
2. Engine performance charts
   - a. Sea level performance
   - b. Altitude performance
   - c. Full throttle vs. propeller load
3. Basic fuel metering
   - a. Requirements for fuel metering
   - b. Development of fuel metering systems
     1. Primitive systems
     2. Interim systems
     3. Complex systems
   - c. Systems of a typical aircraft float-type carburetor
     1. Main metering system
     2. Mixture control system
     3. Idle system
     4. Acceleration system
     5. Power enrichment system
4. Float carburetor service and maintenance
   - a. Inspection
     1. Pre-flight
     2. 100 hour inspection
   - b. Overhaul
     1. Disassembly
     2. Cleaning
     3. Inspection
     4. Parts replacement

5. Reassembly

c. Installation
   1. Mounting
   2. Adjustment

d. Servicing
   1. Troubleshooting
   2. Level one
   3. Level two
   4. Level three

5. Pressure carburetors

a. Characteristics of pressure carburetors
   1. Air metering force
   2. Fuel metering force
   3. Mixture control system
   4. Idle system
   5. Acceleration system
   6. Power enrichment system

b. Pressure carburetor installation, service, and maintenance
   1. Installation
   2. Operation
   3. Idle adjustment
   4. Enrichment valve adjustment
   5. Metered fuel pressure adjustment

6. Bendix fuel injection systems

a. Bendix RS injection system
   1. Air metering force
   2. Servo fuel flow
   3. Metered fuel flow
   4. Idle system
   5. Power enrichment system
   6. Flow control valve
   7. Flow divider
   8. Injector nozzles
   9. Automatic mixture control
   10. Fuel flowmeter

b. Bendix RSA fuel injection systems
   1. Air metering force
   2. Fuel metering force
   3. Metered fuel flow
   4. Flow divider
   5. Injection nozzles
   6. Idle system
   7. Manual mixture control
   8. Automatic mixture control
   9. Installation and service
   10. Starting procedure
   11 Idle speed and mixture adjustment

7. Teledyne Continental fuel injection system
   a. Components

1. Injection pump
2. Fuel control unit
3. Fuel manifold valve
4. Injector lines
5. Injector nozzles

b. Operation
1. Starting
2. Inspection
3. Adjustments
4. Flow matching
5. Rough operation
6. Flow meter fluctuation

8. Turbine engine fuel metering system components
a. Fuel controls
1. Fuel control schematic (EA-FMS)
a. Mechanical section
2. Fuel metering section
3. Bendix DP-12 fuel control unit
a. Fuel flow sequence
1. Component functions
4. Electro-hydromechanical fuel controls
a. Example system (Rolls-Royce RB-211)
b. Example system (Garrett-AiResearch GTP-30)
5. Auxiliary power unit fuel control
6. Hydromechanical fuel control adjustments
a. Specific gravity adjustment
b. Trimming adjustments
c. Trimming speed-rated engines
d. Trimming EPR rated engines
e. Engine pressure ratio (EPR)
f. Part-power trim
g. Trim danger zone
h. Noise protection
i. Flat rating

b. Water injection
1. Water injection fluid
2. Water injection system

c. FAA engine power ratings

d. Fuel system components
1. Main fuel pump
2. Fuel heater
3. Fuel filters
a. Micron rating versus mesh size
4. Fuel nozzles (atomizing type)
5. Fuel nozzles (vaporizing type)
6. Fuel pressurization and dump valve
a. Dump valve
b. Combustor drain valves
7. Example fuel system (Pratt & Whitney JT-12)

SUMMARY:

Summarize all major points covered

HOMEWORK ASSIGNMENT:

At instructor's discretion

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AU Powerphmt cu.rricu.B.u.m lab projects a.re on me in the Aviation Technology department office

Facility pictures deleted from this ma:m.ml

Nashua Community College

Aviation Technology

Facilities Description

Lecture Room #1
Room 93
Consists of 551 square feet with 11 lecture tables each seating 2-3 people. The forward wall consists of a 20' whiteboard, an overhead projector and a metal storage cabinet.

Lecture Room #2
Room89D
Consist of 555 square feet with 12 tables each seating 2-3 people. The forward wall consist of a 12' whiteboard, and overhead projector and a lecture table.

System Lab
Room89C
Consists of 437 square feet with 5 benches and the following portable mockups; fuel systems, air conditioning/heating, hydraulic, fire detection and extinguishing system, fuel training system, cabin pressurization and ice and rain protection system.

Turbine **Lab**
Room 89C
Consists of 675 square feet with 6 benches, turbine engines, turbine engine mock up, propellers and storage cabinets.

Sheet Metal Lab
Room 94
Sheet metal area consists of 964 square feet, five maple work benches, four of which have work stations with vises and air. One of the benches has 2 stake plate adapters and air. Storage rack for aluminum sheet stock, tubing and flat stock, Two steel cabinets for storage, and two composite .work stations. Battery service room is located in the sheet metal lab.

Engine Lab
Room 89D
Consists of 645 square feet with storage shelves, seven benches and two wood storage cabinets.

Aircraft Lab
Room 89A
Consists of 1,908 square feet with various work benches and steel cabinets located around the perimeter. This area also contains the following equipment: Micro fiche and readers, 2 approved paint storage cabinet, 2 metal storage cabinets, 4 storage shelves, 3 aircraft, helicopter, and aircraft jacks.

Pages 457-470 Intentionally Left Blank

A list of approved instructors and their resumes are on file in the Aviation Technology office.

Course Number AVTN208	Lecture/Lab Date
Name	**Signature**
Acosta, Jose	
Beauchamp, Robert	
Cloutier, Justin	
Deyoe, Jeffrey	
Evans, Jeffrey	
Kelly-Linnebur, Stephen	
Landry, Kevin	
Pelletier, Cory	
Sheldon, Brett	
NOTE: MISSING SIGNATURE= ABSENCE!	

December 28, 2007

New Hampshire Community Technical College

Aviation Technology

Certificate of Completion

Airframe & General & Powerplant Sections

we the undersigned certify that

SAMPLE

has successfully completed all training requirements as prescribed in U.S. Department of Transportation-Federal Aviation Administration CFR-147

Donald H Vallerand, Program Director

AMTS Certificate No. NSUT025K

Lucille A. Jordan, College President

Appendix A4-A7 Intentionally Left Blank

Nashua Community College

Aviation Technology

A list of instructional aids, mock.ups, aircraft, shop equipment, special tools, and required student hand tools is on file in the Aviation Technology office

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REVISIONS

LIST OF EFFECTIVE PAGES

Title 14: Aeronautics and Space
PART 147—AVIATION MAINTENANCE TECHNICIAN SCHOOLS

APPENDIX A TO PART 147—CURRICULUM REQUIREMENTS

This appendix defines terms used in appendices B, C, and D of this part, and describes the levels of proficiency at which items under each subject in each curriculum must be taught, as outlined in appendices B, C, and D.

(a) *Definitions.* As used in appendices B, C, and D:

(1) *Inspect* means to examine by sight and touch.

(2) *Check* means to verify proper operation.

(3) *Troubleshoot* means to analyze and identify malfunctions.

(4) *Service* means to perform functions that assure continued operation.

(5) *Repair* means to correct a defective condition. Repair of an airframe or powerplant system includes component replacement and adjustment, but not component repair.

(6) *Overhaul* means to disassemble, inspect, repair as necessary, and check.

(b) *Teaching levels.* (1) Level 1 requires:

(i) Knowledge of general principles, but no practical application.

(ii) No development of manipulative skill.

(iii) Instruction by lecture, demonstration, and discussion.

(2) Level 2 requires:

(i) Knowledge of general principles, and limited practical application.

(ii) Development of sufficient manipulative skill to perform basic operations.

(iii) Instruction by lecture, demonstration, discussion, and limited practical application.

(3) Level 3 requires:

(i) Knowledge of general principles, and performance of a high degree of practical application.

(ii) Development of sufficient manipulative skills to simulate return to service.

(iii) Instruction by lecture, demonstration, discussion, and a high degree of practical application.

(c) *Teaching materials and equipment.* The curriculum may be presented utilizing currently accepted educational materials and equipment, including, but not limited to: calculators, computers, and audio-visual equipment.

[Amdt. 147-2, 35 FR 5534, Apr. 3, 1970, as amended by Amdt. 147-5, 57 FR 28960, June 29, 1992]

General Subjects		Course #	Teaching Level	Required Project
I.	**Powerplant Theory & Maintenance**			
A.	RECIPROCATING ENGINES			
1.	Inspect & repair a radial engine	AVTN206	1	------
2.	Overhaul reciprocating engine	AVTN206	2	RE-1
3.	Inspect, check, service, & repair Reciprocating engines & engine installations	AVTN207	3	RE-2, 3, 4, 5 6, 7
4.	Install, troubleshoot, & remove reciprocating engines	AVTN207	3	RE-8, 9, 10, 11, 12
B.	TURBINE ENGINES			
5.	Overhaul turbine engine	AVTN210	2	TE-1
6.	Inspect, check, service, & repair turbine engine& turbine engine installations	AVTN210	3	TE-1
7.	Install, troubleshoot, & remove turbine engines	AVTN210	3	TE-2
C.	ENGINE INSPECTION			
8.	Perform powerplant conformity & airworthiness inspection	AVTN206	3	RE-13
II.	**Powerplant Systems & Components**			
A.	ENGINE INSTRUMENT SYSTEMS			
9.	Troubleshoot, service, & repair electrical & mechanical fluid rate-of-flow indicating systems	AVTN208	2	ES-1
10.	Inspect, check, service, troubleshoot, & repair electrical & mechanical engine temperature, pressure, & r.p.m. indicating systems	AVTN208	3	ES-1
B.	ENGINE FIE PROTECTION SYSTEMS			
11.	Inspect, check, service, troubleshoot, & repair engine fire detection & extinguishing systems	AVTN208	3	ES-3

General Subjects		Course #	Teaching Level	Required Project
C.	ENGINE ELECTRICAL SYSTEMS			
12.	Repair engine electrical system components	AVTN212	2	EE-1
13.	Install, check, & service engine electrical wiring, controls, switches, indicators, & protective devices	AVTN212	3	EE-2
D.	LUBRICATION SYSTEMS			
14.	Identify & select lubricants	AVTN208	2	ES-12
15.	Repair engine lubrication system components	AVTN208	2	ES-13
16.	Inspect, check, service, troubleshoot, & repair engine lubrication systems	AVTN208	2	ES-4, 5, 6
E.	IGNITION & STARTING SYSTEMS			
17.	Overhaul magneto & ignition harness	AVTN212	2	EE-3
18.	Inspect, service, troubleshoot, & repair reciprocating & turbine engine ignition systems & components	AVTN212	2	EE-4
19.	a. Inspect, service, troubleshoot & repair turbine engine electrical starting systems	AVTN212	3	EE-4
	b. Inspect, service, & troubleshoot turbine engine pneumatic starting system	AVTN210	1	-----
F.	FUEL METERING SYSTEMS			
20.	Troubleshoot & adjust turbine engine fuel metering systems & electronic engine fuel controls	AVTN211	1	------
21.	Overhaul carburetor	AVTN211	2	EF-1
22.	Repair engine fuel metering system components	AVTN211	2	EF2
23.	Inspect, check, service, troubleshoot, & repair reciprocating & turbine engine fuel metering system	AVTN211	3	EF-4

General Subjects		Course #	Teaching Level	Required Project
G.	ENGINE FUEL SYSTEMS			
24.	Repair engine fuel system components	AVTN211	2	EF-4
25.	Inspect, check, service, troubleshoot, & repair engine fuel systems	AVTN211	3	EF-5
H.	INDUCTION & ENGINE AIRFLOW SYSTEMS			
26.	Inspect, check, troubleshoot, service, & repair engine ice & rain control systems.	AVTN208	2	ES-8
27.	Inspect, check, service, troubleshoot & repair heat exchanges, superchargers, & turbine engine airflow & temperature control systems	AVTN208	1	------
28.	Inspect, check, service, & repair carburetor air intake & induction manifolds	AVTN208	3	ES-9
I.	ENGINE COOLING SYSTEMS			
29.	Repair engine cooling system components	AVTN208	2	ES-10
30.	Inspect, check, troubleshoot, service & repair engine cooling systems	AVTN208	3	ES-7
J.	ENGINE EXHAUST & REVERSER SYSTEMS			
31.	Repair engine exhaust system components	AVTN208	2	ES-11
32	a. Inspect, check, troubleshoot, service, & repair engine exhaust systems	AVTN208	3	ES-8
	b. Troubleshoot & repair engine thrust reverser systems & related components	AVTN208	1	------
K.	PROPELLERS			
33.	Inspect, check, service, and repair propeller synchronizing & ice control system	AVTN209	1	------
34.	Identify & select propeller lubricants	AVTN209	2	PS-1
35.	Balance propellers	AVTN209	1	------

General Subjects		Course #	Teaching Level	Required Project
36.	Repair propeller control system components	AVTN209	2	PS-2
37.	Inspect, check, service, & repair fixed pitch constant-speed, & feathering propellers, & propeller governing systems	AVTN209	3	PS-3
38.	Install, troubleshoot, & remove propellers	AVTN209	3	PS-4
39.	Repair aluminum alloy propeller blades	AVTN209	3	PS-5
L.	UNDUCTED FANS			
40.	Inspect & troubleshoot unducted fan systems & components	AVTN210	1	------
M.	AUXILIARY POWER PLANTS			
41.	Inspect, check, service & troubleshoot turbine-driven auxiliary power units	AVTN210	1	-----

LETTERS

U.S. Department
of Transportation
**Federal Aviation
Administration**

Aviation Safety

Portland Flight Standards District Office
82 Running Hill Road
Suite 300
South Portland, ME 04106

207-541-7700
Fax: 207-541-7749

December 16, 2019

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Nashua Community College
Mr. Patrick Geoffroy
505 Amherst Street
Nashua, New Hampshire 03063

Dear Mr. Geoffroy,

Enclosed. Please find your *Operations Specifications,* which are part of your Title 14 Code of Federal Regulations (14 CFR) Part 147 Certificate. Upon our annual review, we found that we are missing a signed copy of A012. Please ensure the signature and title of an authorized officer of the company is entered at the end of each paragraph.

The following paragraph(s) have been revised:

A012: Affiliated Designated Mechanic Examiners

Please ensure both copies of the paragraph are signed. Keep one copy of the paragraph, and return one copy in the enclosed envelope.

If you have any questions or require further assistance, please contact me at (207) 541-7727, or by email at William.j.moore@faa.gov. Our office hours are Monday through Friday, 7:30 a.m. to 4:00 p.m.

Sincerely,

William J Moore Digitally signed by William J Moore
Date: 2019.12.16 09:29:40 -05'00'

William J. Moore
Principal Maintenance Inspector

Enclosures

U.S. Department
of Transportation
**Federal Aviation
Administration**

Portland Flight Standards District Office
412 Yellowbird Road
Portland, ME 04102-1999

207-780-3263
Fax: 207-780-3296

November 14, 2017

Patrick Geoffroy - Program Coordinator
Aviation Technology
Nashua Community College
Nashua, NH 03063

Dear Mr. Geoffroy,

This office has reviewed your Operations Specifications and Air Agency Certificate, as requested. We have made the name change in the Operations Specifications, and changed the zip code on the Air Agency Certificate. The Operations Specifications were digitally signed by Aviation Safety Inspector (ASI) Mark A. Auclair on October 31, 2017. Robert H. Reckert, our Office Manager, signed the Air Agency Certificate. A copy of the Operations Specifications was hand delivered to the Nashua Community College Aviation Department, along with the corrected Air Agency Certificate. A copy of both of these items has been placed in the Flight Standards District Office (FSDO) files.

If you have any questions or require further assistance, please contact me at (207)780-3263 Extension: 132 or by email at fred.king@faa.gov. Our office hours are Monday through Friday, 7:30 a.m. to 4:00 p.m.

Sincerely,

Maurice F. King
Aviation Safety Inspector

In our continuing effort to improve the quality of service to our stakeholders, Flight Standards Service (AFS) would appreciate any comments you may have on our services and how to improve them. Your participation in meeting our goals for continuous improvement is greatly appreciated. Please visit the following website:

http://www.faa.gov/about/office_org/headquarters_offices/avs/offices/afs/qms

April 28, 2015

Mr. Fred King
Portland Flight Standards District Office
412 Yellowbird Road
Portland, ME 04102-3296

Dear Mr. King,

In response to your letter dated February 18, 2015 regarding the welding portion of Structures II AVTN 103, please find enclosed a floor plan for the new welding area. This area is in addition to the existing floor plan currently in use.
The new area is equipped with 6 separate work stations each with Oxy Acetylene gas torches as well as MIG and TIG welders. Each station has a fume extractor as well.
I have added this floor plan to our curriculum manual, Part 8, page 456.
Should you have any questions regarding this subject matter, please do not hesitate to contact me directly.

Sincerely,

Bob Donadio
Aviation Technology Department
(603) 578-6871

U.S. Department
of Transportation
**Federal Aviation
Administration**

Portland Flight Standards District
Office
412 Yellowbird Road
Portland, ME 04102-1999

207-780-3263
Fax: 207-780-3296

March 18, 2014

Donald H. Valerland
Program Director
Nashua Community College
505 Amherst Street
Nashua, New Hampshire 03063

Dear Mr. Valerland,

This letter is a follow-up to the letter sent April 16, 2013, to Nashua Community College Aviation Department, which addressed concerns on moving the Aviation Maintenance Technician School (AMTS) welding portion of "Structures II" class from Manchester Community College, Manchester, New Hampshire, to the new Automotive Department's welding facility, Nashua Community College, Nashua, New Hampshire, to be used in conjunction with the Aviation Department. The re-inspection of the Colleges Automotive Department welding facility, in Accordance with Title 14 of the Code of Federal Regulations (14 CFR) 147.41 and 147.43 on March 12, 2014, was satisfactory.

Should you have any questions, please feel free to contact me at (207) 780-3263 ext. 132 or e-mail fred.king@faa.gov.

Sincerely,

Fred King
Aviation Safety Inspector

COVID-19

FAA
Aviation Safety

Memorandum

Date: April 1, 2020

To: All Flight Standards District Offices

From: Jackie L. Black, Aviation Safety, Manager, Aircraft Maintenance Division

JACKIE L BLACK JR Digitally signed by JACKIE L BLACK JR Date: 2020.04 13:51:20 -05'

Subject: **Revised:** Special Guidance for part 147 AMTS Regarding Training Interruptions Related to Coronavirus (COVID-19) and Applicable Deviations to Order 8900.1.

M330-8000.1-G-2003-0718

This memorandum supersedes memorandum M350-8000.1-G-2003-0716 dated 3/12/2020.

Summary of Revision:

- Removed limitations for enrolling new students.
- Added information regarding sharing memo with AMTS.
- Added note regarding returning students to standard procedures following termination of this deviations.
- Added Avionics PTRS tracking codes.
- Added clarifying sentence regarding missed time.
- Added note regarding maximum allowable hours of absence.
- Added paragraph stating the memo will remain in effect until terminated.

The Novel Coronavirus (COVID-19) outbreak has been declared a Public Health Emergency of International Concern (PHEIC) by the World Health Organization (WHO). The impact of this virus has caused multiple states and cities within the US to take action by reducing or limiting public gatherings which includes the closure of schools in some locations. These closures may impact student learning and schedules of some part 147 Aviation Maintenance Technician Schools (AMTS). The actions taken have caused concerns among Flight Standards District Offices (FSDO) with oversight responsibilities of AMTS requesting flexibility to minimize interruptions to student learning. The Aircraft Maintenance Division has reviewed these concerns and provides the following guidance to assist the AMTS community.

The guidance is temporary in nature and should not be applied as standard procedure. The standard procedures are located in FAA Order 8900.1, Volume 2, Chapter 12, and Volume 6 Chapter 10. Flight Standards offices with AMTS oversight responsibilities may use this guidance to authorize options or flexibility for AMTS curriculum delivery and student attendance within the current requirements of part 147. FAA offices or inspectors should discuss these options with the affected AMTS and provide the appropriate support based on the option selected by the schools. This deviation provides guidance to FAA offices/inspectors, however, it may be shared with an AMTS as a part of the discussions to determine a viable course of action in response to the COVID-19 outbreak.

The FAA recognizes that no one solution will fit every situation or school's capabilities. FAA inspectors should not require a school to choose any specific option. It's the AMTS responsibility to determine its appropriate course of action. The AMTS must remain in compliance with the requirements of part 147. Below are recommended options to assist FAA inspectors and AMTS with determining an appropriate path forward. FSDOs or AMTS experiencing circumstances where this guidance may not be applicable should contact the General Aviation Branch.

Recommended Options

1. Expansion of a currently approved Distance Learning program.
2. Authorize initial use of a temporary Distance Learning program.
3. Temporary Revision of a school's allowable hours of absence.
4. Suspend AMTS operations for a period of time.
5. Other short term deviations to Order 8900.1.
6. Exemptions to 14 CFR part 147.

NOTE: AMTS that implement procedures using deviations in this memo should develop a process to return all affected students to the AMTS standard curriculum or program, within 30 days after the termination of this deviation.

1. **Expansion of a currently approved Distance Learning program.**
   AMTS currently authorized to conduct distance learning have been issued OpSpec A026, Authorizations/ Limitations. The OpSpec lists each eligible curriculum subject/topic areas, the teaching level, and any provisions, conditions, or limitations related to each area.
   a. Responsible Flight Standards offices should be prepared to add learning areas to the OpSpec A026 when those areas meet the AMTSs FAA-approved Distance Learning Program requirements, based on an AMTS request.
   b. However, schools may request that certain subject/topics be authorized for distance learning using an alternate method from what is currently described in its approved Distance Learning Program.
   c. The school may also request an alternate examination and testing procedure, when it can show that it will be using an established testing system such as one used by a college or university associated with the AMTS, or a testing procedure that otherwise ensures the integrity of the testing process. If needed, testing can be postponed until students can return to the classroom.

d. The following guidelines authorize a deviation from FAA Order 8900.1, Volume 2, Chapter 12, Section 1, paragraph 2-1417(C), Section 2, paragraph 2-1450, and Section 3, paragraph 2-1487(C):
    i. The AMTS must develop procedures describing how it will administer the alternate method of distance learning to include:
        1. A description of the how course content will be delivered and how instructors and students will communicate as needed (i.e. technology).
        2. Procedures for tracking student attendance under each subject/topic using the alternate method. The school must maintain a list of those students who were taught under the alternate method.
        3. If the AMTS requests alternate testing procedures, it must submit procedures describing the testing process.
    ii. The AMTS must establish a timeframe for alternate content delivery. The timeframe should align with program semester/defined end dates. Due to the uncertainty of the situation, extensions to the timeframe could be considered at a future date.

e. The responsible office will complete the following:
    i. Review the AMTS submission. If alternate testing procedures are submitted, they must ensure the integrity of testing.
    ii. List the added eligible subjects/topics on OpSpec A026. The following additional information must be listed in the "Provisions, Conditions and Limitations" block for each area:
        1. Reference to the AMTS procedures describing the alternate method of distance learning.
        2. The expiration date for teaching the content. Future extensions to the timeframe will require a revision to OpSpec A026.
    iii. Enter a PTRS record using activity code 3316/5316 with the following information. This information will be used by the Aircraft Maintenance Division to track deviations to current 8900.1 for which schools are authorized an alternate method of distance learning in addition to their current authorization.
        1. Enter "147" in the 14 CFR block.
        2. Enter the school's designator in the "Designator" block
        3. Enter *DLALTCV19* in the "National Use Block".
        4. Enter any other appropriate information in the comment field.

2. **Authorize initial use of a temporary Distance Learning Program.**
The FAA recognizes that approval to use a Distance Learning Program can be a time consuming process. This is to ensure that an AMTS using distance learning will provide students with an equivalent level of instruction as a traditional classroom.
    a. Schools may request to use a <u>temporary</u> distance learning program and be authorized distance learning content via OpSpec A026. The responsible Flight Standards office should support requests to conduct appropriate instruction using the temporary distance learning program for a limited timeframe.

b. The school may also request a temporary examination and testing procedure, when it can show that it will be using an established testing system such as one used by a college or university associated with the AMTS, or a testing procedure that otherwise ensures the integrity of the testing process. If needed, testing can be postponed until students can return to the classroom.

c. The following guidelines authorize a deviation from FAA Order 8900.1, Volume 2, Chapter 12, Section 1, paragraph 2-1417(C), Section 2, paragraph 2-1450, and Section 3, paragraph 2-1487(C):

   i. The AMTS must develop procedures describing the following:
      1. How the distance learning program will be administered, to include:
         a. A description of the how course content will be delivered and how instructors and students will communicate as needed.
         b. If requested, temporary testing procedures describing the testing process.
   ii. Procedures to ensure distance learning course records are kept in compliance with the approved curriculum, to include:
      1. Procedures for tracking student attendance under each subject/topic. The school must maintain a list of those students who were taught under the temporary method.
   iii. A description of the technology to be utilized.
   iv. The AMTS must establish a timeframe for alternate content delivery. The timeframe should align with program semester/defined end dates. Due to the uncertainty of the situation, extensions to the timeframe could be considered at a future date.

d. The responsible office will complete the following:

   i. Review the AMTS temporary distance learning program to ensure it adequately describes how students will be taught course content. If temporary testing procedures are submitted, they must ensure the integrity of testing.
   ii. List the added eligible subjects/topics on OpSpec A026. The following additional information must be listed in the "Provisions, Conditions and Limitations" block for each area:
      1. Reference to the AMTS procedures describing the temporary distance learning program.
      2. The expiration date for teaching the content. Future extensions to the timeframe will require a revision to the OpSpec A026.
   iii. Enter a PTRS record using activity code 3316/5316 with the following information. This information will be used by the Aircraft Maintenance Division to track deviations to current 8900.1 for which schools are authorized a temporary method of distance learning using OpSpec A026.
      1. Enter "147" in the 14 CFR block.
      2. Enter the school's designator in the "Designator" block
      3. Enter *DLTMPCV19* in the "National Use Block".
      4. Enter any other appropriate information in the comment field.

e. Below are some examples of ways to implement a temporary distance learning program.

EXAMPLE 1: The AMTS could communicate to students through one of several types of technology, e.g. email, teleconference, video conference, instant messaging. Instructors should initiate substantive communication with their students, either individually or collectively, on a regular basis. In other words, an instructor could use email to provide instructional materials to students enrolled in his or her class, use chat features to communicate with students, set up conference calls to facilitate group conversations, engage in email exchanges or require students to submit work electronically that the instructor will evaluate.

EXAMPLE 2: An AMTS may work out an agreement with another AMTS for their students to receive instruction using another AMTS FAA-Approved distance learning platform and courses.

3. **Temporary Revision of a Schools Allowable Hours of Absence.**
14 CFR 147.31(e) requires an AMTS to use an approved system for determining final course grades and for recording student attendance. The system must show hours of absence allowed and show how the missed material will be made available to the students.

a. Students missing allowable hours of absence must be provided the missed material by the school. Students are not required to make up missed time, only missed material, except when the student has missed time beyond the approved allowable hours of absence defined by the school. Students missing more than the allowable hours of absence must make up missed-time beyond the defined allowable, or repeat the course, in order to meet curriculum requirements for issuance of a graduation certificate.

b. The following guidelines authorize a deviation from FAA Order 8900.1, Volume 2, Chapter 12, Section 2, paragraph 2-1449(G):

i. Schools may submit a temporary revision of their approved system, with respect to allowable hours of absence and procedures for how missed material will be made available to the students. Flight Standards offices are authorized to allow up to 80 hours of allowable absence.
Note: The deviation authorizes a total of 80 hours of allowable absence.

ii. The AMTS must submit written procedures for approval. The document need only address those areas that are different from its currently approved system. The document should include:
1. Defined allowable absence.
2. Procedures for making missed material available to the student.
3. Procedures for annotating the student record to show how the student was authorized the hours of absence based on this temporary approval. The school must maintain a list of those

students who used the temporary increase in allowable hours of absence.

4. A defined timeframe for using the temporary approval. The procedures must specify that the system is only to be used for absence associated with the COVID-19 outbreak.

   Note: The temporary approval for an increase in allowable absence does not authorize any other change to the school's curriculum or procedures, including testing requirements.

c. The responsible Flight Standards office will complete the following:

i. Review the AMTS system to ensure it adequately describes program requirements listed above.

ii. Approve the document by stamping or signing and dating. The inspector will provide a letter to the school stating the expiration date. Extension will require issuance of a new letter.

iii. Enter a PTRS record using activity code 3372/5372 with the following information. This information will be used by the Aircraft Maintenance Division to track deviations to current 8900.1 for which schools are authorized a temporary increase to their allowable hours of absence.

1. Enter "147" in the 14 CFR block.
2. Enter the school's designator in the "Designator" block.
3. Enter *ABSENCV19* in the "National Use Block".
4. Enter any other appropriate information in the comment field.

4. **Suspend AMTS operations for a period of time.**
AMTS may choose to suspend operations for a period of time depending on local authority's requirements. The AMTS should provide a written notification of the timeframe it expects for suspension. The AMTS should notify the responsible Flight Standards office of when it plans to resume operations. The school should submit its plan for suspension and resumption of operations to the responsible office for their awareness.

i. Enter a PTRS record using activity code 3250/5250 with the following information. This information will be used by the Aircraft Maintenance Division to track schools that suspend operations as a result of COVID-19.

1. Enter "147" in the 14 CFR block.
2. Enter the school's designator in the "Designator" block
3. Enter *SUSPCV19* in the "National Use Block".
4. Enter any other appropriate information in the comment field.

5. **Other short term deviations to Order 8900.1.**
Schools may submit alternate proposals to the responsible Flight Standards office to address learning under circumstances related to COVID-19. When proposals require deviation from FAA Order 8900.1 not discussed above, the responsible Flight Standards office should submit a request for a deviation to guidance to the Aircraft Maintenance Division, General Aviation Branch.

a. Requests can be sent via email to the correspondence inbox **9-AWA-AFS-300-Correspondence@faa.gov.**

b. The request must include the following information:
   i. The school name and certificate number for which the request for deviation applies.
   ii. The specific Volume, Chapter, Section and paragraph(s) for which deviation is being requested.
   iii. The alternate method being used to comply and the responsible flight Standards offices justification for agreeing to the alternate.
   iv. The quantity of students affected. The school must maintain a list of those students who were affected by the deviation.

c. The General Aviation Branch will review the request and, if in agreement, will issue a letter to the responsible office authorizing the deviation.

6. **Exemptions to 14 CFR part 147.**
An AMTS may request an exemption from applicable requirements under 14 CFR part 147. Exemptions requests must be submitted in accordance with the requirements under 14 CFR part 11. An AMTS should be advised that petitions for exemption may take substantially longer compared to deviations to FAA guidance, and the outcome may vary.

The deviation is effective until superseded or terminated. The Aircraft Maintenance Division will notify all responsible Flight Standards offices of revisions or the termination of this deviation.

We appreciate the opportunity to assist you. If you have any additional questions regarding this memorandum, please contact the Aircraft Maintenance Division, General Aviation Branch at (202) 267-1675.

04/10/2020

Mr. Bill Moore,

Mr. Mark Auclair

Proposal from the Aviation Technology Program Coordinator

Nashua Community College (NSUT025K)

Good day, as this Coronavirus crisis evolves, I am proposing the following modifications to our program to minimize interruptions to student learning. First, I request approval as a temporary distance learning program. Second, I request a temporary revision authorizing a total of 80 hours of allowable absence from the program. I developed this plan based on the guidelines provided by the FAA in its memorandum dated 4/1/2020.

Authorize initial use of a temporary Distance Learning Program

1. How will the distance learning program be administered? Additional details are below.

Due to the Coronavirus (COVID 19), the new Social Distancing Protocols, a Stay at Home order by the Governor of New Hampshire and the need to get our course information/materials to our students, I am proposing the use of a temporary distance learning program to move forward with our course work. FAA code ***(DLTMPCV19)***

a. A description of the how course content will be delivered and how instructors and students will communicate as needed.

Lectures will be conducted via weekly Zoom meetings and Canvas discussion forum, similar to Blackboard.

b. If requested, temporary testing procedures describing the testing process.

Testing will be accomplished as a timed, open-book test; the college will be using Zoom as a tool to proctor final exams.

2. What procedures will be employed to ensure distance learning course records are kept in compliance with the approved curriculum? Additional details are below.

All distance learning course records and curriculum material are tracked via Canvas

a. Procedures for tracking student attendance under each subject/topic. The school must maintain a list of those students who were taught under the temporary method.

Each student has to log into canvas to participate in Zoom lectures or take part in a discussion board posts and responses.

b. A description of the technology to be utilized.

As noted above, instructors will deliver lectures and other course content via Canvas – the college's online learning management system. In addition, instructors will use Zoom as a tool to provide synchronous learning experiences.

c. A description of the timeframe for alternate content delivery.

This period start date is March 27th and will run to May 4th 2020. I am proposing the use of this period, for our lectures. At this time, the plan is to return to campus after May 4th, 2020. I have modified our lab schedule to get our students the required time needed to complete the semester. Attached please find the modified lab schedules for both the Senior and Freshman classes. The senior students will need 108 hours and the freshman students will need 66 hours of labs to complete this semester. This semester's original end date is May 1st, 2020, that gives us two weeks to meet their requirements.

If we are unable to return to campus on May 4th, the plan for each class is described below.

Senior Class Plan

The plan is to extend the spring semester as necessary into the summer so seniors would be able to complete their graduation requirements.

Freshman Class Plan

Freshmen would complete their spring labs during the first eight weeks of the fall term. The summer term would be postponed until the second eight weeks of the fall term. The fall 2020 term would be moved to spring 2021 and students would complete their final term in summer 2021. Due to the unusual circumstances, students would still be able to walk at graduation in May 2021 prior to completing their coursework over the summer.

Suspension of Incoming Freshman Class for Fall 2020

To focus on the educational needs of our current students, I recommend suspending the admission of new students into the program for fall 2020.

Temporary Revision of a Schools Allowable Hours of Absence

In addition to online learning modifications, I am requesting a total of 80 hours of allowable absence from the program for the senior students as a result of the COVID-19 crisis. As required, additional details are below.

1. Defined allowable absence.

The senior class will be lacking 108 hours of labs, the 80 hours allowable absence, will relieve the senior students of the burden of fulfilling their remaining lab hours with little or no disruption to their lives, allowing them to graduate at the end of the summer session. The increase in allowable hours gives us flexibility scheduling labs.

The freshman students Spring labs will be moved to the 2020 fall semester first 8 weeks.

2. Procedures for making missed material available to the student.

There should be no need to provide missed material to students since all program content for spring will be presented to students through online lectures. Senior students will return in the summer to finish out the remaining lab time.

3. Procedures for annotating the student record to show how the student was authorized the hours of absence based on this temporary approval. The school must maintain a list of those students who used the temporary increase in allowable hours of absence.

Canvas keeps attendance records along with student's grades on file. With the FAA's approval, the graduating seniors and freshman class will use the code for the allowable absence (***ABSENCV19***).

4. A defined timeframe for using the temporary approval. The procedures must specify that the system is only to be used for absence associated with the COVID-19 outbreak.

This system will be used only for this time of COVID 19 outbreak. Upon return to campus with full use of our facilities, the Aviation Technology Program will resume face to face instructional.

Patrick Geoffroy

Professor/Program Coordinator

Signed April 10th, 2020

04/10/2020

Mr. Bill Moore,

Mr. Mark Auclair

Proposal from the Aviation Technology Program Coordinator

Nashua Community College (NSUT025K)

Good day. As this Coronavirus crisis evolves, I am proposing the following modifications to our program to minimize interruptions to student learning. First, I request approval as a temporary distance learning program. Second, I request a temporary revision authorizing a total of 80 hours of allowable absence from the program. I developed this plan based on the guidelines provided by the FAA in its memorandum dated 4/1/2020. I have composed this letter to specifically address each of the items in the memorandum.

Request 1: Authorize initial use of a temporary Distance Learning Program

1. How will the distance learning program be administered?

Due to the Coronavirus (COVID 19), the new Social Distancing Protocols, a Stay at Home order by the Governor of New Hampshire and the need to get our course information/materials to our students, I am proposing the use of a temporary distance learning program to move forward with our course work. FAA code ***(DLTMPCV19).***

Instruction will take place using the learning management system Canvas.

a. A description of the how course content will be delivered and how instructors and students will communicate as needed.

Students will be kept up-to-date with their lectures by delivering their learning materials online using Canvas. Canvas is the learning management system approved by the Community College System of New Hampshire (CCSNH) and it has been in place for the past three school years. Lectures will be conducted via weekly Zoom meetings and Canvas discussion forums. Instructors will maintain regular communication with students via Zoom meetings, Canvas messaging, and student email.

b. If requested, temporary testing procedures describing the testing process.

Testing will be accomplished as a timed, open-book test; the college will be using Zoom as a tool to proctor final exams.

2. What procedures will be employed to ensure distance learning course records are kept in compliance with the approved curriculum? Additional details are below.

All distance learning course records and curriculum material are tracked via Canvas.

a. Procedures for tracking student attendance under each subject/topic. The school must maintain a list of those students who were taught under the temporary method.

Each student has to log into Canvas to participate in Zoom lectures or take part in a discussion board posts and responses. The Canvas learning platform maintains a continual record of student attendance and participation.

b. A description of the technology to be utilized.

As noted above, instructors will deliver lectures and other course content via Canvas – the college's online learning management system. In addition, instructors will use Zoom as a tool to provide synchronous learning experiences.

c. A description of the timeframe for alternate content delivery.

The delivery of our online lectures began on March 27th, 2020 and will run until May 4th 2020. I am proposing the use of this period, for our lectures. At this point, the plan is to return to campus after May 4th, 2020. I have modified our lab schedule to get our students the required time needed to complete the semester. Attached please find the modified lab schedules for both the Senior and Freshman classes. The senior students

will need 108 hours and the freshman students will need 66 hours of labs to complete this semester. If we are able to return to campus on May 4th, then we will have two weeks to meet these requirements.

If we are unable to return to campus on May 4th, the plan for each class is described below.

Senior Class Plan

The plan is to extend the spring semester as necessary into the summer so seniors would be able to complete their required lab work and meet graduation requirements.

Freshman Class Plan

Freshmen would complete their spring labs during the first eight weeks of the fall term. The summer term would be postponed until the second eight weeks of the fall term. The fall 2020 term would be moved to spring 2021 and students would complete their final term in summer 2021. Due to the unusual circumstances, students would still be able to walk at graduation in May 2021 prior to completing their coursework over the summer.

Suspension of Incoming Freshman Class for Fall 2020

To focus on the educational needs of our current students, I recommend suspending the admission of new students into the program for fall 2020.

Request 2: Temporary Revision of a Schools Allowable Hours of Absence

In addition to online learning modifications, I am requesting a total of 80 hours of allowable absence from the program for the senior students as a result of the COVID-19 crisis.

At this point, senior students have already demonstrated competency in the required student learning outcomes. As a result, much of the remaining lab time focuses on reinforcing established skills. I am asking to increase the number of hours of allowable absence for seniors to 80 hours. This would allow additional flexibility to schedule remaining lab hours should the Governor's stay at home order be extended beyond May 4th. As required, additional details are below.

1. Defined allowable absence.

The senior class currently lacks 108 hours of lab time. The allowance of 80 hours absences, will greatly reduce the number of hours that seniors will need to spend when they are allowed to return to campus. This will relieve the senior students of the burden of fulfilling all of their remaining lab hours and allow them to graduate at the end of the summer session. In addition, the increase in allowable absence hours gives us flexibility scheduling labs during these unusual circumstances.

The freshman students Spring labs will be moved to the 2020 fall semester first 8 weeks.

2. Procedures for making missed material available to the student.

Since seniors have already met their program competencies and much of the remaining lab time focuses on practicing established skills, there should be no need to provide missed material to students. The program faculty keep accurate records on student progress and can verify that all program competencies have been met.

All program content for the reminder of spring semester will be presented to students through online lectures. Senior students will return in the summer to finish out the remaining lab time.

3. Procedures for annotating the student record to show how the student was authorized the hours of absence based on this temporary approval. The school must maintain a list of those students who used the temporary increase in allowable hours of absence.

Canvas keeps attendance records along with student's grades on file. With the FAA's approval, the graduating seniors and freshman class will use the code for the allowable absence (***ABSENCV19***).

4. A defined timeframe for using the temporary approval. The procedures must specify that the system is only to be used for absence associated with the COVID-19 outbreak.

This system will be used only for this time of COVID 19 outbreak. Upon return to campus with full use of our facilities, the Aviation Technology Program will resume face-to-face instruction.

Patrick Geoffroy

Professor/Program Coordinator

Signed April 10th, 2020

03/23/2020

Mr. Bill Moore,

Mr. Mark Auclair

Proposal from the Aviation Technology Program Coordinator

Nashua Community College (NSUT025K)

Good day gentlemen, as this crisis evolves, my program is in need of guidance from the FAA. The situation as I'm composing this e-mail is very fluid at best and the State and Federal Governments are not forthcoming with any concrete information for the disposal of our labs with regards to time/hours and facilities/Lab space. What we are getting from our leadership at the Community College System of New Hampshire (CCSNH) is our students are to maintain the Social Distancing Protocol of 6 foot spacing between students while attending their labs with a maximum of 10 people in any one lab.

Our leadership is proposing we split our lab classes into two 2-hour lab classes in order to maintain the SD protocol. As you know, our facility are not located at the local airport and we are a bit cramped for space. My proposal is to split the class into two equal parts, one-half goes to the airport to work with Bob Donadio who owns a Cesena 414 and a Cesena 313 airplane and the other half comes in to the college to perform their lab work. All together, the students are working on their lectured competencies.

On another front, my senior students have 6 weeks remaining until graduation from this program, 4 of the senior students are currently working in the industry. Is it possible to wave the remaining 6 weeks of the program for the senior students?