AVIATION TECHNOLOGY I

MIS03 17812

Students are provided with an understanding of the science of flight and include the history and possible career paths within the aviation industry. Aviation covers physics, the relationships of weight and balance, principles of navigation and flight control, ground and airport operations and services, and Federal Aviation Administration regulations.

Credit 1 or 2 credit

Level Grades 10-12

Standard 1	***BASICS AND CONTROL SYSTEMS***	
Topic 1.1	**Aircraft Basics**	
	Student Competencies	
	1.1.1	Identify the components of different types of aircraft, both exterior and interior.
	1.1.2	Compare and contrast categories and classes of aircraft: airplane, rotorcraft, glider, powered-lift, and lighter-than-air.
	1.1.3	Compare and contrast the various categories into which aircraft are organized during certification: normal, experimental, restricted, acrobatic, utility, and transport.
Topic 1.2	**Aircraft Flight Instruments**	
	Student Competencies	
	1.2.1	Identify the seven basic/standard instruments.
	1.2.2	Describe the operation/limitations of the pitot-static system.
	1.2.3	Describe the operation/limitations of the gyroscopic system.
	1.2.4	Describe the operation/limitations of the magnetic system.
Topic 1.3	**Flight Systems**	
	Student Competencies	
	1.3.1	Explain the function of the battery, alternator, and magneto.
	1.3.2	Discuss fuel systems.

	1.3.3	Explain the cycle of an internal combustion engine.
	1.3.4	Describe common errors with the induction system.
	1.3.5	Compare differences between fixed pitch and constant speed propellers.
	1.3.6	Explain the operation and limitations of the flight control system (primary and secondary).
	1.3.7	Explain the operation and limitations of the powerplant.
	1.3.8	Explain the operation and limitations of the gear system.
	1.3.9	Explain the operation and limitations of the environmental system.
Standard 2	***SCIENCE OF FLIGHT***	
Topic 2.1	**Aerodynamics of Flight**	
	Student Competencies	
	2.1.1	Describe and explain the relationship the four forces of flight.
	2.1.2	Define the angle of attack and critical angle of attack.
	2.1.3	Describe the types of drag, both parasite and induced.
	2.1.4	Explain various wing shapes and how wing tip vortices are created.
	2.1.5	Discuss and compare the four main types of wing flaps and the advantages and disadvantages to their uses.
	2.1.6	Explain how Newton's Third Law and Bernoulli's principle affect lift.
	2.1.7	Identify the parts of an airfoil (e.g., chord line, relative wind, camber, leading edge, trailing edge).
	2.1.8	Describe the aerodynamics of a stall.
	2.1.9	Define static and dynamic stability.
Topic 2.2	**Weather Theory**	
	Student Competencies	
	2.2.1	Identify the gases and ratios found within the atmosphere.
	2.2.2	Describe factors that affect atmospheric weather patterns.
	2.2.3	Identify and explain the various family of clouds.
	2.2.4	Explain the formation of clouds and the conditions necessary to form each type.
	2.2.5	Explain and compare the various types of precipitation.
	2.2.6	Explain the importance of atmospheric stability and cloud formation.
	2.2.7	Compare dew point and humidity.
	2.2.8	Identify the various stages of thunderstorms and the hazards to flight.
Topic 2.3	**Weather Products and Reports**	
	Student Competencies	
	2.3.1	Identify Terminal Aerodrome Forecast (TAF) codes (e.g., TEMPO, FM).
	2.3.2	Explain, analyze, and apply TAFs.

	2.3.3	Explain the importance of a winds aloft forecast.
	2.3.4	Identify abbreviations (e.g., RA, BR, and SN) used in METAR weather reports.
	2.3.5	Decode, analyze, and apply METARs.
	2.3.6	Analyze weather graphics.
	2.3.7	Determine weather products issuance and valid times.
Topic 2.4	**Weight and Balance**	
	Student Competencies	
	2.4.1	Define weight and balance terms (e.g., center of gravity, basic empty, weight and useful load).
	2.4.2	Identify the methods of calculating weight and balance.
	2.4.3	Explain the effects of weight on aircraft performance.
	2.4.4	Explain the effects of forward/aft center of gravity on aircraft performance.
	2.4.5	Determine the center of gravity using the computation method.
Topic 2.5	**E6B Flight Computer**	
	Student Competencies	
	2.5.1	Calculate Time/Distance/Rate problems.
	2.5.2	Compute groundspeed and wind correction angle.
Topic 2.6	**Performance Calculations**	
	Student Competencies	
	2.6.1	Determine aircraft performance problems.
	2.6.2	Determine aircraft performance predictions using current aircraft information and atmospheric conditions.
	2.6.3	Compare predicted aircraft performance vs. actual aircraft performance (actual or simulated).
	2.6.4	Determine predicted aircraft performance changes if a modification to airframe or powerplant occurs.
Standard 3	***GROUND AND INFLIGHT OPERATIONS***	
Topic 3.1	**Airport Operations**	
	Student Competencies	
	3.1.1	Discuss and explain each leg of standard and nonstandard traffic patterns.
	3.1.2	Describe how runway numbers are determined.
	3.1.3	Recognize various types of airports (controlled and uncontrolled).
	3.1.4	Explain the purpose of a displaced threshold.

	3.1.5	Explain the purpose of a blast pad.
	3.1.6	Recognize visual aids and their purpose (e.g., signs, lights, and markings).
Topic 3.2	**Airspace**	
	Student Competencies	
	3.2.1	Compare the classes of controlled and uncontrolled airspaces and airports.
	3.2.2	Identify the airspace dimensions needed for each class of airspace.
	3.2.3	Recognize various classes of airspace on sectional charts.
	3.2.4	Identify the minimum weather requirements for each class of airspace.
	3.2.5	Categorize the pilot qualifications needed for each class of airspace.
	3.2.6	Explain the aircraft requirements for each class of airspace.
	3.2.7	Determine when it would be necessary to request a special VFR clearance.
Topic 3.3	**Flight Communication**	
	Student Competencies	
	3.3.1	Demonstrate use of the phonetic alphabet and numbers.
	3.3.2	Convert local times to Zulu time and vice versa.
	3.3.3	Discuss the purpose of the following facilities/frequencies: ground control, tower, CTAF, Unicom, FSS, approach/departure control, ATIS and enroute center.
	3.3.4	Describe the purpose of an airplane's transponder.
	3.3.5	Explain the standard and emergency squawk codes.
	3.3.6	Explain light gun signals and their purpose.
Topic 3.4	**Navigation**	
	Student Competencies	
	3.4.1	Identify pilotage and dead reckoning techniques.
	3.4.2	Explain when radio navigation would be beneficial.
	3.4.3	Plan a flight using VOR navigation techniques.
	3.4.4	Plan a flight using GPS navigation techniques.
	3.4.5	Demonstrate appropriate radio navigation techniques using VOR and GPS.
Topic 3.5	**Cross Country Flight Planning**	
	Student Competencies	
	3.5.1	Demonstrate use of flight planning tools (e.g., AFD, E6B, and Plotter Sectional charts).
	3.5.2	Plan a XC flight using multiple navigation techniques.
	3.5.3	Complete nav-log for preflight planning.

Standard 4	*PEOPLE, TRENDS, AND CAREERS IN AVIATION*	
Topic 4.1	**Events and Trends in Aviation**	
	Student Competencies	
	4.1.1	Discuss important people in aviation history and their contribution to the field of aviation.
	4.1.2	Determine the progression of aviation technology (e.g., Pre-Heavier than air flight, gliders (pre-Wright brothers), World War I and II, the jet age, and NextGen aviation).
	4.1.3	Identify and explain current issues (including socio-economic challenges) in aviation.
Topic 4.2	**Aviation Training Requirements**	
	Student Competencies	
	4.2.1	Describe flight training processes.
	4.2.2	Determine the period of time for medical certificate validity.
	4.2.3	Identify the mission of aviation organizations (e.g., AOPA, EAA, CAP).
	4.2.4	Determine FAA Pilot certificate requirements.
Topic 4.3	**Flight Physiology**	
	Student Competencies	
	4.3.1	Explain the PAVE checklist.
	4.3.2	Discuss the IMSAFE checklist.
	4.3.3	Describe the medical qualifications requirements for pilots.
	4.3.4	Identify and explain the various parts of the vestibular system, how the kinesthetic sense affects humans, and the function of the human eye.
	4.3.5	Identify each type of hypoxia and associated causes.
	4.3.6	Describe symptoms of hypoxia.
	4.3.7	Describe corrective actions for hypoxia.
	4.3.8	Explain the development of night vision.
	4.3.9	Discuss the importance of spatial awareness and disorientation.
Topic 4.4	**Aviation Careers**	
	Student Competencies	
	4.4.1	Identify career opportunities in aviation.
	4.4.2	Identify current career trends in aviation.
	4.4.3	Discuss pathways to an aviation career.