Technical Education Competency System			
Course Code	**Course Title**	**Standard**	**Competency**
7905	**Aerospace Engineering**		
		7905.01 History of Flight	
			01 Students will construct a PowerPoint that shows knowledge of the history of flight.
			02 Students will demonstrate an understanding of the knowledge of aerospace history in a PowerPoint that provides insight to future challenges involving travel through the atmosphere and space.
			03 Students will list many types of vehicles that have been designed to fly.
			04 Students shall identify the major components of airplanes which has a specific function in the design and operation of the airplane.
			05 The forces that act on an aircraft which enable it to fly will be listed by the students.
		7905.02 Aerodynamics	
			01 Students will identify the forces applied to an airplane in-flight: lift, weight, drag and thrust.
			02 Students will explain how wings provide the lifting forces needed to overcome the weight of an airplane.
			03 Student will demonstrate an understand of power to weight ratio.
			04 Students will demonstrate basic knowledge of aerodynamics and physics.
			05 Students will utilize the design process, with computer simulation tools, to predict the performance of a design prior to the building of a physical model.
			06 Students will utilize the design process to create and evaluate multiple solutions to a problem.
		7905.03 Airfoil Construction	
			01 Students design, create, and test prototypes and models of airfoils.
			02 Students create sub-scale models used to represent a full-size system.
			03 Students will apply coordinate geometry to create varied shapes used to design an airfoil.
			04 Students will select appropriate hand tools and equipment, and operate tools and equipment selected to create accurate scale models.
		7905.04 Wind Tunnel Testing	
			01 Students will compare and contrast prototypes of auxiliary models.
			02 Students will use scale models to evaluate, to test, and to determine the performance of aircraft designs.
			03 Students will use the wind tunnel to graph, display, evaluate and analyze test data.

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Course Code	**Course Title**	**Standard**	**Competency**
7905	**Aerospace Engineering**		
		7905.05 Glider Design and Construction	
			01 The students will use flight theory to design a glider.
			02 Students predict the flight performance of an aircraft utilizing the mathematics of flight theory.
			03 Students will construct a multi-component device by the use of assembly and alignment jigs.
			04 The student will collect and use flight testing data to evaluate an aircraft design.
			05 Students will construct multiple designs capable of achieving similar results.
		7905.06 Measuring Rocket Engine Thrust	
			01 Rocket thrust is measured using a simple device.
			02 Students calibrate thrust measurements.
			03 Thrust vs. time data is acquired using a data taking device.
		7905.07 Model Rocket Trajectory	
			01 Parts of a model rocket and parts of a model rocket engine are identified by the student.
			02 Students understand and explain how the forces of weight, thrust, drag, and lift interact differently on a rocket in flight.
			03 Students state how Newton's three laws of motions (inertia, F- ma, and action-reaction) can be used to describe and predict events during each phase of a rocket launch.
			04 Rockets are designed with features that are interrelated.
			05 The student will calculate the maximum velocity and maximum acceleration of a rocket during flight.
			06 The student will calculate a rocket's maximum altitude by using indirect measurement.
		7905.08 Rocket Camera	
			01 The internet and the library are used for conducting research.
			02 Students understand and explain applications of aerial photography.
			03 Students use the scientific method to design and project to answer a research question.
			04 Students formulate a research question based on research, gathering data, analyzing data, and making judgments about experimental data.
			05 Students use the scale factor of aerial photographs to determine a rocket's altitude, number, and kind of objects in the photograph, and the dimension of objects in the photographs.
			06 Students use aerial photographs to identify, classify, and enumerate objects in the photograph.
			07 Students understand that a rocket's launch angle affects the forces of lift, thrust, weight, and drag.

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Course Code	**Course Title**	**Standard**	**Competency**
7905	**Aerospace Engineering**		
		7905.09 Orbital Mechanics	
			01 Students create drawings to show that ellipses are conic sections, and circles are special cases of ellipses.
			02 Students create diagrams to show that orbits involve the steady procession of a small mass object around a large mass object.
			03 Students calculate to show that an object in orbit is continuously "falling" toward the body about around which they orbit.
			04 Students calculate to show that orbital elements can be used to fully define a satellite's orbit, allowing the accurate prediction of the precise location of the satellite at a given time.
		7905.10 Life Support and Environmental Systems	
			01 Students describe basic physiological needs of the human body when living safely within and outside of Earth's atmosphere.
			02 The students make a model to show how the environment on earth and in space must be considered when designing solutions to problem in aerospace engineering.
			03 Students discuss how engineers have solved many technological challenges faced when designing solutions for living higher atmospheres and space.
			04 Students develop a demonstration of force, mass, and acceleration phenomena or G-forces that astronauts, fighter pilots, and Formula One drivers might experience.
		7905.11 Effect of Gravity on the Human Body	
			01 Students simulate a 1-g, Earth-normal, environment
			02 Students simulate the action of spinning and how it can fool the senses and stimulate the vestibular system in the inner ear.
			03 Students work in cooperative and supportive teams to simulate how theses behaviors result in increased safety and higher quality data.
			04 Students investigate and give examples of how a stress-filled environment is physically unique and can affect the ability to perform mental functions.
			05 Students identify common equipment that can be used for data acquisition.
			06 Students use spreadsheet software to collect, analyze and report data.
		7905.12 Microgravity Drop Tower	
			01 Students describe gravity and its effects on other masses.
			02 Students state the value of "g" on earth.
			03 Students demonstrate microgravity.
			04 Students describe the microgravity environment associated with the space shuttle.
			05 Students list the types of experiments that can be done in microgravity.

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Course Code	**Course Title**	**Standard**	**Competency**
7905	**Aerospace Engineering**		
		7905.13 Composites Fabrication and Testing	
			01 Students test multiple layers of material to determine that they are stronger than a single layer of that material.
			02 Students describe the composition of composite materials that are fabricated by molding together layers of reinforced fabric (often glass or carbon fiber) with a plastic matrix, such as epoxy.
			03 Students describe how composite materials are used in the aerospace industry.
			04 Students determine how the strength and stiffness of composite materials can be significantly increased.
			05 The student will assess material performances by comparing strength to weight ratios.
			06 Students will test composite materials using a deflection test to evaluate the stiffness of various composite plastic samples.
		7905.14 Thermal Protection Systems for Space Vehicles	
			01 An understanding of the physics of space vehicle re-entry into the atmosphere is used by the students to design thermal protection systems.
			02 Students demonstrate knowledge of material properties and types of testing when trying to protect a space vehicle.
			03 Students describe the heat transfer process that creates high temperatures in a space vehicle.
			04 Thermal Protection Systems (TPS) are described by the students.
		7905.15 Intelligent Vehicles	
			01 Students will evaluate incentives for building robots.
			02 Students define interactive systems used in science exploration.
			03 Students will interpret electronic data and communication that allows information to be transferred from human to human, human to machine, machine to human, and machine-to-machine.
			04 Students will define the meaning of pH values.
			05 Students will describe uses for robotic devices.
			06 Students will list robotic devices that are composed of mechanical, electrical, and computer based systems that can be programmed to make decisions and control actions based upon sensor readings.
			07 Students will construct a robot device that performs a task.

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Course Code	**Course Title**	**Standard**	**Competency**
7905	**Aerospace Engineering**		
		7905.16 Communication Skills - Career Standard	
			01 Listen for and identify key words.
			02 Listen for words that identify a procedure.
			03 Listen for steps or actions to be performed.
			04 Listen for clues regarding the order or sequence in which a task is performed.
			05 Draw conclusions or make generalizations from another's oral communication.
		7905.17 Self-Assessment - Career Standard	
			01 Personal goals
			02 Standards and values
			03 Strengths/weaknesses
		7905.18 Impact on Decision Making/Problem Solving - Career Standard	
			01 Needs and wants
			02 Values
			03 Goals
			04 Standards
		7905.19 Resource Management - Career Standard	
			01 Locate information and select the materials, tools, equipment, or other resources to perform the activities needed to accomplish a specific task.
			02 Develop strategies to overcome procrastination and meet deadlines.
			03 Access and use information to develop educational career options.
		7905.20 Leadership Standard	
			01 Value diversity, practice tolerance and acceptance, and work cooperatively toward common goals.
			02 Communicate creatively with stories, examples, pictures, props, etc., to help convey your message.
			03 Apply one or more problem-solving processes to a given situation(s).
			04 Establish and examine personal short- and long-term goals, including resources needed to reach these goals.

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Course Code	**Course Title**	**Standard**	**Competency**
7905	**Aerospace Engineering**		
		7905.21 Academic - Math Standard	
			01 Students will review the history of measurement tools and identify two innovations that have led to improved functionality of that tool. - **Math Standard 3-Benchmark 2** Measurement and Estimation: The student estimates, measures and uses geometric formulas in a variety of situations.
			02 Students will investigate the principles and elements of design and demonstrate their use in the design process. - **Math Standard 3-Benchmark 1** Geometric Figures and their Properties: The student recognizes geometric figures and compares and justifies their properties of geometric figures in a variety of situations.
			03 Students will demonstrate the ability to produce two-dimensional geometric figures. - **Math Standard 3-Benchmark 3** Transformational Geometry: The student recognizes and applies transformations on two- and three-dimensional figures in a variety of situations.
			04 Students will create sketches utilizing both the additive and subtractive methods to assess underlying geometric and perceptual principles. - **Math Standard 3-Benchmark 2** Measurement and Estimation: The student estimates, measures and uses geometric formulas in a variety of situations.
			05 Students will interpret annotated sketches in the design analysis process. - **Math Standard 4.2.1A** Uses data analysis (mean, median, mode, range, quartile, interquartile range) in real-world problems with rational number data sets to compare and contrast two sets of data, to make accurate inferences and predictions, to analyze decisions, and to develop convincing arguments from these data displays.
			06 Using a compass, ruler and triangle, students will construct arcs, circles and ellipses - **Math Standard 3** Geometry: The student uses geometric concepts and procedures in a variety of situations.
			07 Students will apply the right hand rule to identify the X, Y, and Z axes of the Cartesian Coordinate System. - **Math Standard 3.1.1bA** Solves real-world problems by applying the Pythagorean Theorem
			08 Students will identify the Origin and planar orientations of each side of a three-dimensional model. - **Math Standard 3** Geometry: The student uses geometric concepts and procedures in a variety of situations.
			09 Students will identify the different geographical methods of data representation. - **Math Standard 4** Data: The student uses concepts and procedures of data analysis in a variety of situations.
			10 Students will evaluate a problem using mathematical formulas - **Math Standard 2** Algebra: The student uses algebraic concepts and procedures in a variety of situations.
			11 Students will draw a two-dimensional sketch using CAD package. - **Math Standard 3-Benchmark 1** Geometric Figures and their Properties: The student recognizes geometric figures and compares and justifies their properties of geometric figures in a variety of situations.
			12 Students will create circular and rectangular patterns of components within an assembly model. - **Math Standard 3** Geometry: The student uses geometric concepts and procedures in a variety of situations.

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Course Code	**Course Title**	**Standard**	**Competency**
7905	**Aerospace Engineering**		
			13 Students will explore and demonstrate assembly modeling skills to solve a variety of design problems. - **Math Standard 3** Geometry: The student uses geometric concepts and procedures in a variety of situations.
			14 Students will describe how analysis data can be used to update parametric models. - **Math Standard 4** Data: The student uses concepts and procedures of data analysis in a variety of situations.
			15 Students will generate an isometric view from orthographic drawing views. - **Math Standard 3-Benchmark 1** Geometric Figures and their Properties: The student recognizes geometric figures and compares and justifies their properties of geometric figures in a variety of situations.
			16 Students will create a detail view that corresponds to the appropriate orthographic drawing view. - **Math Standard 3-Benchmark 1** Geometric Figures and their Properties: The student recognizes geometric figures and compares and justifies their properties of geometric figures in a variety of situations.