Ware Public Schools

SCI-TECH – Grades 10-12

SUBJECT MATTER: Artificial Intelligence **Grade: 10 to 12**

Unit/Theme	Content and Essential Questions	Skills	Methods of Assessment (test and quiz(zes) every unit)	Teacher Resources & Notes	Framework Strand/s & Standard/s
History of AI	1. Start of AI 2. AI model 3. computer integration Can a computer think?	1. Students will be able to explain were AI began 2. Students will gain a basic understanding of bits and bytes 3. Students will be able to relate the base two number system to computers	Timeline activity Module questions	Module	
Develop-ments in AI	1. Logic theorist 2. General problem solver	1. Students will be able to relate common games to developments in the field of AI 2. Students will be able to explain inventions such as LT and GPS 3. Students will see how computers are programmed to be able to beat live players	Lab using computer games Module exercises	CD with computer games, module	
Robots and AI	1. computer senses 2. increased demand in need for AI 3. CYE	1. Students will be able to explain the need for computer senses 2. Students will explore the need for AI especially in dangerous situations 3. Students will be able to navigate the robot CYE on the ground.	Lab computer game Module exercises Lab programming the robot and using the map program	CD with games, module Robot, camera, bluetooth software, mapping software	

Unit/Theme	Content and Essential Questions	Skills	Methods of Assessment (test and quiz(zes) every unit)	Teacher Resources & Notes	Framework Strand/s & Standard/s
Brain vs computers	1. Neurons 2. Digital computers and their parts 3. Computer vision and speech analysis	1. Students will be able to explain the makeup and function of a human neuron 2. Students will be able to relate a neuron to the parts of a digital computer 3. Students will explore two areas of AI were intelligent machines have practical applications. (Vision and speech)	Module exercises Lab creating hot spots for CYE Environmental impacts lab	Module, robot, Bluetooth software, mapping software, camera	
Expert systems	1. computers as experts 2. knowledge base 3. inference engine 4. expert transportation system	1. Students will be able to explain why computer experts are needed. 2. Students will be able to define what a computer based expert system is 3. Students will be able to list the two different parts of an expert system and what t hey do 4. Students will create a simple expert system on transportation	Lab using line path tool Module exercise	Module, robot, Bluetooth software, mapping software, camera	
Machine learning	1. How machines work 2. CYE & polar coordinates 3. CYE and Cartesian coordinates	1. Students will be able to manipulate CYE using both relative and absolute Cartesian coordinates 2. Students will be able to manipulate CYE using polar coordinates	Module exercises Lab using CYE and polar coordinates Lab using CYE and Cartesian coordinates	Module, robot, Bluetooth software, mapping software, camera	

Unit/Theme	Content and Essential Questions	Skills	Methods of Assessment (test and quiz(zes) every unit)	Teacher Resources & Notes	Framework Strand/s & Standard/s
Future of AI systems	1. Neural network 2. Fuzzy logic 3. Career opportunities	1. Students will be able to explain how neural net was designed to imitate the human brain 2. Students will be able to explain fuzzy logic and its relationship with soft failure 3. Students will explore career opportunities in the field of AI.	Module exercises Lab programming and using CYE and video camera Careers activity	Module, robot, Bluetooth software, mapping software, camera	

SUBJECT MATTER: Biotechnology Grade: 10 to 12

Unit/Theme	Content and Essential Questions	Skills	Methods of Assessment (test and quiz(zes) every unit)	Teacher Resources & Notes	Framework Strand/s & Standard/s
Into to biotech-nology	1. Technology vs. biotechnology 2. Four subsystems of biotechnology (human factor engineering, health care, biomass utilization, and cultivation of plants and animals)	1. Students will be able to explain what biotechnology is and list examples of products that have been created using biotechnology techniques. 2. Students will understand the four subsystems of biotechnology	Timeline activity Module exercises	Module	Bio: 1.1,1.2,3.3,3.4,3.5.3.6
Ergonomics and microscopes	1. Human factors engineering 2. Concerns of ergonomics 3. Anthropometric data 4. Microscope parts and uses	1. Students will be able to explain what ergonomics is and how it is used. 2. Student should be able to identify the three primary concerns of ergonomics. 3. Student swill be able to build a piece of ergonomically correct furniture 4. Students will be able to use a microscope correctly and identify its parts.	Module questions Build an ergonomically appropriate piece of furniture for the wooden statue Lab using the microscope	Ergonomic model Microscope and slides	Bio: 1.1,1.2,3.3,3.4,3.5.3.6
Bioengineering/bionics	1. Bionics 2. Development of artificial limbs (prosthetics) 3. Creating a	1. Students will explore the field of bionics. 2. student swill learn about and develop their own prosthetic arm 3. Students will be able to explain how computers have impacted bioengineering	Module exercises Lab creating a prosthetic arm	Clay, paint, ergonomic model Mirror, paper, data sheet	Bio: 1.1,1.2,3.3,3.4,3.5.3.6

Unit/Theme	Content and Essential Questions	Skills	Methods of Assessment (test and quiz(zes) every unit)	Teacher Resources & Notes	Framework Strand/s & Standard/s
	prosthetic 4. Technological advances in bioengineering 5. Biofeedback	4. Students will be able to explain what biofeedback is and how the information is used to help handicapped people.	Lab overcoming handicap's		
Genetics and diseases	1. Disease prevention 2. Assessment of personal health 3. Medical treatment of diseases and health problems 4. Genetic engineering	1. Students will be able to explain various methods of disease prevention 2. Students will be able to accurately take someone's blood pressure. 3. Students will be able to correctly use a stethoscope 4. Students will be able to identify various communicable and non communicable diseases 5. Students will be able to explain the basic principles of genetic engineering	Module exercises Lab taking blood pressure and vitals Lab immunization	Blood pressure monitor, stethoscope Microscope, disease slides	Bio: 1.1,1.2,3.3,3.4,3.5.3.6
Biotechnology and nutrition	1. Hydroponics 2. GM foods 3. Nutraceuticals	1. Students will be able to explain how hydroponics is carried out and why it is used. 2. Students will be able to list some common GM foods and explain why they are important agriculturally to today's society. 3. Students will be able to explain what a nutraceutical is and where they are currently being used.	Module exercises	**M**odule	Bio: 1.1,1.2,3.3,3.4,3.5.3.6
Cells	1. Cell parts and functions 2. DNA	1. Students should be able to explain at least five cell parts and their function 2. Students should understand that DNA carries	Module exercises Lab heredity	PTC paper, heredity pedigree Microslide, microslide scope	Bio: 1.1,1.2,3.3,3.4,3.5.3.6

Unit/Theme	Content and Essential Questions	Skills	Methods of Assessment (test and quiz(zes) every unit)	Teacher Resources & Notes	Framework Strand/s & Standard/s
	3. Human genome project	hereditary information 3. Students should be aware of the human genome project and be able to articulate its main purpose.	Lab examining cells		
Environ-mental biotech-nology	1. Recycling 2. Sewage treatment 3. Landfills 4. Impacts of biotechnology	1. Students will explore the process of using biotechnology to rid us of never ending waste 2. Students will understand the processes of using biotechnology in sewage treatment plants. 3. Students will learn how to recycle old paper into new useable paper 4. Students will understand the impacts biotechnology has made on society	Module quizzes Lab making paper Lab water testing	Newspaper, blender, deckle, screen Water sources, PH paper, chlorine test kit	Bio: 1.1,1.2,3.3,3.4,3.5.3.6

SUBJECT MATTER: Controls and Sensors Grade: 10 to 12

Unit/Theme	Content and Essential Questions	Skills	Methods of Assessment (test and quiz(zes) every unit)	Teacher Resources & Notes	Framework Strand/s & Standard/s
Automation	1. Controls and sensors of modern machines 2. Computers and how they are used in automation 3. Automation software 4. Write programs for different machines	1. Students will be able to identify common controls and sensors used today 2. Students will be able to operate computer automated models of machines 3. Students will be able to operate automation software.	Module questions	Module Text books	Tech 6.3, 7.3
Fisher-technik control system	1. Computer software 2. Fishertechnik control system parts, how it works, how it is used in automation	Students will be able to use the fishertechnik control system software to program and assemble models.	Module questions	Module Control system	Tech 6.3, 7.3
Motor control	1. Switch assembly 2. Model assembly 3. Limit switches vs. remote control open switches 4. Programming the	1. Students will be able to create and operate a garage door operator 2. Students will be able to use the software to control the motors direction, starting and stopping features.	Module exercises Lab constructing and operating a model of a garage door opener	Module Control system and parts	Tech 6.3, 7.3

Unit/Theme	Content and Essential Questions	Skills	Methods of Assessment (test and quiz(zes) every unit)	Teacher Resources & Notes	Framework Strand/s & Standard/s
	software				
Construc-tion of a hand dryer	1. Function and used of a hand dryer 2. Downloading and running a program on the built model	1. Students will be able to assemble a model hand dryer 2. students will be able to write and run a program that cause the hand dryer to operate correctly	Module exercises Environmental impacts activity Lab build a hand dryer	Control system and equipment Module	Tech 6.3, 7.3
Construc-tion of a sequential light	1. uses of a sequential light 2. programming different sequences 3. downloading and running a program on the built model	1. Students will be able to explain how a sequential light can be used 2. Students will be able to program their model to operate using various sequences 3. Students will be able to correctly assemble a sequential light	Module exercises Lab sequential light	Control system and equipment Module	Tech 6.3, 7.3
Construc-tion of a traffic light	1. Operation of a traffic light 2. In sequence vs. out of sequence 3. Downloading and running a program on the built model	1. Students will be able to trouble shoot traffic light and get it in sequential order again. 2. Students will be able to program their model to operate using various sequences 3. Students will be able to correctly assemble a traffic light	Module exercises Lab traffic light	Control system and equipment Module Traffic light activity worksheet	Tech 6.3, 7.3
Construc-tion of a	1. Sliding doors and operations in	1. Students will be able to explain how automatic sliding doors function	Module quizzes	Control system and equipment	Tech 6.3, 7.3

Unit/Theme	Content and Essential Questions	Skills	Methods of Assessment (test and quiz(zes) every unit)	Teacher Resources & Notes	Framework Strand/s & Standard/s
sliding door	public buildings 2. Downloading and running a program on the built model	2. Students will be able to correctly assemble a sliding door	Module exercises Lab sliding door	Module	

SUBJECT MATTER: Digital Video Editing Grade: 10 to 12

Unit/Theme	Content and Essential Questions	Skills	Methods of Assessment (test and quiz(zes) every unit)	Teacher Resources & Notes	Framework Strand/s & Standard/s
Camera techniques	1. Camera shots 2. Camera composition 3. Common video editing techniques	1. Students will be able to identify types of camera shots (zoom, pan, tilt, dolly etc) 2. Student swill be able to explain the importance of camera composition 3. Students will explore various shots t hat frame objects.	Timeline activity Module questions	Module	
Editing Suite	1. storing video images on tape 2. understanding editing suite software 3. basic editing functions	1. Students will be able to store video images on tape 2. Students will be able to use the editing suite correctly. 3. Students will be able to use the video editing software to perform basic editing techniques.	Module questions Lab recording videos	Module Editing suite (VCR, tape, video monitor)	
Editing concepts	1. When to edit 2. Cut – in editing 3. Cut- away editing	1. Students will be able to explain at least two different editing techniques. 2. Students will perform a cut-in using editing software. 3. Students will perform a cut-away using the editing software.	Module exercises Video editing concepts	Module Monitor	
Voice over's, Titles and credits	1. Title editor 2. Recording basic voice –over's 3. Creating credits	1. Students will be able to use the title editor tool. 2. Students will be able to perform and record a basic voice over. 3. Students will be able to correctly export credits into their new video.	Module exercises Lab create a voice over with a title and credits Lab environmental Impacts	Editing suite Video tape (movie of some kind) Microphone	

Unit/Theme	Content and Essential Questions	Skills	Methods of Assessment (test and quiz(zes) every unit)	Teacher Resources & Notes	Framework Strand/s & Standard/s
Editing Audio	1. Creating a mood 2. Manipulating audio 3. Sound effects	1. Students will be able to explain how audio plays a major role in creating the mood of a scene. 2. Students will be able to use editing software to actually edit there own audio. 3. Students will be able to explain the role of sound effects play in a video presentation.	Module exercises Lab using audio editing software	Audio software	
Editing a scene	1. Capturing shots 2. Assembling a sequential video 3. Video presentation	1. Students will be able to explain what a selects project is. 2. Students will be able to create t heir own selects project using the pinnacle software. 3. Students will be able to create a complete presentation including credits and title.	Module exercises Lab capturing and assembling a sequential video	Module Video tape, VCR, monitor Pinnacle software	
Outputting a video	1. Video presentation 2. Careers using digital video editing	1. Students will be able to completely put together and output their own video presentation. 2. Students will be able to discuss various careers in the field of digital video editing.	Module quizzes Careers activity Lab video presentation	Module VCR, monitor, microphone, software	

SUBJECT MATTER: Exploring Electricity Grade: 10 to 12

Unit/Theme	Content and Essential Questions	Skills	Methods of Assessment (test and quiz(zes) every unit)	Teacher Resources & Notes	Framework Strand/s & Standard/s
Safety and Meters	1. Importance of safety 2. Explore direct currents 3. Measure current in volts and milliamperes	1. Students will know the electricity safety rules 2. Students will be able to explain DC currents 3. Students will discover that a voltmeter measures voltage in volts ands the milliammeter measures current in milliamperes	Lab voltmeters Lab millimeter Module questions	Module Electricity trainer leads	
Electric Circuits	1. Completes circuits 2. various voltage sources 3. electromotive force EMF	1. Students will be able to explain how a flashlight works electrically 2. Students will be able to identify voltage sources of different types of electrical equipment 3. Students will be able to explain electromotive force	Module questions Lab electric circuits and operation	Electric trainer Leads Module	
Current, Voltage and resistance	1. Electrons and their role in electricity 2. current and closed circuits 3. AC vs. DC 4. voltage 5. some materials pass currents while others do not	1. Students will be able to explain how current and voltage is related to electrons 2. Students will be able to explain and recognize the difference between AC and DC currents 3. Students will be able to identify materials that are resistors to current	Module exercises Lab current Lab voltage drop Lab exploring resistance	Module Electric trainer DC circuit board	
Conductors and Insulators	1. Explore various metal conductors 2. Molecular	1. Student swill be able to identify good conductors of currents and be able to explain molecularly why they are able to hold a	Module exercises Environmental	Module Electric trainer	

Unit/Theme	Content and Essential Questions	Skills	Methods of Assessment (test and quiz(zes) every unit)	Teacher Resources & Notes	Framework Strand/s & Standard/s
	structure of metals 3. Insulators and their molecular structure	current 2. Students will be able to identify insulators and explain why they cannot hold a current well.	impacts activity	Various samples of metals, wood, plastics	
Series Circuits	1. Function of series circuit 2. make up of series circuit 3. calculations of voltage throughout the circuit	1. Students will learn that series circuits only have one complete current path 2. Students will be able to calculate voltage throughout the circuit	Lab series circuits Module questions	Calculator, module,	
Parallel Circuits	1. Splitting of current 2. Paths current can take 3. Calculations of voltage	1. Students will be able to recognize a parallel circuit and understand that current may take many paths 2. Students will explore parallel circuits 3. students will be able to assemble a parallel circuit	Lab parallel circuits Module questions	Calculator, module, circuits	
Ohm's law	1. Relationships between the properties of current, voltage, and resistance 2. Ohm's law formulas and calculations 3. Actual vs. calculated measurements	1. Students will be able to explain the relationship between resistance, voltage and current 2. Students will be able to calculate one of the properties (resistance, current, voltage) if two values are know. 3. Students will be able to apply Ohm's law to both series and parallel circuits	Module quizzes Lab Ohm's law Career activity	Module, calculator	

SUBJECT MATTER: Electronic Music Grade: 10 to 12

Unit/Theme	Content and Essential Questions	Skills	Methods of Assessment (test and quiz(zes) every unit)	Teacher Resources & Notes	Framework Strand/s & Standard/s
Basic Music Theory	1. Introduction into how music is written and interpreted. 2. Pitch, tone and note duration 3. Sharps, flats, octaves 4. Tempo, harmony, melody, rhythm	1. Students should be able to distinguish between melody, harmony and identify rhythm 2. Students will be able to specify how a staff and the musical alphabet are used to document the language of music 3. Students will be able to identify elements such as time value and tempo	Practice on the keyboard identifying musical notes(flats sharps ect and tempo)	Keyboard, musical editing equipment, module timeline and instructions	
Recording Music	1. Digital vs. analog recording methods 2. Familiarize themselves with different instruments used during recording sessions 3. Multitracking 4. Mixing down 5. Use a MIDI studio	1. Students should be able to explain the difference between digital and analog recording methods. 2. Students will familiarize themselves with various types of instruments used in recording 3. students will examine two general stages to the recording process: multi tracking and mixing down	Use a MIDI studio to record various types of music Module questions	MIDI studio and software Synthesizer and mixing board	
Editing	1. Basic music editing (revising , reworking, rearranging) 2. Staff and piano	1. Students know how to use the “cakewalk music creator” software 2. Students should know how to edit, rearrange and revise a piece of prerecorded music 3. Students should be able to use the buttons on	Module exercises Edit several pieces of prerecorded music	Cakewalk software Prerecorded music MIDI studio	

Unit/Theme	Content and Essential Questions	Skills	Methods of Assessment (test and quiz(zes) every unit)	Teacher Resources & Notes	Framework Strand/s & Standard/s
	roll views and how they influence editing music	the Transport toolbar correctly.			
Composing and recording music	1. Create tracks 2. Create notes on synthesizer, playback notes and record 3. Percussion instruments and how they emphasize various notes	1. Students should be able to use cakewalk to create two tracks of their own. 2. Students should know how to record their own notes 3. Students will be able to explain how percussion instruments can emphasize different notes 4. Students will be able to create a "rock beat"	Cakewalk software exercises Module exercises Record two tracks	Cakewalk software Synthesizer MIDI studio	
Adding Melody	1. Create melody track 2. Experiment with instrument sounds on synthesizer 3. Interpret musical notation on sheet music 4. Play notes in proper time on synthesizer	1. Students will be able to read the notes on a piece of sheet music. 2. Should be able to play the notes correctly on the synthesizer 3. Students will be able to record o melody track for their song keeping in time with the drum beat	Cakewalk quizzes/exercises Record of melody	Cakewalk Synthesizer MIDI studio	
Adding Bass	1. Remix music 2. Bass clefs 3. Alter bass sound	1. Students will understand the concept using MIDI technology to remix current songs 2. Students will be able to recognize a bass clef.	Remix music	MIDI program Keyboard	

Unit/Theme	Content and Essential Questions	Skills	Methods of Assessment (test and quiz(zes) every unit)	Teacher Resources & Notes	Framework Strand/s & Standard/s
	by lowering pitch	3. Students will be able to alter the bass sound by lowering pitch of the notes using the keyboard.		Sheet music	
Adding Harmony	1. Music theory behind harmony 2. Chromatic VS diatonic 3. Record the harmony	1. Students will understand the musical theory behind harmony 2. Students will be able to explain the differences between diatonic and chromatic 3. Students will be able to interpret musical notation and record their harmony on a tape.	Module quizzes	MIDI program Keyboard/ synthesizer Cassette tapes and recorder	

SUBJECT MATTER: Fiber Optics Grade: 10 to 12

Unit/Theme	Content and Essential Questions	Skills	Methods of Assessment (test and quiz(zes) every unit)	Teacher Resources & Notes	Framework Strand/s & Standard/s
Morse code trans-mission	1. History of Morse code 2. uses 3. development of other codes	1. Students will be able to discuss how Morse code came about 2. Students will be able to use Morse code to send messages 3. Students will be able to encode messages sent to them	Lab send and receive Morse code Module exercises	Fiber optic cables, transmitter and receiver Module	Technology 6.1-6.5
Data trans-mission	1. Digital data 2. Logical highs and lows 3. Transmitting and re-transmitting 4. Handshaking	1. Students will be able to explain what makes up digital data 2. Students will be able to send and receive digital data 3. Students will be able to explain the term handshaking	Lab send and receiving digital data Module exercises	Fiber optic cables, module, transmitter and receiver, cables	
Voice trans-mission	1. Speed of sound 2. Magnifying sound speed 3. Transmitting and receiving voice messages using different methods	1. Students will be able to list how fast sound travels 2. Students will be able to identify things that could increase the speed at which sound travels 3. students will be able to send and receive voice transmissions using fiber optics and a laser.	Module exercises Lab transmitting and receiving voice using fiber optic cable Lab transmitting and receiving voice using a laser beam	Transmitter and receiver, module, laser, cables	
Radio trans-mission	1. Units of measure 2. Amplitude modulation (am) 3. Frequency modulation (FM)	1. Students will be able to explain how frequency is measured and what the measurements mean 2. Students will be able to explain how sound waves are converted to radio wavers	Lab transmission of AM and FM using a laser and a fiber optic cable.	Laser, cable, transmitter and receiver, power sources, radio	

Unit/Theme	Content and Essential Questions	Skills	Methods of Assessment (test and quiz(zes) every unit)	Teacher Resources & Notes	Framework Strand/s & Standard/s
	4. Transmitting AM and FM	3. Students will be familiar with the two major methods of sound conversion AM and FM 4. Students will actual transmit both AM and FM signals over a fiber optic cable and a laser beam	Module exercises		
Funda-mentals of optics	1. light descriptions 2. characteristics of light 3. light behavior 4. rainbows and t heir format ion	1. Students will be able to explain the role electromagnetic waves have with light 2. Students will be able to list the three main characteristics of light 3. Students will be able to explain what a rainbow really is and why they appear	Lab reflections and refraction Module exercises	Fiber optic cable, light source	
Laser light	1. Laser types 2. How to use a laser 3. Laser uses	1. Students will be able to explain the acronym for t he word laser 2. Students will be able to explain the basic properties of laser light 3. Students will be able to show the difference between ordinary light and laser light	Lab laser light versus ordinary light	Laser, module, light source	
Lasers	1. Parts of a laser 2. Laser uses and real world application 3. Using a laser correctly	1. Students will be able to identify the three main parts of a laser. 2. Students will be able to give several examples of where lasers are used in the world today	Module exercises Career activity Lab laser lights	Lasers, module	

SUBJECT MATTER: Flight Grade: 10 to 12

Unit/Theme	Content and Essential Questions	Skills	Methods of Assessment (test and quiz(zes) every unit)	Teacher Resources & Notes	Framework Strand/s & Standard/s
Aviation	1. History of aviation 2. Major parts an airplane and their function 3. Flight simulator	1. Students will be able to discuss the major events in the history of flying. 2. Students will be able to locate five major airplane parts and be able to describe their function 3. Students will take an introductory flight lesson on the flight simulator	Matching exercise Module flight	Flight simulator software and yoke& rudders module	Does not line up with frameworks
Controls and Instruments	1. Plane construction 2. Yoke, rudder, throttle 3. Instrument panel and function	1. Students will be able to construct and fly their own wooden plane 2. Students will be able to point out and explain the function of the yoke, rudder and throttle 3. Students will be able to identify key elements such as altimeter	Module questions Lab plane construction	Model plane, glue, worksheet	
Taxiing	1. Driving the plane 2. Taxiing using the flight simulator	1. Students will be able to explain what taxiing actually is 2. Students will be able to taxi using the flight simulator	Module exercises Lab practicing taxiing on flight simulator	Flight simulator software	
Takeoff	1. Steering 2. Plane velocity 3. Lift	1. Students will learn the correct way to lineup a plane 2. Students will be able to explain he effect has on a planes velocity 3. Students will be able to use the flight simulator to correctly take off.	Module exercises Lab flight simulator	Flight simulator module	
Flying	1. Forces on a plane (drag, lift, weight, thrust) 2. Leveling off	1. Students will be able to explain the major forces acting on their aircraft 2. Students will be able to use the flight simulator to change direction and to level off.	Module exercises Lab flight simulator flying	Flight simulator	

Unit/Theme	Content and Essential Questions	Skills	Methods of Assessment (test and quiz(zes) every unit)	Teacher Resources & Notes	Framework Strand/s & Standard/s
	3. Change direction using a compass				
Landing	1. How to land 2. Dangers involved in landing 3. Landing using flight simulator	1. Students will be able to list the dangers of landing an aircraft 2. Students will be able to land safely using the flight simulator	Module exercises Practice landing flight simulator	Flight simulator	
Solo flight and licenses	1. Requirements for permits and licenses 2. Types of licenses 3. Instrument rating	1. Students will be able to explain the difference in a permit vs. a license requirement 2. Students will be aware that there are more than one type of license 3. Students will be able to explain what the different instrument rating mean	Module quizzes Career activity Lab solo flight simulator	Flight simulator	

SUBJECT MATTER: Plastics Grade: 10 to 12

Unit/Theme	Content and Essential Questions	Skills	Methods of Assessment (test and quiz(zes) every unit)	Teacher Resources & Notes	Framework Strand/s & Standard/s
History of plastics	1. Development of plastics 2. Natural vs. synthetic 3. Evolution of synthetic plastics 4. Commercial uses of plastics particularly celluloid	1. Students should understand that plastics have been used for centuries 2. Students should be able to name and explain both natural and synthetic plastics 3. Students should be able to recognize and explain how plastics are used today.	Timeline activity Module exercises	Module timeline and instructions	
Vacuum forming	1. Celluloid vs. bakelite plastics 2. Color range and how it was achieved 3. Vacuum forms	1. Students will be able to explain the difference between celluloid (partial synthetic) 2. Understand how the creation of powder colors helped allow plastics to be different hues 3. Students should know how to correctly use a vacuum form machine	Module questions	Vacuum molding machine, molds, plastic sheets	
Basic chemistry of plastics	1. structure of plastics 2. mixture vs. pure substance (compound and element) 3. properties of matter 4. bonding 5. isotopes, nucleus and parts 6. Physical vs.	1. Students should be able to define matter 2. Students should be able to give examples of a mixture and of a pure substance 3. Students should be able to understand the concept between ionic and covalent bonds 4. Students should be able to identify the parts of an atom and their function 5. Define a chemical reaction and carry out an experiment to demonstrate one	Module exercises Chemical reaction lab	Dish detergent, metal dish, test tube, sodium tetraborate, water, periodic table	

Unit/Theme	Content and Essential Questions	Skills	Methods of Assessment (test and quiz(zes) every unit)	Teacher Resources & Notes	Framework Strand/s & Standard/s
	chemical properties 7. chemical reactions				
Properties of plastics	1. Classification of plastics 2. Thermoplastics vs. thermosets 3. Polymerization	1. Students will be able to classify plastics based on molecular structure and respons4e to heat 2. Students will understand the difference between thermoplastics and thermosets 3. Students will be able to name the building blocks of polymers and explain the process of polymerization. 4. Students will be able to carry out a polymerization lab	Module exercises Lab fluid polymer lab Molding lab	Molding machine, plastic sheets, molds Water, test tube, detergent	
Injection molding	1. Nature of injection molding pressure vs. heat 2. Parts of an injection mold 3. Injection mold operations	1. Students will understand the concept of injection molding 2. Students will be able to identify the parts of an injection molding machine 3. Students will be able to operate an injection molding machine 4. students will produce a product using the molding machine	Module exercises Lab making a screwdriver Lab making a key chain	Plastic beads, injection molding machine, safety gloves and goggles, molds, screwdriver part, key ring, powder coloring	
Character-istics of thermosetti ng resins	1. Thermosetting resins 2. Phenolics 3. Rreas 4. Melamine 5. Polyesters 6. Epoxy resins 7. Silicones	1. Students will be able to explain characteristics of thermosetting resins 2. Understand that some naturally occurring materials can be made synthetically 3. students will understand properties of different resins such as polyesters, epoxy and melamine 4. Students will be able to explain why silicones are considerably different type of	Modules exercises Polymer experiments using injection molding	Injection molding machine, plastic beads, color dust, molds	

Unit/Theme	Content and Essential Questions	Skills	Methods of Assessment (test and quiz(zes) every unit)	Teacher Resources & Notes	Framework Strand/s & Standard/s
		thermosetting			
Characteristics of Acrylics	1. Uses /characteristics of polyethylene and polystyrene 2. Uses/characteristics of nylon (polyamide) 3. Polyvinyl used as rubber substitute 4. Careers in plastics	1. Students will understand the versatility of many acrylics 2. students will be able to identify different types of plastics based on their characteristics 3. Students will explore various careers in the field of plastics.	Module quizzes Career exploration Lab using acrylics	Module, handouts and text on careers, various types of acrylics and thermosetting plastics	

SUBJECT MATTER: Space and Rocketry Grade: 10 to 12

Unit/Theme	Content and Essential Questions	Skills	Methods of Assessment (test and quiz(zes) every unit)	Teacher Resources & Notes	Framework Strand/s & Standard/s
History of Space Studies	1. Ptolemy 2. N.Copernicus 3. Galaxies	1. Students will be able to compare and contrast the Ptolemy model with that of Copernicus 2. Students will be able to identify the true solar system model 3. Students will be able to explain what makes up a galaxy and identify which galaxy we live in.	Timeline activity Module exercises	Module	Earth Science 4.1
Early Space Exploration	1. History of rockets 2. Newton's third law 3. Early space missions	1. Students will be able to explain who first used rockets. 2. Students will be able to relate Newton's third law to rocket launches 3. Students will be able to explain the Apollo 11 mission and its current day controversies	Lab build model rocket Module exercises	Module Rocket, glue, ruler	ES 4.1
Space Shuttle	1. Shuttle design 2. Three main shuttle components 3. launches and missions	1. Students will be able to explain why a space shuttle is reusable. 2. Students will be able to explain the function of the three main components of a shuttle 3. Students will be able to correctly and accurately use the space simulator software. 4. Students will be able to discuss several space missions in addition to t he Apollo 11 mission.	Module exercises Lab using space simulator software	Space software	ES 4.1, 4.3
Working in Space	1. Living in space 2. International space station	1. Students will be able to explain the major obstacles of living in space and be able to discuss how they are over come. 2. Students will be able to discuss the major functions of the international space station	Module exercises Environmental activity Computer research	Internet, module, worksheets	ES 4.1-4.3

Unit/Theme	Content and Essential Questions	Skills	Methods of Assessment (test and quiz(zes) every unit)	Teacher Resources & Notes	Framework Strand/s & Standard/s
			lab on the space station		
Solar System	1. Sun 2. Orbits 3. Planets	1. Students will be able to explain the rotation of the planets and the importance of the sun. 2. Students will be able to name the eight planets and match basic statistics to each one. 3. Students will successfully use the space simulator to conduct "missions" to several of these planets	Module exercises Lab solar system	Worksheet solar system module, space simulator software,	ES 4.1-4.3
Deep Space and surroundings	1. Space colonies 2. Galaxies 3. Nova stars, nebulas	1. Students will be able to explain what a space colony is 2. Students will be able to use the stargazers program to properly identify nova stars and super nova stars. 3. Students will be able to explain what galaxy we live in and name galaxies that are near ours.	Lab stargazer's log	Space software	ES 4.2
Technology that results from Space	1. Technology 2. Rocket launch	1. Students will be able to explain at least two new technologies that resulted from a space mission 2. Students will be able t o successfully launch their rockets	Module quizzes Lab rocket launch	Rockets, battery pack, launch tube, engines,	

SUBJECT MATTER: Stress and engineering Grade: 10 to 12

Unit/Theme	Content and Essential Questions	Skills	Methods of Assessment (test and quiz(zes) every unit)	Teacher Resources & Notes	Framework Strand/s & Standard/s
Forces in structure	1. Forces 2. Equilibrium 3. Loads 4. Compression vs. tension	1. Students will be able to explain the relationship of force to gravity 2. Students will be able to demonstrate equilibrium 3. Students will be able to name the three main types of loads 4. Students will be able to explain the difference between tension and compression	Lab equilibrium Lab Loads Module exercises	Playing cards Boards, weights, beams	Technology 1.1-1.5, 2.1-2.4
Stress	1. Stress applications 2. Stress analyzer 3. Tension and compression 4. Torsion	1. Students will be able to explain what stress actually is. 2. Students will be able to safely use and extrapolate data from the stress analyzer. 3. Students will be able to calculate the amount of stress placed on an object 4. Students will understand the concept of torsion and will be able to demonstrate it.	Module exercises Lab stress analyzer Lab torsion	Stress analyzer, stress boards Chalk	
Physical properties of building materials (non-synthetic)	1. choosing materials based on their physical properties 2. physical properties 3. Hooke's law	1. students will understand how architects choose their building materials 2. Students will be able to accurately describe physical properties of building materials (tensile, hardness, corrosion etc) 3. Students will be able to apply Hooke's law.	Module exercises Lab testing stress of reinforced materials Lab Hooke's law	Cubes of various materials, periodic table, balance Rubber band, ruler, spring scale	
Testing materials force and stress	1. Description of properties 2. Synthetic materials 3. Polymers	1. Students will be able to describe properties of commonly used materials (brick, iron steel) 2. Students will be able to create a box beam and test it on the stress analyzer 3. Students will be able to explain what a	Module exercises Lab stress analyzer using box beams	Samples of materials Stress analyzer Box beam supplies	

Unit/Theme	Content and Essential Questions	Skills	Methods of Assessment (test and quiz(zes) every unit)	Teacher Resources & Notes	Framework Strand/s & Standard/s
	(thermoplastics and thermosets)	synthetic material is. 4. Students will explore the field of polymers: specifically thermosets and thermoplastics			
Shapes and Forces 1	1. Construction (post and lintel, arches, tetrahedron geodesic dome etc) 2. Building a roman arch 3. Geometric shapes	1. Students will build an arch that could hold the weight of an average person 2. Students will be able to compare common construction method. 3. Students will be able to build several geometric shapes	Lab roman arch Lab building geometric shapes Module exercises	Roman arch kit Beams and wooden sticks	
Shapes and forces 2	1. History of bridges 2. Bridge design 3. Arch bridges	1. Students will be able build a truss. 2. Students will be able to explain the advantages and disadvantages of basic bridge design 3. Students will be able to explain the progression of bridges over time. 4. Students will be able to name the three most common types of arches.	Lab stress analyzer and geometric shapes Lab design and build a bridge Module exercises	Geometric shapes, beams, glue t pins	
Building a structure	1. Architect sketches and blueprints 2. Models to scale 3. Careers	1. Students will be able to explain what a blueprint is and how it is used 2. Students will be able to draw a model to scale. 3. Students will be able to explain at least three careers in this field.	Module exercises Career activity Scale drawing activity	Graph paper, ruler, object	