Nevada CTE

Building Engineers II

UNDERSTAND CAREERS AND THE NATURE OF WORK 1.0	**1.0 UNDERSTAND CAREERS AND THE NATURE OF WORK** 1.0
Explore Career Pathways 1.1	**1.1.1** Relate your skills, interests, talents, and values to a career pathway 1.1.1
	1.1.2 Explain careers in each of the Career Clusters 1.1.2
	1.1.3 Research the pathway to a career of interest 1.1.3
	1.1.4 Describe the difference between various types of academic degrees and other credentials 1.1.4
	1.1.5 Discuss the importance of company dress codes 1.1.5
	1.1.6 Create or review an academic and career plan 1.1.6
	1.1.7 Define terms used within technical careers 1.1.7
Collaborate with Others 1.2	**1.2.1** Practice communicating with others in a variety of ways to explain an idea, solution, or problem 1.2.1
	1.2.2 Explain what it means to be reliable and honest 1.2.2
	1.2.3 Demonstrate leadership skills through participation in a school activity, club, or career and technical student organization 1.2.3
	1.2.4 Plan and/or participate in a community service project 1.2.4
	1.2.5 Demonstrate conflict-resolution skills 1.2.5
	1.2.6 Demonstrate critical-thinking and problem-solving skills 1.2.6
	1.2.7 Practice active listening skills 1.2.7
Practice Leadership Roles 1.3	**1.3.1** Demonstrate language, attitude, and manners suitable for the workplace 1.3.1
	1.3.2 Assume different roles on a team to accomplish a goal 1.3.2
	1.3.3 Discuss characteristics of a leader and a team member 1.3.3

	1.3.4 Prepare and make a presentation in front of a group 1.3.4
	1.3.5 Practice speaking to adults in an interview format 1.3.5
	1.3.6 Describe the importance of personal appearance 1.3.6
	1.3.7 Utilize a timeline to manage a project 1.3.7
PRACTICE SAFETY AND UTILIZE TOOLS 2.0	**2.0 PRACTICE SAFETY AND UTILIZE TOOLS** 2.0
Demonstrate Safety Practices 2.1	**2.1.1** Describe general lab safety rules and procedures 2.1.1
	2.1.2 Comply with lab dress standards and use of personal protective equipment (PPE) during lab activities 2.1.2
	2.1.3 Identify marked safety areas 2.1.3
	2.1.4 Identify the location and the types of fire safety equipment 2.1.4
	2.1.5 Demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment 2.1.5
	2.1.6 Identify the location of the posted evacuation routes 2.1.6
	2.1.7 Maintain an organized and clean work environment 2.1.7
	2.1.8 Follow verbal and written instructions to complete work assignments 2.1.8
Identify and Utilize Hand Tools 2.2	**2.2.1** Identify hand tools and their appropriate usage 2.2.1
	2.2.2 Identify standard and metric designation 2.2.2
	2.2.3 Demonstrate the proper techniques when using hand tools 2.2.3
	2.2.4 Demonstrate safe handling and use of appropriate hand tools 2.2.4
	2.2.5 Demonstrate proper cleaning, storage, and maintenance of hand tools 2.2.5
Utilize Power Tools 2.3	**2.3.1** Identify power tools and equipment and their appropriate usage 2.3.1
	2.3.2 Demonstrate the proper techniques when using power tools and equipment 2.3.2
	2.3.3 Demonstrate safe handling and use of appropriate power tools and equipment 2.3.3

	2.3.4 Demonstrate proper cleaning, storage, and maintenance of power tools and equipment 2.3.4
UNDERSTAND MEASUREMENT SYSTEMS 3.0	**3.0 UNDERSTAND MEASUREMENT SYSTEMS** 3.0
Demonstrate Use of Measuring Devices 3.1	**3.1.1** Operate a measuring tool to determine length, width, and height of an object 3.1.1
	3.1.3 Calculate the volume of an object 3.1.2
	3.1.3 Determine the weight of an object using a measuring tool 3.1.3
	3.1.4 Use a measuring tool to determine the time of an event 3.1.4
Describe Measurement Systems, Units, And Conversion 3.2	**3.2.1** Differentiate between the U.S. Customary System and Metric System of measurement 3.2.1
	3.2.2 Determine which measurement system to use in a given situation 3.2.2
	3.2.3 Discuss the relationships between unit dimension and what you are trying to measure 3.2.3
	3.2.4 Convert between and within U.S. Customary units or Metric units 3.2.4
Explain Ratios, Proportions, And Scale 3.3	**3.3.1** Demonstrate accurate measurements with fractions and decimals in various units 3.3.1
	3.3.2 Identify the scale between two mediums (sketch, 3D model, real world object) 3.3.2
	3.3.3 Use ratio reasoning to convert measurement units; manipulate and transform units appropriately 3.3.3
	3.3.4 Apply a scale when converting between two mediums (sketch, 3D model, real world object) 3.3.4
	3.3.5 Assess what scale/proportion is appropriate 3.3.5
Calculate Measurements 3.4	**3.4.1** Calculate the cost of the materials for a project 3.4.1
	3.4.2 Determine most efficient layout with given measurements to maximize resources 3.4.2
	3.4.3 Use length measurements to calculate surface area and volume 3.4.3
	3.4.4 Use length and time measurement to determine speed 3.4.4

UNDERSTAND THE ENGINEERING DESIGN PROCESS 4.0	**4.0 UNDERSTAND THE ENGINEERING DESIGN PROCESS** 4.0
Explain the Steps in The Design Process 4.1	**4.1.1** Identify the steps in an engineering design process 4.1.1
	4.1.2 Explain the relationships between the steps in the engineering design process 4.1.2
	4.1.3 Solve a problem using the engineering design process 4.1.3
	4.1.4 Apply the engineering design process in an interdisciplinary group with assigned roles (team leader, recorder, tester, presenter) 4.1.4
Describe Spatial Relations 4.2	**4.2.1** Explain the difference between one and two point perspectives 4.2.1
	4.2.2 Identify the quadrants and the X, Y and Z axes in a coordinate plane 4.2.2
	4.2.3 Apply rotations, reflections, and translations to two-dimensional and three-dimensional figures 4.2.3
	4.2.4 Describe the two-dimensional figures that result from slicing three-dimensional figures 4.2.4
Sketch an Object 4.3	**4.3.1** Compare and contrast the difference between a thumbnail, perspective, and isometric sketch 4.3.1
	4.3.2 Describe the qualities of a sketch that conveys information to an engineer 4.3.2
	4.3.3 Create a detailed sketch by hand with labels and dimension of an object 4.3.3
	4.3.4 Incorporate a sketch into the design process 4.3.4
Create A Model 4.4	**4.4.1** Describe the role that models have in the design process 4.4.1
	4.4.2 Create a model to demonstrate a solution to a problem 4.4.2
	4.4.3 Evaluate data generated from testing a prototype to determine if design modification is needed before manufacturing 4.4.3
	4.4.4 Use a computer simulation to evaluate a model's design 4.4.4
	4.4.5 Use computer software to create a 3D model 4.4.5
EXPLORE ROBOTICS AND AUTOMATION TECHNOLOGIES 5.0	**5.0 EXPLORE ROBOTICS AND AUTOMATION TECHNOLOGIES** 5.0

Explore the Role of Robotics and Related Technologies in Society 5.1	**5.1.1** Describe the purpose of automation and robotics and its effect on society 5.1.1
	5.1.2 Explore terminology related to basic robotics concepts 5.1.2
	5.1.3 Discuss the potential positive and negative impacts technology may have on the natural environment ultimately limiting possible solutions to various problems 5.1.3
	5.1.4 Discuss the roles and responsibilities of mechanical, electrical, and computer engineers 5.1.4
	5.1.5 Research employment opportunities in areas related to robotic technologies 5.1.5
Explain Gear Ratios 5.2	**5.2.1** Investigate and interpret the relationship between kinetic energy, mass, and speed of an object 5.2.1
	5.2.2 Identify standard units of measurement focusing on gear ratio 5.2.2
	5.2.3 Explain the difference between speed and torque 5.2.3
	5.2.4 Evaluate Newton's Law of Motion when designing a solution to a problem 5.2.4
	5.2.5 Identify standard gear assemblies, e.g., simple gear train, bevel gear, differential gear, universal joint, worm wheel, chain drive, belt drive, crank and slider, and cam and follower 5.2.5
	5.2.6 Research how standard gears are incorporated in various real world applications 5.2.6
Explore the Field of Automation 5.3	**5.3.1** Design, build, wire, and program both open and closed loop systems 5.3.1
	5.3.2 Use motors and sensors appropriately to solve robotic problems 5.3.2
	5.3.3 Troubleshoot a malfunctioning system using a methodical approach 5.3.3
	5.3.4 Use models, simulations, and peer feedback to test, modify, and improve solutions to various problems 5.3.4
	5.3.5 Integrate hardware and software design to solve a task using critical thinking and collaboration skills 5.3.5
UNDERSTAND POWER SYSTEMS 6.0	**6. UNDERSTAND POWER SYSTEMS** 6.0

Identify Power Systems 6.1	**6.1.1** Define terms used in power systems, e.g., power, work, horsepower, and watts 6.1.1
	6.1.2 Identify basic power systems 6.1.2
	6.1.3 List the basic components of a power system 6.1.3
Explain Electrical Systems 6.2	**6.2.1** Define AC and DC electrical systems 6.2.1
	6.2.2 Discuss safety concerns of working with electricity 6.2.2
	6.2.3 Describe the principles of generation, transmission, distribution, and storage of electricity 6.2.3
	6.2.4 Compute values of current, resistance, and voltage using Ohm's law 6.2.4
	6.2.5 Identify series, parallel, and series-parallel (combination) circuits 6.2.5
	6.2.6 Construct and test simple electrical circuits from a schematic 6.2.6
Describe Motors, Engines, And Drives 6.3	**6.3.1** Explain the difference between an electric motor and a combustion engine/generator 6.3.1
	6.3.2 Explain the function of an electric engine 6.3.2
	6.3.3 Research the parts and function of a small combustion engine 6.3.3
	6.3.4 Construct a simple drive system using ratios of gears 6.3.4
	6.3.5 Deconstruct a full drive system with gearing 6.3.5
RESEARCH ENERGY SOURCES 7.0	**7.0** RESEARCH ENERGY SOURCES 7.0
Describe Energy Sources 7.1	**7.1.1** Research non-renewable energy sources and their effect on the environment 7.1.1
	7.1.2 Research different types of renewable energy sources and their benefits 7.1.2
	7.1.3 Compare and contrast sustainable energy vs renewable energy sources 7.1.3
	7.1.4 Design a model related to a renewable or sustainable energy source 7.1.4
Explore Sustainable Construction 7.2	**7.2.1** Identify systems required in a residential home, e.g. electrical, plumbing, heating, ventilation, and air conditioning 7.2.1

	7.2.2 Explore various construction technologies to maximize energy consumption. 7.2.2
	7.2.3 Design an environmentally friendly building 7.2.3
	7.2.4 Evaluate a carbon footprint and how it can be reduced 7.2.4
UTILIZE CODING CONCEPTS 8.0	**8.0 UTILIZE CODING CONCEPTS** 8.0
Utilize Algorithms to Solve A Problem 8.1	**8.1.1** Use flowcharts and/or pseudocode to address complex problems as algorithms 8.1.1
Document Program Development 8.2	**8.2.1** Document programs (throughout the design, development, troubleshooting, and user experience phases) in order to make them easier to follow, test, and debug by others 8.2.1
Create Variables 8.3	**8.3.1** Create clearly named variables that represent different data types and perform operations on their values 8.3.1
Utilize Control Structures 8.4	**8.4.1** Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals 8.4.1
Organize Code with Modularity 8.5	**8.5.1** Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs 8.5.1
	8.5.2 Create procedures with parameters to organize code and make it easier to reuse 8.5.2