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	Secondary Competency Task List	
100	**ENGINEERING SAFETY**	
101	Implement a safety plan, including first aid procedures.	
102	Operate lab equipment according to safety guidelines.	
103	Use personal protective equipment.	
104	Comply with OSHA and EPA regulations for a safe work site.	
105	RESERVED	
106	Maintain safe working practices around tools and equipment.	
107	Participate in classroom and laboratory management and clean-up activities.	
108	RESERVED	
109	Execute lockout/tag out procedures.	
161	Explain laboratory safety precautions and procedures	
162	Demonstrate proper use of test equipment	
163	Demonstrate proper use of measuring equipment	
164	Complete OSHA 10 hour safety program	
200	**KNOWLEDGE OF ENGINEERING**	
201	Demonstrate knowledge of the history of engineering.	
202	Investigate engineering careers, training and associated opportunities.	
203	Participate on an engineering team.	
300	**ETHICS IN ENGINEERING**	
301	Identify current Professional Engineering codes of ethics.	
302	Analyze ethical engineering issues.	
303	Analyze and explain ethical and technical issues contributing to an engineering disaster.	
361	Describe the impact of changing technology	
400	**RESERVED**	
401	RESERVED	
402	RESERVED	
403	RESERVED	
404	RESERVED	
405	RESERVED	
500	**TEAMWORK**	
501	RESERVED	
502	Apply constructive feedback.	
503	Develop a plan for conflict resolution.	

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504	Apply active listening techniques.	
505	Communicate verbally and in writing	
506	Sell an idea to team members.	
507	RESERVED	
508	RESERVED	
509	Perform evaluations (e.g. peer, self, and management).	
600	**ENGINEERING GRAPHICS**	
601	Use graphics equipment and tools.	
602	Read and interpret various types of drawings.	
603	Perform metric-U.S. system conversions.	
604	Interpret scale on a drawing.	
605	Prepare freehand sketches.	
606	Apply line conventions.	
607	Prepare orthographic projection drawings.	
608	Prepare additional views to clarify the design.	
609	Apply principles of dimensioning and annotation.	
610	Prepare drawings for product assembly, fabrication, or construction.	
611	Create schematics.	
612	Revise an existing drawing to meet modifications or changes.	
661	Demonstrate, identify and prepare required parts of a complete design documentation package for a major design project	
662	Define and describe Gantt charts, abstract and milestones associated with a project	
663	Create animated assembly drawings using SolidWorks.	
700	**ENGINEERING PROBLEM SOLVING AND DESIGN PROCESSES**	
701	Apply the steps of an iterative design process.	
702	Create an engineering solution that meets a given design brief.	
703	RESERVED	
704	Generate a design improvement to address specific flaws/failures.	
705	Create a proposal for an engineering project.	
706	Participate in a design review.	
707	Prepare a schedule for a design project.	
708	Write an engineering problem statement.	
760	Prepare applied physics concepts relating to forces, work, energy, and gases	
761	Solve sample engineering problems using correct formulas and units of measure	
762	Demonstrate ability to apply correct units of measure for both standard and metric systems	
800	**MODELING**	
801	Identify the three areas of modeling (i.e., physical, conceptual, and mathematical).	

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802	Create a scale model or working prototype.	
803	Evaluate a scale model or a working prototype.	
804	RESERVED	
805	RESERVED	
860	Become familiar with all elements of a typical engineering drawing	
861	Develop a modeling sequence	
862	Produce a computer generated engineering drawing using SolidWorks.	
863	Produce a pencil sketch of an assembly with a minimum of 3 parts	
865	Build engineering models utilizing class supplies	
866	Design and create a 3D model from software drawing program(s)	
867	Design, draw, and build several individual models (race car, bridge, catapult, work cell, etc.)	
900	**MANUFACTURING AND INDUSTRIAL SYSTEMS**	
901	RESERVED	
902	RESERVED	
903	Describe procedures used in manufacturing.	
904	RESERVED	
905	Create and apply a flowchart that portrays a manufacturing process.	
906	Create a control system that replicates a factory cell.	
907	RESERVED	
908	Evaluate a product and the processes used in its manufacture.	
960	Explain the concept of Continuous Quality Improvement	
1000	**MANUFACTURING PROCESSES**	
1001	RESERVED	
1002	Determine the relationship of time and cost to manufacturing systems.	
1003	Determine if a manufacturing process is primary or secondary.	
1004	Evaluate and present a production line activity.	
1005	Analyze the product-development process.	
1006	Plan steps of production for a manufactured product.	
1007	List tools needed for a manufactured product.	
1008	Make a list of the production processes in manufacturing.	
1009	Apply manufacturing systems to develop and produce a product.	
1010	RESERVED	
1011	Write a step-by-step procedure for an assembly.	
1012	Identify methods and sources for obtaining materials and supplies.	
1013	Compile a materials list that includes vendors and costs for all required materials and equipment to build the prototype.	
1060	Create a manufacturing process flow diagram	
1061	Explain an actual manufacturing process of your choice	

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1062	Create a manufacturing process with the use of the robotic trainer	
1100	**COMPUTER ASSISTED MANUFACTURING (CAM)**	
1101	Prepare a process, identify machines that will be used to carry out the process, and then describe the work that each machine performs.	
1102	RESERVED	
1103	Demonstrate how to use CAM software to create a program for a machine part.	
1200	**POWER AND ENERGY**	
1201	Differentiate between power, work, and energy.	
1202	Discuss the forms of potential and kinetic energy.	
1203	Design a vehicle that stores and releases potential energy for propulsion.	
1204	RESERVED	
1205	Calculate the efficiency of energy conversions (e.g., electrical, fluid, mechanical).	
1206	RESERVED	
1207	Explain the Laws of Thermodynamics.	
1300	**MECHANICAL ADVANTAGE AND MECHANISMS**	
1301	Identify examples of the six simple machines, their attributes and components.	
1302	Measure forces and distances related to mechanisms.	
1303	Calculate mechanical advantage and drive ratios of mechanisms.	
1304	Design, create, and test various drive systems.	
1305	Determine efficiency in a mechanical system.	
1306	Convert power between units.	
1307	Measure torque, and use it to calculate power.	
1308	RESERVED	
1400	**FLUID POWER SYSTEMS**	
1401	Design, create, and test a fluid power system.	
1402	Identify components of a fluid system.	
1403	Calculate values in a fluid power system, using Pascal's Law.	
1404	Calculate values in a pneumatic system, using the ideal gas laws.	
1405	Calculate flow rate, flow velocity, and mechanical advantage in a fluid power system.	
1406	RESERVED	
1500	**GREEN ENERGY**	
1501	Produce mechanical power, using alternative energy systems.	
1502	Research renewable/non renewable energy sources.	
1503	Investigate energy efficiency and conservation.	
1504	Create a model that will utilize a renewable energy concept.	

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1505	RESERVED	
1506	Prepare a concept of an alternative energy for transportation.	
1600	**MACHINE CONTROLS AND AUTOMATED SYSTEMS**	
1601	Choose appropriate machine control inputs and outputs, based on the need of a technological system.	
1602	RESERVED	
1603	Differentiate between the characteristics of digital and analog devices.	
1604	Select between open and closed loop systems to solve a technological problem.	
1605	Create system control programs using flowchart logic.	
1606	RESERVED	
1607	RESERVED	
1608	Identify components needed to integrate computer controls for an automated system.	
1609	Plan, design, program, and construct an automated system based on given constraints.	
1610	RESERVED	
1611	Interface system output to another automated system.	
1612	Create and program a simulated work cell with simulation software.	
1613	Program timers, counters and loops.	
1614	Select appropriate motors for an application.	
1615	Interface output devices to a computer, microcontroller or programmable logic controller.	
1700	**PROPERTIES OF MATERIALS**	
1701	Describe the properties of natural, composite, and synthetic materials.	
1702	Investigate methods used to alter materials.	
1703	Illustrate causes of failure in materials.	
1704	Calculate material properties relating to a stress strain curve.	
1705	Create a written report of material test evaluations.	
1706	Solve a problem, design a product, or a prototype, that requires natural, composites and/or synthetic materials.	
1800	**RESERVED**	
1801	RESERVED	
1802	RESERVED	
1803	RESERVED	
1804	RESERVED	
1805	RESERVED	
1900	**STATICS AND DYNAMICS**	
1901	Demonstrate knowledge of the principles of statics and dynamics to calculate the strength of a structure.	
1902	Create free body diagrams of objects, identifying all forces acting on the object.	
1903	Locate the centroid of a rectangle and a triangle, using mathematics.	

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1904	Calculate the moment of inertia for a rectangular shape.	
1905	Differentiate between scalar and vector quantities.	
1906	Identify magnitude, direction, and sense of a vector.	
1907	Calculate the X and Y components, given a vector.	
1908	Calculate moment forces, given a specified axis.	
2000	**KINEMATICS**	
2001	Calculate distance, displacement, speed, velocity, and acceleration.	
2002	Calculate acceleration due to gravity, based on data from a free-fall device.	
2003	Calculate the X and Y components of a projectile motion.	
2004	Determine the needed angle to launch a projectile a specific range, given the projectile's initial velocity.	
2100	**TOTAL QUALITY CONTROL**	
2101	Explain the eight "M's" as they relate to quality control in the manufacturing industry: Machines, Methods, Materials, Manpower, Measurement, Milieu, Management, and Maintenance.	
2102	Demonstrate knowledge of ISO quality standards.	
2103	Demonstrate the application of the following Total Quality Management techniques: Cause and Effect Diagram, Check Sheet, Control Chart, Histogram, Pareto Chart, Scatter Diagram, and Flow Chart.	
2104	Create a total quality control checklist for a product.	
2105	RESERVED	
2106	Identify how to correct, and improve, a finding from an inspection document.	
2107	Develop a report of inspection observations and findings.	
2200	**PRECISION MEASUREMENT FOR INDUSTRY**	
2201	RESERVED	
2202	Make linear measurements accurately to 1/16".	
2203	Use a micrometer to measure accurately to .001".	
2204	Use a dial caliper to measure accurately to .001".	
2205	Perform angular measurement to the nearest one degree.	
2206	Use a height gauge to measure accurately to .001".	
2207	Use inside micrometers and telescoping gauges to measure accurately to .001".	
2208	Express numbers in scientific notation, and engineering notation.	
2300	**BASIC ELECTRICITY AND ELECTRONICS**	
2301	Follow safety rules in the use of electrical lab machines and equipment.	
2302	Define and describe basic terms in electricity and electronics.	
2303	Identify electrical and electronic symbols on a schematic.	
2304	Follow a schematic and construct series and parallel electrical and electronic circuits.	

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2305	Identify resistors by type and value.	
2306	Use various types of sensing and control devices.	
2307	Use a digital multi-meter to measure circuit values of current, resistance, and voltage.	
2308	Compute values of current, resistance and voltage using Ohm's Law.	
2309	Compare DC and AC waveforms.	
2310	Analyze and measure values in AC circuits (including inductance, capacitance, reactance, and LRC circuits).	
2311	Calculate voltage, amperage, resistance, and power in all types of circuits.	
2312	Troubleshoot all types of circuits.	
2313	Identify functions, operation, and characteristics of grounding systems.	
2314	RESERVED	
2315	RESERVED	
2316	Identify and install electrical panel boards and switchboards.	
2317	Identify, select, and install over-current devices.	
2318	RESERVED	
2319	Explain transformer operation.	
2320	Describe and identify types of oscillators.	
2321	RESERVED	
2322	Construct an amplifier circuit and verify the characteristics.	
2323	Construct a power supply circuit and verify operation.	
2324	RESERVED	
2325	RESERVED	
3000	**ADVANCED STUDENT PROJECTS**	
3060	Explore individual topics which reflect personal interests, future goals, and levels of ability	
3061	Demonstrate individual initiative or group responsibility	
3062	Determine resource materials to express ideas and talents	
3063	Exchange ideas with peers during the development stage of the project	
3064	Develop a personal resume	
3065	Identify the components of and develop a employment portfolio	