Student Competency Record
Technology of Robotic Design
8421 - 36 weeks

_____   _____

_____   _____
Student   **School Year**

_____   _____

_____   _____
School   **Teacher Signature**

Traditional letter or numerical grades do not provide adequate documentation of student achievement in competency-based education; therefore, the Virginia Standards for CBE require a recording system to provide information about competencies achieved to employer, student-employee, and teacher. The Student Competency Record provides a means for keeping track of student progress. Ratings are assigned by the teacher for classroom competency achievement and by the teacher-coordinator in conjunction with the training sponsor when competence is evaluated on the job.

Tasks/competencies designated "Required" are considered essential statewide and are required of all students. In some courses, all tasks/competencies have been identified as required. Tasks/competencies marked "Optional" are considered optional; they and/or additional tasks/competencies may be taught at the discretion of the school division. Tasks/competencies marked with an asterisk (*) are considered sensitive, and teachers should obtain approval by the school division before teaching them. Student competency records should be kept as long as the student is enrolled in the school and for five years after the student graduates/leaves the school.

Note: Students with an Individualized Education Program (IEP) or an Individualized Student Alternative Education Plan (ISAEP) will be rated, using the following scale, only on the competencies identified in their IEP or ISAEP.

Students will be expected to achieve a **satisfactory rating** (one of the three highest marks) on the Student Competency Record (SCR) rating scale on at least 80% of the required (essential) competencies in a CTE course.

...RATING SCALE...
1 - Can teach others
2 - Can perform without supervision
3 - Can perform with limited supervision
4 - Can perform with supervision
5 - Cannot perform

8421 36 weeks		Technology of Robotic Design TASKS/COMPETENCIES	Date	Rating
		Demonstrating Personal Qualities and Abilities		
Required	1	Demonstrate creativity and innovation.		
Required	2	Demonstrate critical thinking and problem solving.		
Required	3	Demonstrate initiative and self-direction.		
Required	4	Demonstrate integrity.		
Required	5	Demonstrate work ethic.		
		Demonstrating Interpersonal Skills		
Required	6	Demonstrate conflict-resolution skills.		
Required	7	Demonstrate listening and speaking skills.		
Required	8	Demonstrate respect for diversity.		
Required	9	Demonstrate customer service skills.		
Required	10	Collaborate with team members.		
		Demonstrating Professional Competencies		
Required	11	Demonstrate big-picture thinking.		
Required	12	Demonstrate career- and life-management skills.		
Required	13	Demonstrate continuous learning and adaptability.		
Required	14	Manage time and resources.		
Required	15	Demonstrate information-literacy skills.		
Required	16	Demonstrate an understanding of information security.		
Required	17	Maintain working knowledge of current information-technology (IT) systems.		
Required	18	Demonstrate proficiency with technologies, tools, and machines common to a specific occupation.		
Required	19	Apply mathematical skills to job-specific tasks.		
Required	20	Demonstrate professionalism.		
Required	21	Demonstrate reading and writing skills.		
Required	22	Demonstrate workplace safety.		
		Examining All Aspects of an Industry		
Required	23	Examine aspects of planning within an industry/organization.		
Required	24	Examine aspects of management within an industry/organization.		
Required	25	Examine aspects of financial responsibility within an industry/organization.		

Required	26	Examine technical and production skills required of workers within an industry/organization.		
Required	27	Examine principles of technology that underlie an industry/organization.		
Required	28	Examine labor issues related to an industry/organization.		
Required	29	Examine community issues related to an industry/organization.		
Required	30	Examine health, safety, and environmental issues related to an industry/organization.		
	Addressing Elements of Student Life			
Required	31	Identify the purposes and goals of the student organization.		
Required	32	Explain the benefits and responsibilities of membership in the student organization as a student and in professional/civic organizations as an adult.		
Required	33	Demonstrate leadership skills through participation in student organization activities, such as meetings, programs, and projects.		
Required	34	Identify Internet safety issues and procedures for complying with acceptable use standards.		
	Exploring Work-Based Learning			
Required	35	Identify the types of work-based learning (WBL) opportunities.		
Optional	36	Reflect on lessons learned during the WBL experience.		
Required	37	Explore career opportunities related to the WBL experience.		
Optional	38	Participate in a WBL experience, when appropriate.		
	Exploring Robotics and Automation Systems			
Required	39	Define *robotics*, *automation*, and *control systems*.		
Required	40	Investigate careers in robotics, automation, and control systems.		
Required	41	Research the history and development of robotics, automation, and control systems.		
Required	42	Explain the universal systems model (i.e., input, process, output, and feedback).		
Required	43	Apply direct and indirect measurement systems and coordinate systems.		
Required	44	Identify open and closed loops in control systems.		
	Applying the Basics of Control and Distribution of Energy			
Required	45	Describe the concepts of voltage, current, and resistance in electricity.		

Required	46	Describe the difference between alternating and direct current.		
Required	47	Identify safety precautions and information for electricity (AC and DC), mechanical, hydraulic, and pneumatic systems.		
Required	48	Explain the primary functions of electronic systems components.		
Required	49	Identify the primary concepts and components of mechanical systems.		
Required	50	Explain primary concepts and components of a fluid power system.		
Required	51	Describe the differences between and uses of analog and digital electronics for the control of power distribution systems.		
Required	52	Describe the operation of basic logic circuits.		
Required	53	Measure circuit values with a multimeter.		
Required	54	Identify the primary types of data transmission hardware.		
	Exploring Microprocessor/Microcontroller (Computer) System Basics			
Required	55	Describe the function of an operating system.		
Required	56	Describe the essential components of a computing system.		
Required	57	Describe the software applications of computer technology within automation systems.		
Required	58	Describe how computers are used to control automated systems.		
Required	59	Describe a microcontroller.		
Required	60	Describe the function of interfacing robotic systems.		
Required	61	Describe the function of a microcontroller/logic controller.		
Required	62	Describe the fundamentals of computer numeric control (CNC).		
Required	63	Identify microcontrollers and their functions within industry tools, including PLC.		
Required	64	Develop a computer-controlled model solution to a problem.		
	Manipulating and Controlling Data			
Required	65	Describe the need for data manipulation and control.		
Required	66	Manipulate data.		
Required	67	Ensure the security of data.		
	Exploring Communication and Networking			
Required	68	Explain types of communication/networking and layers.		

Required	69	Describe various types of ports, channels, and controllers for robotic communications.		
Required	70	Define a process control network (PCN).		
Required	71	Plan a PCN for various systems.		
		Exploring the Components of Robotics and Automation Systems		
Required	72	Identify components of safe robotic systems.		
Required	73	Describe types and functions of sensors and the intelligent systems used to analyze and expand on these functionalities.		
Required	74	Describe the options for power supplies, silicon-controlled rectifiers (SCRs), solenoid valves, actuators, and motors to control movement systems.		
Required	75	Describe types and functions of relays.		
Required	76	Describe various hardware and software used in the industry.		
Required	77	Describe precision measurement equipment and techniques.		
Required	78	Describe components or processes that typically require precision measurement.		
		Assembling an Automated System		
Required	79	Compare open and proprietary hardware components.		
Required	80	Simulate functions of all components of a working automated system.		
Required	81	Assemble an automated system.		
Required	82	Reengineer the design of an existing system.		
Required	83	Simulate precision measurements of components in a control system.		
Required	84	Simulate control, robotics, and automation systems.		
Required	85	Install a machine vision system on an existing design.		
		Programming an Automated System		
Required	86	Implement basic programming procedures.		
Required	87	Select the most appropriate programming language/platform for application.		
Required	88	Program an automated system.		
		Locally Developed Tasks/Competencies		