Great Oaks Engineering Technologies and Robotics Essential Skills Profile

This profile provides an outline of the skills required for successful completion of this career program. Additional information is located on the Great Oaks website at https://hs.greatoaks.com/future-students/essential-skills-for-high-school-programs and selecting the corresponding career program.

Recommended WorkKeys® Scores for Engineering Technologies and Robotics

Applied Mathematics – 5
Workplace Documents – 6
Graphic Literacy – 6

*Practice tests and more information at https://jobseeker.ohiomeansjobs.monster.com/Assessments/Home.aspx

Recommended Essential Skills to Successfully Complete the Program			
Rating Key:	**Low = Slightly Essential**	**Medium = Essential**	**High = Very Essential**

Key Vocational Factors		**Rating**
Visual Acuity	The ability to detect differences/details visually	High
Depth Perception	The ability to detect the physical distance/depth of objects in space and time	High
Oral Communication	The ability to express/explain ideas	High
Written Communication	The ability to communicate in a written format and record information accurately	High
Physical Mobility/Strength	Extended times sitting and using computers	Medium
Eye-hand Coordination	The ability to use tools	High
Auditory Acuity	The ability to detect differences in pitch and sound	Medium
Reasoning Skills	Deductive: ability to apply general rules to specific problems and Inductive: ability to combine pieces of information to form conclusions among seemingly unrelated events	High

Worker Trait Skills	**Rating**
Ability to get along with others	High
Ability to work independently, without close supervision	High
Ability to work toward work including tasks of minimal interest	Medium
Ability to work accurately, recheck and correct work, to an industry standard	High
Ability to work accurately/within industry standards	High
Dependability (Attendance and Punctuality)	High
Ability to follow and retain:	
Multistep oral instructions	High
Written instructions/technical manuals - multistep	High

Simple to complex diagram instructions	High
Visual models or demonstrated instructions	High
Ability to use tools of trade (soldering iron, signal conditioners, multi-meters, microcontrollers, force or torque sensors, etc.)	High
Ability to use numerical data (count, measure, compute, etc.) in applied setting	High
Ability to discriminate between objects of similar:	
Size	High
Shape	High
Color	Medium
Spatial Relationship	High
Ability to organize work process/follow defined procedures	High
Ability to follow sequence or to determine sequence of actions to a successful conclusion	High
Critical Thinking: Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems	High
Reading Comprehension: Understanding written sentences and paragraphs in work related documents	High
Active Listening: Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times	High

Applied Mathematics Skills * Recommended WorkKeys® Scores 5	
Understanding of numbers	Work with whole numbers and decimals.
Mathematical Calculations	Use one or two-step calculations to solve problems, decide what information, calculations or unit conversions to use to answer a problem
Solving problems with math	Solve problems that require mathematical operations with multiple units (e.g. 6 feet 4 inches or 4 hours 30 minutes), identify calculation mistakes
Workplace Documents Skills * Recommended WorkKeys® Scores 6	
Complexity	Somewhat complicated sentences that may be long and complex and may contain conditional situations
Information and detail	Contains implied and extraneous details
Vocabulary	Difficult and advanced words, technical jargon and meanings may need to be determined from text
Document type	Informational, instructional and policy-type documents, multiple related documents
Graphic Literacy Skills * Recommended WorkKeys® Scores 6	
Using charts/graphs	Locate information in charts or graphs, identify a graphic that accurately represents data
Interpreting information	Compare two or more pieces of information, identify trends/patterns, make inference and identify graphics that accurately represents data, interpret a trend or relationship

Additional Recommended Abilities

Problem Sensitivity	The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
Visualization	The ability to imagine how something will look after it is moved around or when its parts are moved or rearranged.
Deductive Reasoning	The ability to apply general rules to specific problems to produce answers that make sense.

Knowledge Required in Engineering Technologies and Robotics Field

Engineering and Technology	Knowledge of the practical application of engineering science and technology. This includes applying principles, techniques, procedures, and equipment to the design and production of various goods and services.
Computers and Electronics	Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.
Design	Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.

Additional Considerations

Must have strong critical evaluation skills and analytical thinking	Must possess strong attention to detail
Strong computer skills	Independent work
Sitting for extended time	Must be creative
Enjoy Science and Math	Strong Math background

Engineering Technologies and Robotics Work Activities

Debug robotics programs.	Provide technical support for robotic systems.
Review or approve designs, calculations, or cost estimates.	Install, calibrate, operate, or maintain robots.
Supervise, technologists, technicians, or other engineers.	Process or interpret signals or sensor data.
Investigate mechanical failures or unexpected maintenance problems.	Integrate robotics with peripherals, such as welders, controllers, or other equipment.
Create back-ups of robot programs or parameters.	Make system device lists or event timing charts.

Design automated robotic systems to increase production volume or precision in high- throughput operations, such as automated ribonucleic acid (RNA) analysis or sorting, moving, or stacking production materials.	Design robotic systems, such as automatic vehicle control, autonomous vehicles, advanced displays, advanced sensing, robotic platforms, computer vision, or telematics systems.
Document robotic application development, maintenance, or changes.	Plan mobile robot paths and teach path plans to robots.
Analyze and evaluate robotic systems or prototypes.	Design end-of-arm tooling.
Build, configure, and test robots.	Automate assays on laboratory robotics.
Design software to control robotic systems for applications, such as military defense or manufacturing.	Write algorithms or programming code for ad hoc robotic applications.
Conduct research into the feasibility, design, operation, or performance of robotic mechanisms, components, or systems, such as planetary rovers, multiple mobile robots, reconfigurable robots, or man-machine interactions.	Conduct research on robotic technology to create new robotic systems or system capabilities.
Identify opportunities or implement changes to improve products or reduce costs using knowledge of fabrication processes, tooling and production equipment, assembly methods, quality control standards, or product design, materials and parts.	Determine root causes of failures using statistical methods and recommend changes in designs, tolerances, or processing methods.
Troubleshoot new or existing product problems involving designs, materials, or processes.	Review product designs for manufacturability or completeness.
Apply continuous improvement methods such as lean manufacturing to enhance manufacturing quality, reliability, or cost-effectiveness.	Investigate or resolve operational problems, such as material use variances or bottlenecks.
Estimate costs, production times, or staffing requirements for new designs.	Evaluate manufactured products according to specifications and quality standards.
Design layout of equipment or workspaces to achieve maximum efficiency.	Prepare reports summarizing information or trends related to manufacturing performance.

Technology

Operating system software	File versioning software
Development environment software	Computer aided design CAD software
Analytical or scientific software	PLC software

Certifications Students Can Earn

Credential	Ohio Graduation Points
Pre-apprenticeship Engineering/Manufacturing	12
Certified Solid Works Professional	6
FANUC – Handling, Tool Operation and Programming	6
Motoman DX100 Basic Programming with Material Handling	6
Certified Solid Works Associate	4
OSHA 10 – General Industry	1
CPR/First Aid Certification	1

Possible College Credits

College Credit Plus (CCP)	The CCP program provides Ohio high school students an opportunity to complete college courses and earn transcripted credit.
Career Technical Assurance Guides (CTAGs)	CTAGs award college credit for career-technical coursework to students who complete an approved course and earn a qualifying score on the end of course exam.
Articulated Credit	Some Great Oaks career-technical programs have agreements with colleges where student can earn credit toward a specific degree.

Please speak with your school counselor, Great Oaks counselor and/or career technical instructor to learn more about these potential opportunities.

Possible Career Pathways

CNC Programmer	Automation Specialist
Robotic Technician	Programmer
Electrical Engineer	Mechanical Engineer
Programmer	Manufacturing Engineer