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 http://hs.greatoaks.com/essential-skills-high-school-programs/ and selecting the corresponding career program.

Recommended Work Keys Scores for Engineering Technologies and Robotics

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

*Practice tests and more information at www.act.org/workkeys

Essential Skills Needed 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:	
Multi step oral instructions	High
Written instructions/technical manuals-multi step	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

Reading Skills *See Recommended Work Keys Scores	
Math Skills *See Recommended Work Keys Scores	
Counting-Recording-Comparing-Calculating	Whole numbers
Calculating Fractions, ratios	Geometry
Ratio, Formulas	Advanced Algebra

Additional Abilities Required

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	

Available Certifications

FANUC Handling Tool Operation & Programming J2P0310 IACT (6 Points)	Motoman DX100 Basic Programming with Material Handling (6 points)
Certified Solid Works Professional (CSWA) (6 points)	Certified Solid Works Associate (CSWA) (4 points)
CPR/First Aid Certification (1 point)	OSHA-10 hour –General Industyry (1 point)
ECSI (Emergency Care and Safety Institute)	Allen Bradley PLC (6 points)

Possible College Credits

College Credit Plus in English, Math, Social Studies, or Science	Must be preapproved. Must pass a college course at an Ohio college or College Credit Plus class at Great Oaks.
Career Technical Credit Transfer	The Ohio Transfer to Degree Guarantee helps career and technical students transfer credits earned in high school to community college or four-year degree programs. The credit can be used at any Ohio public college or university: • If you successfully completed your career-technical program and passed certain required assessments. • If you attend a similar program at a public Ohio college or university.

*Additional college or post-secondary education may be required in this field.

Possible Career Pathways

Manufacturing installer	Robotic programmer
Quality control inspector	Engineer
Manufacturing maintenance	