

# Georgia Department of Education Career Pathway Descriptions

## **Manufacturing Cluster**

*Planning, managing and performing the processing of materials into intermediate or final products and related professional and technical support activities such as production planning and control, maintenance and manufacturing/process engineering.*

### Mechatronics Pathway

The Mechatronics pathway is a pathway within the Manufacturing Career Cluster. The Mechatronics pathway has been developed to provide students with a strong foundation in the skills needed by advanced manufacturing industry. This pathway includes a core curriculum of three high school courses, followed by a work-based learning experience and/or additional training specific to the needs of the local community. Flexibility during the fourth year will enable this pathway to be tailored to the needs of local industry in order to further increase the student's career and post-secondary opportunities. Mechatronics skill sets provide students with opportunities to pursue rewarding and high-demand careers within the workplace. Mechatronics is a diverse field. It encompasses many inter-related disciplines including: Electronics, Mechanics, Fluid Power, Electrical Control Systems, Programmable Logic Controllers (PLC), Computers, and Robotics. Mechatronics is a term which includes the above disciplines and takes an integrated approach to their study. People employed in the mechatronics field deal with automated systems in a wide variety of applications. They also deal with related professional and technical support activities such as production planning and control, maintenance, and engineering. This pathway culminates with an opportunity for students to take the SkillsUSA Automated Manufacturing Technology (AMT); Robotics and Automated Technology (RAT) end of pathway assessment.

Course 1 – Introduction to Mechatronics-DC Theory, Pneumatic Systems, and Programmable Logic Controllers 21.46200

Course Description: By completing this course, students will be introduced to direct current concepts and applications, pneumatic system fundamentals, and programmable logic controllers (PLCs). Topics include, but are not limited to, electrical laws and principles, magnetism, series, parallel, and simple combination DC circuits, pneumatic system principles and components, and PLC installation and programming. Theory and practical application concepts are discussed and illustrated through labs. Furthermore, this course introduces students to the operational theory, systems terminology, installation, and programming procedures for PLCs. Emphasis is placed on PLC programming, connections, installation, and start-up procedures. Other topics include timers and counters, relay logic instructions, and hardware and software applications.

Course 2 – AC Theory, Electric Motors, and Hydraulic Systems 21.46300

Course Description: This course further expands the student's knowledge and understanding of Mechatronics through introducing students to: alternating current theory and applications of varying sine wave voltages and current, inductance and capacitance, motor theory and operating principles, control devices, symbols and schematic diagrams, preventative maintenance and troubleshooting, and hydraulic system principles and components. Theory and practical application concepts are discussed and illustrated through labs.

Course 3 – Semiconductors, Mechanical Systems, and Pump and Piping Systems 21.46400

Course Description: By completing this course, students will be introduced to electronics theory, mechanical systems, and pump and piping systems. Topics include, but are not limited to, diodes and amplifiers, semiconductor fundamentals, mechanical drives, measurement processes and techniques, maintenance tools, manufacturing processes, bearing design and application, and pump and piping systems. Theory and practical application concepts are discussed and illustrated through labs.

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