

WEEK 1: Foundational Skills for College and Career Success

- Growth Mindset and Self-Advocacy
- Navigating College Culture and Resources
- Time Management and Goal Setting Strategies
- Financial Literacy and Study Techniques

WEEK 2: Refresher in Math Fundamentals for Technical Fields

- Arithmetic and Fractions Review
- Application in Mechatronics and Manufacturing Context
- Pre-Course Prep for First-Semester Learners

WEEK 3: Workplace Safety and Industrial Readiness

- OSHA Standards and Industrial Hazards
- PPE and Emergency Protocols
- Lockout/Tagout (LOTO) and Ergonomics

WEEK 4: Introduction to Manufacturing Systems

- Measurement Tools and Techniques
- Manufacturing Efficiency and Processes
- Supply Chain Basics in Industrial Contexts

WEEK 5: Systems Thinking and Problem Solving

- Mechanical Principles and Simple Machines
- Electrical and Fluid Power Basics
- Troubleshooting and Preventive Maintenance

WEEK 6: Applied Photonics in Modern Manufacturing

- Laser Applications: Welding, Cutting, Marking
- Spectroscopy and Measurement Techniques
- Forensics, Security, and Industrial Usage

WEEK 7: Engineering Drawing and Visualization

- 3-View Sketching Techniques
- Special Views and Drawing Layout
- Basic Dimensioning and Graphics

WEEK 8: Computer-Aided Design (CAD) Basics

- CAD Terminology and Tools
- Drawing and Modifying Objects
- Applying Tolerancing and CAD Dimensioning

WEEK 9: Mechanical Systems Operations I

- Component Roles and System Safety
- Energy Flow, Force, and Torque Calculations
- Systems-Level Maintenance and Troubleshooting

WEEK 10: Mechanical Systems Operations II

- Power Transmission: Gears, Chains, Belts
- Lubrication and Component Analysis
- Technical Data Sheets and Troubleshooting

WEEK 11: Mechanical Systems Operations III

- Shafts, Couplings, Bearings: Maintenance and Lubrication
- Predictive and Preventative Techniques
- Alignment, Bushings, Seals

WEEK 12: Electrical Principles and Tools I

- Electrical Safety and Circuit Fundamentals
- AC/DC Principles and Power Concepts
- Using Multimeters, Oscilloscopes, and Probes

WEEK 13: Electrical Principles and Tools II

- Parallel Circuits and Reed Switches
- Voltage/Current Dividers, Solenoids

- Indicators, Relays, and Troubleshooting Methods

WEEK 14: Electrical Principles and Tools III

- Sensors: Photoelectric, Capacitive, Inductive
- Electromagnetism and Motor Basics
- Instrumentation and Advanced Troubleshooting

WEEK 15: Introduction to Automation I

- DC Motor Operations and Controls
- PLC Concepts and Hardware Overview
- Troubleshooting and Component Handling

WEEK 16: Introduction to Automation II

- AC Motors and Three-Phase Systems
- PLC Architecture and Logic Systems
- Boolean Algebra in Circuit Design

WEEK 17: Introduction to Automation III

- AC Motor Control and Speed Adjustment
- PLC Input/Output Modules and Symbolism
- Interpreting Ladder Diagrams

WEEK 18: Professional Skills in STEM Environments

- Attitude and Behavior in Technical Workplaces
- Communication and Teamwork Skills
- Workplace Expectations and Success Habits

WEEK 19: Automation and PLC Programming I

- Motor Protection and Regenerative Braking
- National Electrical Code (NEC) Basics
- Circuit and Relay Logic Principles

WEEK 20: Automation and PLC Programming II

- PLC Programming: Entry and Monitoring
- Component Addressing and Troubleshooting
- Analog to Digital Conversions

WEEK 21: Automation and PLC Programming III

- Data Manipulation and Loop Systems
- Arithmetic Instructions and Control Limits
- Optimizing PLC Performance

WEEK 22: Robotics Programming and Integration I

- Traditional Programming with Teach Pendants
- Collaborative Robot Basics
- Systems Integration Overview

WEEK 23: Robotics Programming and Integration II

- Advanced Teach Pendant Techniques
- Collaborative Workflow Application
- Robotic System Networking

WEEK 24: Robotics Programming and Integration III

- Flexible Manufacturing Systems
- Final Robotic Integrations and Automation
- Safety and Maintenance of Integrated Systems

WEEK 25: Pneumatics and Hydraulics I

- Safety and Introduction to Fluid Power
- Hydraulic Components and Principles
- Basic Pneumatics Overview

WEEK 26: Pneumatics and Hydraulics II

- Power Supplies and Pumps
- Circuit Diagrams and System Tracing

- Troubleshooting Pneumatic Systems

WEEK 27: Pneumatics and Hydraulics III

- Electronic Fluid Controls and Cylinders
- Technical Documentation and Adjustment
- Predictive and Preventive Maintenance

WEEK 28: Capstone Experience I

- Overview of Mechatronics System Operation
- Introduction to Programming and Troubleshooting
- Initial Hands-On System Repair Skills

WEEK 29: Capstone Experience II

- Refining Operation and Repair Skills
- Integrated Programming and System Functions
- Intermediate Troubleshooting Techniques

WEEK 30: Capstone Experience III

- Full System Troubleshooting and Programming
- Advanced Repair Scenarios
- Demonstrating Integrated Skills Proficiency