Technology & Engineering Comprehensive Endorsement

Specifications, Competencies & Requirements

PURPOSE

This endorsement is meant for certified teachers interested in teaching **Technology** courses. It is attached to a current Utah Educator License with a license area of concentration in **Secondary and CTE** Education.
Upon attachment of this endorsement to a Utah educator license, educators will be approved to teach the following USBE courses:

Manufacturing Principles 1
Manufacturing Principles 2
Introduction to Electronics
Digital Electronics
Intermediate Electronics
Robotics 1
Robotics 2
Architectural Design 1
Architectural Design 2
Architectural Design 3
Mechanical Design & Engineering 1
Mechanical Design & Engineering 2
Mechanical Design & Engineering 3
Engineering Principles 1
Engineering Principles 2
Engineering Capstone
Beginning Woodworking
Intermediate Woodworking
Advanced Woodworking
College and Career Awareness
Construction Technology
Engineering Technology
Exploring Technology
Biomanufacturing 1
Biomanufacturing 2
Manufacturing Technology
Robotics Technology
Energy & Power Technology
Machining 1
Machining 2
Machining 3
Plastics 1
Plastics 2
Composites 1
Composites 2

ENDORSEMENT TYPES

Prerequisite

Demonstrate an understanding of Career and Technical Education basics
CTE Knowledge

Associate Level Requirements

Applicants must complete any **SIX** of the following competency requirements. The associate level endorsement is valid for up to three school years before it expires. Associate-level endorsements are non-renewable.

Digital Construction & Building Systems
Residential Construction Trades
Construction Estimating & Scheduling
Building Code
Construction Plans and Document Reading
Electrical Theory & Digital Electronics
Electrical Components and Testing
C-Based Programming
Engineering & Troubleshooting
Industrial Robotics

Learning that works for Utah CTE®

Utah State Board of Education

Engineering Design
Assembly & Woodworking Drawings
Manufacturing/Production Systems
Lean Manufacturing
Machinery (Use and Maintenance)
Computer-Aided Design and Manufacturing
Lab Safety
CTSO Knowledge

Professional Level Requirements

The applicant must meet **ALL** the competency areas listed above for the professional level.

COMPETENCY DETAILS & DESCRIPTIONS

Prerequisite

1. CTE Knowledge

Demonstrate an understanding of CTE basics:

- Explain how CTE links learning to specific Utah industries and what its main goals are.
- Know the licenses and endorsements needed to teach specific CTE courses.
- Describe how CTE is organized into clusters and pathways at the state, district (LEA), and school levels, and how this helps students succeed after graduation.
- Locate and use the state's strands and standards in lesson plans.
- Explore CTE student organizations (CTSOs) and professional groups and explain how they support students and teachers.
- Explain how advisory boards, with industry members, make sure programs meet job market needs and maintain safe learning environments.
- Understand the basics of securing funding, planning for the future of the program, and participating in the state Program of Quality Review (PQR) to ensure program excellence.

*Select **one** of the following options:*

- **USBE Course:** CTE Orientation
- **Complete THREE years of full-time CTE Teaching in Utah**
- **Currently hold a professional-level CTE endorsement**

Endorsement Competencies

2. Digital Construction & Building Systems

Demonstrates proficiency in utilizing Building Information Modeling (BIM) and Computer-Aided Design (CAD) software for accurate and efficient digital representation, coupled with a comprehensive understanding of residential and basic commercial building construction methods, materials, and systems.

*Select **one** of the following options:*

- Degree in Architecture
- Architectural Design Technology Certificate (ex, UVU certificate program)
- Udemy Free Basic BIM Training: Introduction to BIM
- Onshape CAD Basics Learning Pathway
- Bachelor's degree in engineering, computer science, or manufacturing (ex, USU BS Technology & Engineering Education or BYU BS Technology & Engineering Studies)
- PRAXIS #5051 Technology Education

3. Residential Construction Trades

Demonstrate basic understanding, terminology, and procedures for ALL the following:

- Construction plans
- Wall and floor layout
- Stair construction
- Roof construction
- Codes & zoning

Demonstrate basic residential construction concepts for ONE of the following:

- Electrical
- Plumbing
- HVAC
- Finishing
- Foundation
- Building envelope

*Select **one** of the following options:*

- Bachelor's degree in engineering, computer science, or manufacturing (ex, USU BS Technology & Engineering Education or BYU BS Technology & Engineering Studies)
- PRAXIS #5051 Technology Education
- **USBE Microcredential:** Residential Construction Trades
- **BCCM 2010 - Framing I** (Utah State University)
- **Equivalent College Course:** Transcripts showing passing grade of relevant course(s), and course description covering the required competency skills.
- **DOPL B100 General Contractor License**
- **DOPL R100 Residential/Small Commercial Contractor License**

4. Construction Estimating & Scheduling

Demonstrate applied mathematical concepts in relation to the construction field.

- Dimensions
- Areas
- Volumes
- Material quantities/sizes/types
- Cost
- Labor
- Time

*Select **one** of the following options:*

- Bachelor's degree in engineering, computer science, or manufacturing (ex, USU BS Technology & Engineering Education or BYU BS Technology & Engineering Studies)
- PRAXIS #5051 Technology Education
- **USBE Microcredential:** Construction Estimating & Scheduling
- **BCCM 2240 - Construction Estimating** (Utah State University)
- **Equivalent College Course:** Transcripts showing passing grade of relevant course(s), and course description covering the required competency skills.
- **DOPL B100 General Contractor License**
- **DOPL R100 Residential/Small Commercial Contractor License**

5. Building Code

Understand how residential buildings are built, including the different types of materials and methods used. Have a basic understanding of the International Residential Code (IRC).

*Select **one** of the following options:*

- Degree or certificate in Architecture (ex, Architectural Design Technology, Undergraduate Certificate UVU/Technology and Engineering Education BYU)
- Architectural Design Technology Certificate (ex, UVU certificate program)
- Occupational Experience: Work experience as a building inspector with certificates from ICC or standalone Certificates from ICC. Submit certificates with the application.
- PRAXIS #5051 Technology Education

6. Construction Plans and Document Reading

Demonstrate skill in reading and creating blueprints, plans, views, bills of materials, estimations, and any other documentation used in the Architecture, Engineering, and Construction (AEC) industry.

*Select **one** of the following options:*

- Degree or certificate in Architecture (ex, Architectural Design Technology, Undergraduate Certificate UVU/Technology and Engineering Education BYU)
- Architectural Design Technology Certificate (ex, UVU certificate program)
- Print Reading Basic Training
- PRAXIS #5051 Technology Education

7. Electrical Theory & Digital Electronics

Understanding of logic gates, number systems, inputs and outputs, microcontrollers, and programming.

*Select **one** of the following options:*

- Bachelor's degree in engineering, computer science, or manufacturing (ex, USU BS Technology & Engineering Education or BYU BS Technology & Engineering Studies)
- PRAXIS #5051 Technology Education
- SACA Certified Industry 4.0 Control Systems Specialist
- Skill Share Arduino Intro Course

8. Electronic Components & Testing

Identify and understand electrical components. Demonstrate skill in using testing equipment used on electronics (Digital Mulitmeter, Oscilliscope, etc.).

*Select **one** of the following options:*

- Bachelor's degree in engineering, computer science, or manufacturing (ex, USU BS Technology & Engineering Education or BYU BS Technology & Engineering Studies)
- PRAXIS #5051 Technology Education
- Bachelor's degree in engineering/technology and engineering education
- SACA Certified Industry 4.0 Control Systems Specialist
- Skill Share Arduino Intro Course

9. C-Based Programming

Demonstrate basic skills in a C-based programming language.

*Select **one** of the following options:*

- Bachelor's degree in engineering, computer science, or manufacturing (ex, USU BS Technology & Engineering Education or BYU BS Technology & Engineering Studies)
- PRAXIS #5051 Technology Education

- Automated Manufacturing Program from a Technical College
- SACA Certification Mtech
- Skillshare Introduction to Arduino: Creating Interactive Projects certificate
- Arduino for Makers: Intro to Microcontrollers

10. Engineering & Troubleshooting

Demonstrate basic skills in engineering and troubleshooting methodologies.

*Select **one** of the following options:*

- Bachelor's degree in engineering, computer science, or manufacturing (ex, USU BS Technology & Engineering Education or BYU BS Technology & Engineering Studies)
- PRAXIS #5051 Technology Education

11. Industrial Robotics

Have a general knowledge and understanding of industrial robotic arms, workcells, conveyor systems, and general automation.

*Select **one** of the following options:*

- Bachelor's degree in engineering, computer science, or manufacturing (ex, USU BS Technology & Engineering Education or BYU BS Technology & Engineering Studies)
- PRAXIS #5051 Technology Education

12. Engineering & Design

Demonstrate skills in the engineering design process. Have a basic understanding and knowledge of what makes a good design.

*Select **one** of the following options:*

- Bachelor's degree in engineering
- Complete a Drafting/Design program from a Technical College
- Soldworks CAD Design Professional (CSWP) Certification
- PRAXIS #5051 Technology Education

13. Assembly & Woodworking Drawings

Be able to read and create proper assembly and other technical drawings and working drawings for objects, parts, and buildings.

*Select **one** of the following options:*

- Bachelor's degree in engineering
- Complete a Drafting/Design program from a Technical College
- Soldworks CAD Design Professional (CSWP) Certification
- PRAXIS #5051 Technology Education

14. Manufacturing/Production Systems

Demonstrate skills and understanding of manufacturing processes, tools, equipment, materials, and quality control procedures.

*Select **one** of the following options:*

- Bachelor's degree in engineering, computer science, or manufacturing (ex, USU BS Technology & Engineering Education or BYU BS Technology & Engineering Studies)
- PRAXIS #5051 Technology Education

15. Lean Manufacturing

Demonstrate skills in lean principles, statistical analysis, problem-solving, waste identification, and process improvement (combining Lean Manufacturing and Six Sigma concepts).
*Select **one** of the following options:*

- Hold a bachelor's degree in engineering or a directly related field (e.g., Manufacturing Engineering, computer science, or manufacturing, Technology & Engineering Education or BYU BS Technology & Engineering Studies).
- Lean Manufacturing Bronze Certification
- Six Sigma Yellow Belt
- Advanced Manufacturing Undergraduate Certificate
- PRAXIS #5051 Technology Education

16. Machinery (Use and Maintenance)

Ability to use and maintain tools and machines used to cut, join, bore, sand, and safely finish wood.
*Select **one** of the following options:*

- Hold a bachelor's degree in engineering or a directly related field (e.g., Manufacturing Engineering).
- PRAXIS #5051 Technology Education
- Course work equivalent to: UVU CAW 140R, CAW 1170, CAW 2450
- Advanced Manufacturing Undergraduate Certificate

17. Computer-Aided Design and Manufacturing

Ability to use Computer Aided Design and Manufacturing software to plan, design, and manufacture. Demonstrate skills in creating full 3D models using 3D modeling software.
*Select **one** of the following options:*

- Bachelor's degree in engineering
- Complete a Drafting/Design program from a Technical College
- Soldworks CAD Design Professional (CSWP) Certification
- PRAXIS #5051 Technology Education

18. Lab Safety

Demonstrate and implement comprehensive laboratory and shop safety procedures across all technical domains (construction, manufacturing, electronics, etc.) to ensure a safe learning and working environment.

*Select **one** of the following options:*

- Bachelor's degree in engineering, computer science, or manufacturing (ex, USU BS Technology & Engineering Education or BYU BS Technology & Engineering Studies)
- PRAXIS #5051 Technology Education
- Technology & Engineering Lab Safety Microcredential (Coming 2026)

19. CTSO Knowledge

Demonstrate Career and Technical Student Organization (CTSO) knowledge:

- **Help students lead:** Give students opportunities to build their leadership abilities and take charge.
- **Mentor students:** Offer guidance to help students set goals and overcome difficulties as they grow.
- **Manage the organization:** Coordinate meetings, events, and budgets, and handle administrative tasks smoothly.
- **Create helpful programs:** Develop activities that match the CTSO's goals of building leadership, exploring careers, and developing skills.
- **Communicate effectively:** Clearly talk with students, school leaders, and community members, and promote the CTSO.
- **Work with others:** Partner with teachers, businesses, and other organizations to create opportunities like internships and community service.
- **Advocate for CTE:** Promote Career and Technical Education and work to get the resources and recognition it needs.
- **Keep learning:** Stay up-to-date on CTSO management and trends in CTE.
- **Focus on student success:** Support students' interests and celebrate their accomplishments.

*Select **one** of the following options:*

- **Attend a CTSO Fall Leadership Conference:** Reflected on MIDAS transcripts.
- **USBE Course:** SkillsUSA Utah Advisor Training
- **USBE Microcredential:** Career & Technical Student Organizations (under development)