Programming & Software Development Endorsement

Specifications, Competencies & Requirements

PURPOSE

This endorsement is intended for certified teachers interested in teaching programming and software development 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:

Computer Programming 1
Computer Programming 2
Computer Programming Advanced
Computer Programming Capstone
3D Print Technology
Introduction to Python 1
Introduction to Python 2
Creative Coding
Game Development Fundamentals 1
Game Development Fundamentals 2
Introduction to Information Technology
Digital Literacy
Exploring Computer Science
IB Computer Science SL1 and SL 2
IB Computer Science HL 1 and HL 2
A/R & V/R
Database Development
Computer Science Principles
Computer Science Investigations
Mobile Development Fundamentals
Cloud Computing 1
Cloud Computing 2
Algorithms & Data Structures
AP Computer Science A
AP Computer Science Principles
Web Development 1
Web Development 2
Principles of Cyber Defense and Ethics
Data Analytics

ENDORSEMENT TYPES

Prerequisite

Demonstrate an understanding of Career and Technical Education (CTE) basics.

- CTE Knowledge

Associate Level Requirements

The applicant must complete **TWO** 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.

- Software Programming
- Programming Language
- Database
- Game Development
- Web Development Asset Creation
- Digital Literacy
- CTSO Knowledge

Learning that works for Utah CTE®

Utah State Board of Education

Professional Level Requirements

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

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. Software Programming

Demonstrate understanding of basic software programming. Must show competence in core software development skills, including object-oriented programming and web applications. This includes:

- Computer storage and data types
- Decision structures - if/else, algorithms, flowcharts, decision tables, when to use loops, recursion, data structures
- The software development lifecycle
- Secure code concepts - encryption, hashing, share keys, SQL injection, etc.
- Web applications and object-oriented programming

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

- **Bachelor's Degree or higher in Computer Sciences:**
  Examples:
  Utah Tech University: Computer Science BS
  Utah Valley University: Computer Science BS

Utah Valley University: CS Education BS

- **PRAXIS**: Take and pass the PRAXIS #5652: Computer Science exam. Exam study guide.
- **Utah State University CS** Teaching Program
- **Industry Certification (choose one):**
  - Software Development Industry Exam
  - NES: Test #315: Computer Science exam.
- **University Courses:** Credit from an accredited university, passing with a C or higher grade in a course similar to: UVU - CS 1400 - Fundamentals of Programming, OR USU - CS 1400 - Intro to Computer Science, OR WSU - CS1030 - Foundations of Computing.
- **Other**: Harvard EdX: CS50X

3. Programming Language

Demonstrate understanding of basic programming language. Demonstrate competency in writing syntactically correct, well-documented "language" code that will logically solve a given problem, correctly use data types supported by the chosen language, and use common libraries to write a program that solves a complex problem. Common competencies in various languages: data types, structures, data analysis, sequences, operators, flow, code documentation, debugging, scripts, variables, expressions, strings, etc.

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

- **Bachelor's Degree or higher in Computer Sciences:**
  Examples:
  Utah Tech University: Computer Science BS
  Utah Valley University: Computer Science BS
  Utah Valley University: CS Education BS
- **PRAXIS**: Take and pass the PRAXIS #5652: Computer Science exam. Exam study guide.
- **Utah State University CS** Teaching Program (3 courses)
- **Industry Certification**: Take and pass the NES: Test #315: Computer Science exam.
- **Industry Certification**: Take and pass ONE Programming Industry Certification in a specific language:
  - C#: Knowledge Pillars C# Coding Specialist
  - Python: Certiport ITS Python
  - Python: Knowledge Pillars Python Coding Specialist
  - Java: Certiport ITS Java
  - Java: Knowledge Pillars Java Coding Specialist
  - JavaScript: Certiport ITS JavaScript
  - JavaScript: Knowledge Pillars JavaScript Coding Specialist
- **University Courses:**
  Credit from an accredited university, passing with a C or higher grade in a course similar to: UVU - CS3270 - Python Software Development OR WSU - CS 1410 - Object-Oriented Programming
- **Other**: Choose one from the ed2go online course in a specific language:
  - ed2go - Introduction to C# Programming
  - ed2go - Introduction to C++ Programming
  - ed2go - Introduction to Java Programming

- ed2go - Introduction to JavaScript
- ed2go - Introduction to Python Programming

- **Other**: Harvard EdX: CS50W

4. Database

Demonstrate introductory knowledge of how to design, create, and query relational databases, such as MySQL, Microsoft SQL Server, or Oracle. This includes:

- Database design - storing data, primary key, date types, design relationships, normalization, data protection measures
- Object management - queries (drop tables, drop views), input/output parameters and return values, clustered/non-clustered
- Data retrieval - construct and analyze queries, sort, filter, aggregate data
- Data Manipulation - insert/update/delete statements and troubleshooting

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

- **Bachelor's Degree or higher in Computer Sciences:**
  Examples:
  Utah Tech University: Computer Science BS
  Utah Valley University: Computer Science BS
  Utah Valley University: CS Education BS
- **PRAXIS**: Take and pass the PRAXIS #5652: Computer Science exam. Exam study guide.
- **Utah State University CS** Teaching Program (2 courses)
- **Industry Certification**: Take and pass the NES: Test #315: Computer Science exam.
- **Industry Certification:** Take and pass the Certiport ITS Databases Exam
- **University Courses:**
  Credit from an accredited university, passing with a C or higher grade in a course similar to: UVU - INFO 2410 - Database Fundamentals OR UTU - IT 2300 - Database Design and Management.

5. Game Development

Demonstrate understanding of game development. Show competency in interactive content creation. This includes:

- Package management of games
- Using common preplanning techniques, including design documents, flow charts, animatics, character model sheets, prototyping, greyboxing, storyboarding, concept art, and proportional level scaling, ideation
- Design strategy, virtual environments, visualization, conceptual design, design elements & principles,
- Character & scene development - understanding of basic animation, storytelling, tweening, buttons, event systems, and lighting
- Usability Testing - alpha & beta testing, troubleshooting, rigging problems

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

- **Bachelor's Degree or higher in Computer Sciences:**
  Examples:
    Utah Tech University: Computer Science BS
    Utah Valley University: Computer Science BS
    Utah Valley University: CS Education BS
- **PRAXIS**: Take and pass the PRAXIS #5652: Computer Science exam. Exam study guide.
- **Utah State University CS** Teaching Program (3 courses)
- **Industry Certification (choose one):**
  - Unity Certified User Industry Exam
  - NES: Test #315: Computer Science exam.
- **University Courses:** Credit from an accredited university, passing with a C or higher grade in a course similar to: UVU - DAGV 2460 - Game Development I OR U of U - EAE 6200 - Game Arts I
- **Other:** Coursera: Game Design: Art & Concepts Specialization

6. Web Development Asset Creation

Demonstrate understanding of web development asset creation and the use of our statewide contract with Adobe. Demonstrate understanding of image editing techniques, retouching, and compositing to enhance and manipulate photographs. Have a strong understanding of layers, layer masks, and adjustment layers to non-destructively edit images. Show skills in using selection tools. Show knowledge of color correction. Understand the importance of exporting settings.

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

- **Bachelor's Degree or higher in Computer Sciences:**
  Examples:
    Utah Tech University: Computer Science BS
    Utah Valley University: Computer Science BS
    Utah Valley University: CS Education BS
- **PRAXIS**: Take and pass the PRAXIS #5652: Computer Science exam. Exam study guide.
- **Utah State University CS** Teaching Program
- **Industry Certification (choose one)**
  - Adobe Photoshop Industry Exam
  - NES: Test #315: Computer Science exam.
- **USBE Microcredential:** Photoshop Image Editing
- **University Courses:** Credit from an accredited university, passing with a C or higher grade in a course similar to: UVU - DWDD 1600 - Web Essentials OR WEB 1400 - Web Design and Usability.

7. Digital Literacy

Demonstrate knowledge of the information processing cycle, digital communication, digital citizenship, and digital tools/media.

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

- **USBE Digital Literacy Methods Workshop:** Typically held in the summer. Visit the USBE CTE Calendar for more information.
- **IC3 Digital Literacy Certifications:** Successful completion of the most current version of the IC3 certification from the date of application. Certifications can be found at Certiport.com.

8. 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 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 transcript.
- **SkillsUSA New Advisor Training**
- **USBE Microcredential**: Career & Technical Student Organizations.