

# Indiana Career and Technical Education

## NLPS Capstone Guidance and Examples

Indiana Commission for Higher Education

July 2024

1816

# NLPS CAPSTONE GUIDANCE

- ▶ The CTE team at the Indiana Commission for Higher Education continues to share guidance on NLPS Capstone implementation as the 2024-2025 school year marks the full transition from Perkins V to NLPS.
- ▶ The following slides contain a guidance overview and examples of Capstone breakdowns for three CTE Programs of Study (Automotive Services, IT Operations: IT Support, and Welding Technology).
- ▶ Additional NLPS Capstone guidance can be found in
  - ▶ This [NLPS Capstone Guidance Document](#) - Includes an FAQ on NLPS Capstones

# CTE CAPSTONE COURSE OVERVIEW

## NLPS CAPSTONE COURSE 2-6 CREDITS

### **Part I** *Priority Competencies*

Competencies required to complete CT

### **Part II** *Accelerated Competencies*

Competencies required to complete TC/CG

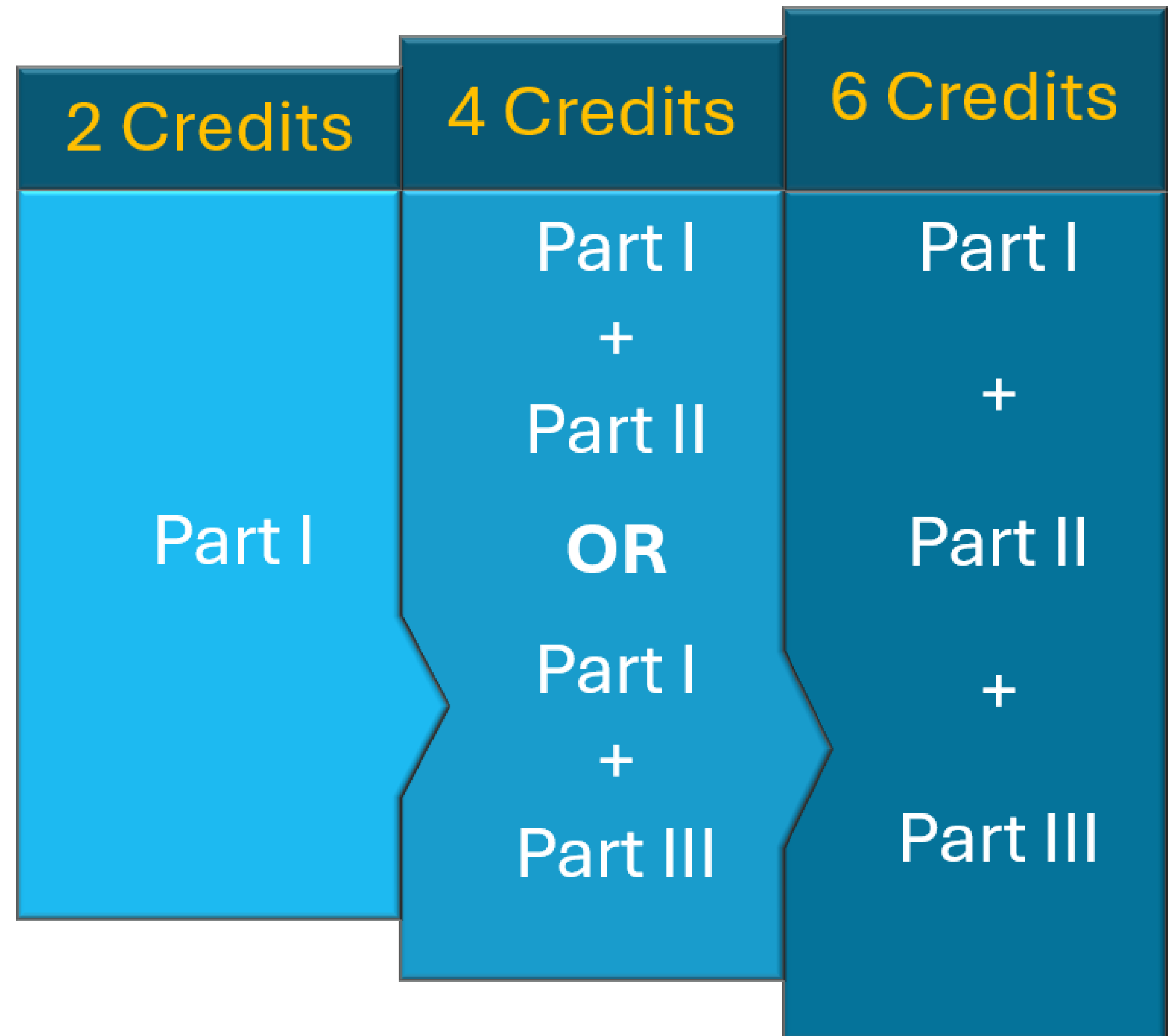
### **Part III** *Experiential Learning*

Work-Based Learning  
Applied Learning



# WAYS TO OFFER CAPSTONES

- ▶ **Capstones may be offered in three formats:**
  - ▶ **2 Credits:** Similar format to Concentrator Courses.
  - ▶ **4 Credits:** Must include Part I. May include *either* Part II *or* Part III.
  - ▶ **6 Credits:** Must include Parts I, II, & III.
- ▶ May split parts across multiple years, but Part I **must be done first.**
- ▶ **Remember:** Six (6) credit maximum.



# DELIVERY MODELS

Schools have four options for delivering course content to students:

- 1. Secondary Classroom/ Dual Credit**
- 2. Postsecondary through Dual Enrollment**
- 3. Eligible Training Provider\***
- 4. Employer-Provided/ On-the-Job Training\***

*\*Requires the school to assess learning and award grades.*

CTE CAPSTONE GUIDANCE & EXAMPLES

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# AUTOMOTIVE SERVICES



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# AUTOMOTIVE SERVICES CAPSTONE

- ▶ **Capstone course:** 7375 – Automotive Service Capstone
- ▶ **Promoted Certifications:** ASE A-1 Engine Repair; ASE A-7 Heating and Air; ASE A-8 Engine Performance; ASE A-6 Electrical Systems
- ▶ **Postsecondary Alignment:** Ivy Tech Community College
- ▶ **Priority Competencies (Part I) Postsecondary Alignment:**
  - ▶ AUTI 141: Engine Fundamentals and Repair
  - ▶ AUTI 131: Engine Performance Systems I
- ▶ **Accelerated Competencies (Part II) Postsecondary Alignment:**
  - ▶ AUTI 142: Climate Control Systems\*
  - ▶ AUTI 112: Electrical Systems II\*
  - ▶ AUTI 132: Engine Performance Systems II\*



THE FOLLOWING SLIDES CONTAIN AN EXAMPLE OF HOW A DISTRICT MAY OFFER THE **AUTOMOTIVE SERVICES** CAPSTONE COURSE.





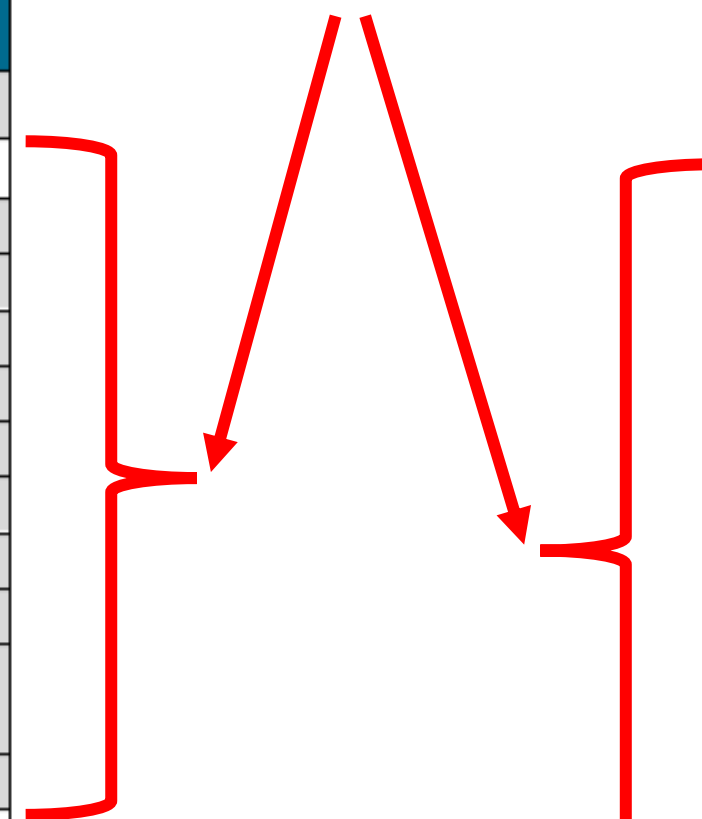
# AUTOMOTIVE SERVICES CAPSTONE

## ▶ Part I: Priority Competencies

- ▶ Taught in-person in the secondary classroom with a dual credit certified instructor over 2 semesters

CONTENT STANDARDS AND COMPETENCIES	
Competency #	Competency
<b>Domain</b>	<b>Engine Performance and Repair</b>
7375.D1.1	Demonstrate proper shop safety practices while in the labs.
7375.D1.2	Explain four-stroke cycle fundamentals and volumetric efficiency.
7375.D1.3	Identify and explain the operation of fuel injection systems.
7375.D1.4	Identify and explain operation of ignition systems.
7375.D1.5	Identify and explain operation of vehicle emission systems.
7375.D1.6	Identify and explain operation of sensors and actuators.
7375.D1.7	Retrieve DTCs and freeze frame data with a scan tool.
7375.D1.8	Diagnose fuel and ignition faults.
7375.D1.9	Describe the major engine operating systems and their function. Identify engine configurations.
7375.D1.10	Demonstrate basic engine diagnosis including compression and leak down testing.
<b>Domain</b>	<b>Engine Performance Systems</b>
7375.D2.1	Demonstrate knowledge of computer sensors and inputs.
7375.D2.2	Demonstrate knowledge of computer actuators and outputs.
7375.D2.3	Diagnose inputs and outputs.
7375.D2.4	Describe the function of the OBD II Monitors.
7375.D2.5	Diagnose OBD II system fault codes and determine repair needed.
7375.D2.6	Determine if OBD II monitors have executed.
7375.D2.7	Attain readiness to take the VERUS Navigation and Scanner Certification exam.

### Priority Competencies



Domain	Engine Fundamentals
7375.D3.1	Identify tools used for common engine repair.
7375.D3.2	Describe the major engine operating systems and their function.
7375.D3.3	Identify engine configurations.
7375.D3.4	Describe engine components and their functions.
7375.D3.5	Describe engine lubricants and sealing systems.
7375.D3.6	Demonstrate use of precision measuring equipment.
7375.D3.7	Describe fasteners and torque requirements and procedures.
7375.D3.8	Inspect cylinder long block components and determine needed repairs.
7375.D3.9	Properly install camshaft and timing chain(s) and /or belts.
7375.D3.10	Disassemble and reassemble engines to industry standards.
7375.D3.11	R & R engine assembly.
7375.D3.12	Attain readiness to take Snap on Torque Electrical Certification exam.
7375.D3.13	Attain readiness to take Snap on Torque Mechanical Certification exam.
<b>Domain</b>	<b>Electrical Systems</b>
7375.D4.1	Describe and explain analog and digital signals.
7375.D4.2	Explain and diagnose body modules and their function.
7375.D4.3	Demonstrate knowledge of wiring and circuit diagrams.
7375.D4.4	Demonstrate knowledge of voltage, current, and resistance measurements using meters and scopes.

# AUTOMOTIVE SERVICES CAPSTONE

## ▶ Part II: Accelerated Competencies

- ▶ Dual enrollment at local Ivy Tech campus to cover AUTI 142: Climate Control Systems and AUTI 112: Electrical Systems II (these courses are only available through dual enrollment currently)

### Accelerated Competencies

Domain	Climate Control
7375.D5.1	Demonstrate proper handling of refrigerants.
7375.D5.2	Identify tools and equipment used in climate control systems.
7375.D5.3	Identify all components of the heating and air conditioning system.
7375.D5.4	Explain the purpose and function of the heating and air conditioning systems.
7375.D5.5	Explain refrigeration theory.
7375.D5.6	Diagnose service and repair heating and air conditioning components.
7375.D5.7	Recover and recycle refrigerants using approved equipment.
7375.D5.8	Demonstrate knowledge of automatic climate control systems.
7375.D5.9	Diagnose automatic and manual climate control systems.
7375.D5.10	Explain hybrid climate control system operation.

Domain	Electrical Systems
7375.D4.1	Describe and explain analog and digital signals.
7375.D4.2	Explain and diagnose body modules and their function.
7375.D4.3	Demonstrate knowledge of wiring and circuit diagrams.
7375.D4.4	Demonstrate knowledge of voltage, current, and resistance measurements using meters and scopes.
7375.D4.5	Diagnose service and repair electrical/electronic system faults.
7375.D4.6	Demonstrate the ability to diagnose automotive circuits using electrical schematics.
7375.D4.7	Explain Hybrid Electrical systems and their operation.
7375.D4.8	Explain/demonstrate Hybrid vehicle service safety precautions.
7375.D4.9	Explain and diagnose advanced automotive systems and networks.
7375.D4.10	Utilize scan tools, lab scopes, and other electronic diagnostic equipment.



# AUTOMOTIVE SERVICES CAPSTONE

## ▶ **Part III: Experiential Learning**

### ▶ **Semester I: Work-based Learning Placement**

- ▶ Local auto dealership service department
- ▶ 75+ hours over the course of the semester
- ▶ *Scheduling flexibility:* Student leaves for the last period of the day and continues to work at the dealership after school

### ▶ **Semester II: Additional Competencies**

- ▶ Student dual enrolls in AUTI 132: Engine Performance Systems II at local Ivy Tech campus to earn Automotive Service Technology TC

*If there is not a work-based learning opportunity available for the student, semester one of Part III could be used for additional lab hours for the student to work toward adding additional industry certifications.*



CTE CAPSTONE GUIDANCE & EXAMPLES

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# IT OPERATIONS: IT SUPPORT



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# IT OPERATIONS: IT SUPPORT CAPSTONE

- ▶ **Capstone course:** 7245 – IT Operations: IT Support Capstone
- ▶ **Postsecondary Alignment:** Ivy Tech Community College
- ▶ **Priority Competencies (Part I) Postsecondary Alignment:**
  - ▶ ITSP 175: IT Customer Support and Helpdesk Software
  - ▶ DBMS 110: Introduction to Data Analytics
- ▶ **Accelerated Competencies (Part II) Postsecondary Alignment:**
  - ▶ SVAD 121: Enterprise Computing
  - ▶ SVAD 111: Linux and Virtualization Technologies Fundamentals



THE FOLLOWING SLIDES CONTAIN AN EXAMPLE OF HOW A DISTRICT MAY OFFER THE IT OPERATIONS: IT SUPPORT CAPSTONE COURSE.





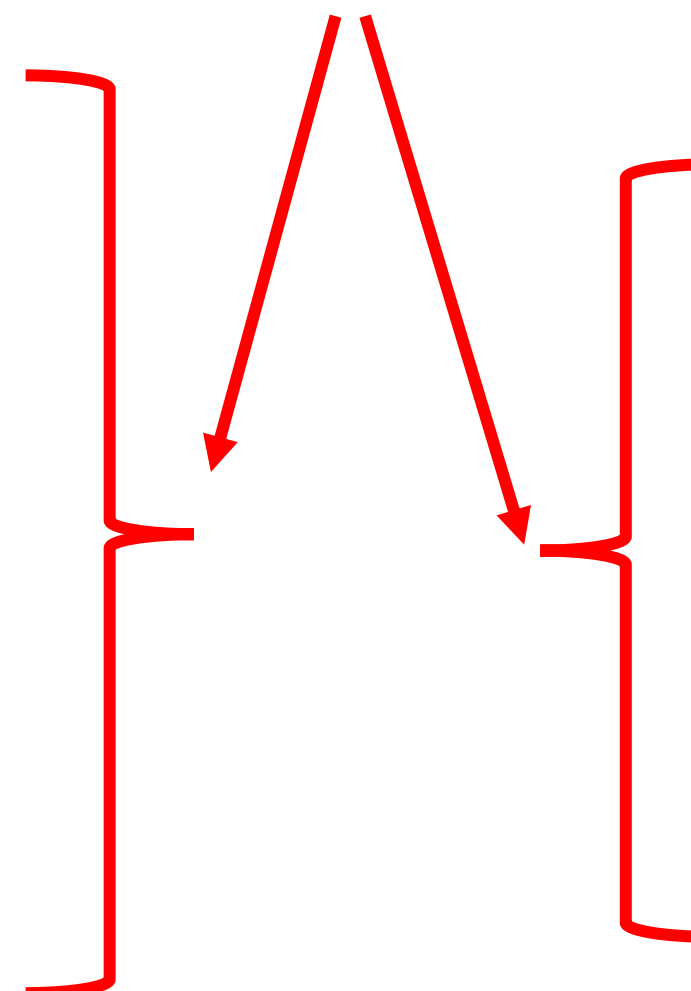
# IT OPERATIONS: IT SUPPORT CAPSTONE

## ▶ Part I: Priority Competencies

- ▶ Taught in-person in the secondary classroom with a dual credit certified instructor over 2 semesters

7245.D2.11	Work with the administrative virtualization software consoles.
7245.D2.12	Use virtualization software to create and run virtual machines.
7245.D2.13	Install virtualization software.
7245.D2.14	Troubleshoot and repair systems using virtualization software.
<b>Domain</b>	<b>IT Customer Support and Helpdesk Software</b>
7245.D3.1	Explain the evolution of help desk technical support as a profession in the IT industry.
7245.D3.2	Describe the roles and operations of different levels of IT customer support agents.
7245.D3.3	Define responsibilities and skill sets required to support a customer service help desk.
7245.D3.4	Recognize the most common practices used in help desk operations and how their performance is measured to improve quality support.
7245.D3.5	Identify and explore the tools and technology used in an IT customer help desk environment including appropriate ticketing systems.
7245.D3.6	Exhibit proficiency using the features and functionality of a helpdesk ticketing system.
7245.D3.7	Demonstrate professionalism in working with end users.
7245.D3.8	Develop work habits that promote organization and personal success.
7245.D3.9	Exhibit proper written and oral documentation and communication skills required of a help desk technician including training users in both internal and external environments.
7245.D3.10	Demonstrate proper troubleshooting techniques using problem-solving and critical-thinking skills.
7245.D3.11	Investigate methods of user needs analysis and assessment to select appropriate customer solutions.

### Priority Competencies



Domain	Introduction to Data Analytics
7245.D4.1	Identify, define, or describe the types and nature of databases in a business setting.
7245.D4.2	Categorize data integrity and security requirements.
7245.D4.3	Compare and contrast the general structure and organization of relational, hierarchical, network database structures, and non-relational databases.
7245.D4.4	Discover unstructured data techniques including Key-pair and JSON.
7245.D4.5	Demonstrate an understanding of the relational data model.
7245.D4.6	Describe the field names, field types, and relationships among tables.
7245.D4.7	Demonstrate an understanding of normalization techniques in the design of databases utilizing 1NF, 2NF, & 3NF.
7245.D4.8	Retrieve, insert, update, and manipulate data using SQL commands without the use of advanced generative tools.
7245.D4.9	Express the concepts and use of big data, data warehousing, and data mining.



# IT OPERATIONS: IT SUPPORT CAPSTONE

## ▶ Part II: Accelerated Competencies

- ▶ Taught in-person in the secondary classroom by a dual credit credentialed instructor, or through dual enrollment at the local Ivy Tech campus (either option would be 2 semesters)

Competency #	Competency
<b>Domain</b>	<b>Enterprise Computing</b>
7245.D1.1	Perform and troubleshoot an unattended installation of Windows servers and clients.
7245.D1.2	Deploy service packs and other critical updates.
7245.D1.3	Configure, troubleshoot, and control access to system resources such as files, printers, and web sites.
7245.D1.4	Manage and troubleshoot the use and synchronization of offline files.
7245.D1.5	Monitor and optimize usage of system resources, disk performance, compression, and quotas.
7245.D1.6	Manage, recover, and optimize availability of processes, System State data, and user data.
7245.D1.7	Configure and manage user profiles.
7245.D1.8	Manage applications by using Windows Installer packages.
7245.D1.9	Install, configure, and troubleshoot shared and remote access, virtual private network (VPN), and network protocols.
7245.D1.10	Configure and troubleshoot accessibility services.
7245.D1.11	Configure and troubleshoot the TCP/IP protocol.
7245.D1.12	Encrypt data on a hard disk by using Encrypting File System (EFS).
7245.D1.13	Implement, configure, manage, and troubleshoot policies in a Windows environment, including auditing, local accounts, and security.

### Accelerated Competencies

Domain	Linux and Virtualization Tech
7245.D2.1	Use the command line for help, listing directories & files, and archiving files.
7245.D2.2	Write basic shell scripts using Linux commands.
7245.D2.3	Demonstrate knowledge of major operating systems and Linux distributions.
7245.D2.4	Determining the basic requirements for a computer on a Local Area Network (LAN) and configure the network interface card (NIC).
7245.D2.5	Create user accounts and groups and configure user passwords and user and group permissions.
7245.D2.5	Demonstrate knowledge of devices and how they interact with the system.
7245.D2.7	Configure devices using O.S. tools and commands.
7245.D2.8	Describe how virtualization software works.
7245.D2.9	Identify categories of virtualization software.
7245.D2.10	Select a virtualization software product based on its features and system requirements.
7245.D2.11	Work with the administrative virtualization software consoles.
7245.D2.12	Use virtualization software to create and run virtual machines.
7245.D2.13	Install virtualization software.
7245.D2.14	Troubleshoot and repair systems using virtualization software.

*With dual credit earned for all pathway courses, student would earn Information Technology Support, Technical Certificate upon completion of Part II of the Capstone.*



# IT OPERATIONS: IT SUPPORT CAPSTONE

## ▶ **Part III: Experiential Learning**

- ▶ **Semester I: Work-based Learning Placement**
- ▶ Local business IT support department
- ▶ 75+ hours over the course of the semester
- ▶ *Scheduling flexibility:* Student leaves for the last period of the day and continues to work at the WBL placement after school
- ▶ **Semester II: Additional Competencies**
- ▶ Student dual enrolls in CPIN 269: Information Technology Project Management to begin working toward Information Technology Support, AAS through Ivy Tech Community College

*If a work-based learning opportunity is not available, the student could utilize both semesters of Part III for dual enrollment at Ivy Tech to complete additional courses toward earning their Applied Associate Degree if the Technical Certificate was earned with the completion of Part II of the Capstone.*



CTE CAPSTONE GUIDANCE & EXAMPLES

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# WELDING TECHNOLOGY



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# WELDING TECHNOLOGY CAPSTONE

- ▶ **Capstone course:** 7226 – Welding Technology Capstone
- ▶ **Promoted Certification:** AWS D.1.1 SMAW
- ▶ **Postsecondary Alignment:** Ivy Tech Community College
- ▶ **Priority Competencies (Part I) Postsecondary Alignment:**
  - ▶ WELD 208: Gas Tungsten Arc (TIG) Welding
  - ▶ WELD 273: Advanced Gas Tungsten Arc Welding II
- ▶ **Accelerated Competencies (Part II) Postsecondary Alignment:**
  - ▶ WELD 203: Pipe Welding I\*
  - ▶ WELD 210: Welding Fabrication I\*



THE FOLLOWING SLIDES CONTAIN AN EXAMPLE OF  
HOW A DISTRICT MAY OFFER THE  
**WELDING TECHNOLOGY** CAPSTONE COURSE.



# WELDING TECHNOLOGY CAPSTONE

## ▶ Part I: Priority Competencies

- ▶ Taught in-person in the secondary classroom with a dual credit certified instructor over 2 semesters

Competency #	Competency
<b>Domain</b>	<b>Gas Tungsten Arc Welding</b>
7226.D1.1	Interpret welding symbols and demonstrate how they apply to shop drawings.
7226.D1.2	Identify the various joint configurations and explain how they affect weld strength.
7226.D1.3	Employ and practice safety procedures and practices used in the welding industry.
7226.D1.4	Identify and describe the function of each component of a GTAW station.
7226.D1.5	Identify and specify GTAW electrodes using the AWS electrode classification system.
7226.D1.6	Identify and specify GTAW filler metals using the AWS filler metal classification system.
7226.D1.7	Explain the effects of DCEN, DCEP, and AC current on electrode life, surface cleaning, and weld characteristics.
7226.D1.8	Describe the shielding gases used for GTAW, describe their characteristics and their uses.
7226.D1.9	Select the proper power source, current type, shielding gas, flow rate, electrode type and diameter, nozzle size, and filler metal.
7226.D1.10	Properly assemble and adjust all variables required to produce acceptable GTA welds.
7226.D1.11	Properly prepare tungsten electrodes for welding with AC or DC current.
7226.D1.12	Demonstrate the use of square wave and pulse welding technology and how it applies to GTAW.
7226.D1.13	Properly prepare metals for welding.
7226.D1.14	Identify different types of weld defects and describe steps to prevent them.
7226.D1.15	Describe welding characteristics for Mild Steel, Stainless Steel, and Aluminum and other weldable metals.
7226.D1.16	Demonstrate welding on various types of metals.

### Priority Competencies

Domain	Advanced Gas Tungsten Arc Welding
7226.D2.1	Demonstrate the proper safety procedures in Gas Tungsten Arc welding.
7226.D2.2	Learn proper AWS Standard Welding Terms and Definition.
7226.D2.3	Setup and shut down of a Gas Tungsten Arc station properly and safely.
7226.D2.4	Select and determine the proper electrode and nozzle size for a job.
7226.D2.5	Understand welding procedure specifications (WPS) and be able to follow them.
7226.D2.6	Perform destruction testing with appropriate welds.
7226.D2.7	Perform proper techniques of preparation of tungsten electrodes.
7226.D2.8	Perform balling of tungsten electrodes in preparation for aluminum welding.
7226.D2.9	Gain insight into the Certification for AWS welders.
7226.D2.10	Practice welding, following WPS and instructor's guidelines.
7226.D2.11	Lap/T/Square groove/w/wire on 10ga. steel.
7226.D2.12	Lap/T/Square groove on 10ga. Stainless Steel.
7226.D2.13	Lap/T on 10ga. Aluminum.
7226.D2.14	Workmanship sample prints; steel, stainless steel, aluminum.
7226.D2.15	Attain readiness to take American Welding Society certification exam.
7226.D2.16	Demonstrate ability to read and interpret technical documents.



# WELDING TECHNOLOGY CAPSTONE

## ▶ Part II: Accelerated Competencies

- ▶ Taught in-person through dual enrollment at the local Ivy Tech campus

### Accelerated Competencies

Domain	Pipe Welding
7226.D3.1	Understand and apply all shielded metal arc pipe welding and gas tungsten arc welding safety rules.
7226.D3.2	Apply American Welding Society D1.1 code welding criteria to guided bend tests.
7226.D3.3	Utilize and apply shielded metal arc pipe welding process and gas tungsten arc welding fundamentals to pass AWS welding certifications.
7226.D3.4	Apply all appropriate equipment settings and adjustments.
7226.D3.5	Understand and apply the basic principles and terminology involved in destructive weld testing.
7226.D3.6	Employ safety procedures in preparation of and welding of pipe.
7226.D3.7	Perform the proper technique for preparing the pipe for welding.
7226.D3.8	Tack pipe in 2G and 5G position.
7226.D3.9	Weld pipe in the 2G position with the stringer bead method.
7226.D3.10	Weld pipe in the 5G position with the stringer or weave bead method.
7226.D3.11	Prepare pipe for weld test.
7226.D3.12	Demonstrate ability to inspect weld joint before, during and after welding.
7226.D3.13	Demonstrate ability to read and interpret technical documents.

Domain	Fabrication
7226.D4.1	Describe equipment used in basic metal fabrication.
7226.D4.2	Use measuring equipment.
7226.D4.3	Prepare a bill of materials from a print chosen for project.
7226.D4.4	Prepare a list of fabrication steps necessary to fabricate this project.
7226.D4.5	Layout the various tolerances, fits and allowances related to this project.
7226.D4.6	Layout the assigned project.
7226.D4.7	Fabricate the assigned project.
7226.D4.8	Perform visual inspection of project.
7226.D4.9	Produce a detailed drawing of project with welding symbols.
7226.D4.10	Demonstrate ability to read and interpret technical documents.

*With dual credit earned for all pathway courses, student would earn Welding Technology, Technical Certificate upon completion of Part II of the Capstone.*

# WELDING TECHNOLOGY CAPSTONE

## ▶ **Part III: Experiential Learning**

- ▶ **Semester I: Work-based Learning Placement**
- ▶ Local manufacturing plant
- ▶ 75+ hours over the course of the semester
- ▶ *Scheduling flexibility:* Student leaves for the final period of the day and continues working at the manufacturing plant after school

- ▶ **Semester II: Additional Competencies**
- ▶ Student dual enrolls in an elective course toward earning Industrial Technology, Applied Associate Degree at local Ivy Tech campus

*If a work-based learning opportunity is not available, the student could utilize both semesters of Part III for dual enrollment at Ivy Tech to complete additional courses toward earning their Applied Associate Degree if the Technical Certificate was earned with the completion of Part II of the Capstone.*



# FLEXIBLE CAPSTONE OPTIONS

- ▶ 3 NLPS Capstone Courses may be used with *any* NLPS pathway:
  - ▶ Work-Based Learning Capstone (5974)
  - ▶ Entrepreneurship and New Ventures Capstone (5966)\*
  - ▶ Advanced Digital Skills Capstone (7396)\*\*
- ▶ [CTE Master Pathways List](#) is a resource for viewing Capstone options for your pathway

\*May **not** be used with the Entrepreneurship pathway.

\*\*May **not** be used with the Information Technology and Computer Science pathway.



The background of the slide features a large, faint, circular seal of the State of Indiana. The seal contains the text "SEAL OF THE STATE OF INDIANA" around the top and "1816" at the bottom. In the center of the seal is a landscape with a rising sun, a river, and a plowman. The text "NLPS CAPSTONE GUIDANCE & EXAMPLES" is overlaid on the seal in a bright blue, bold, sans-serif font.

# NLPS CAPSTONE GUIDANCE & EXAMPLES

Indiana Commission for Higher Education

Contact [CTE@che.in.gov](mailto:CTE@che.in.gov) with questions.

July 2024



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