

# Supply Chain Management II: Warehousing and Distribution

<b>Primary Career Cluster:</b>	Marketing, Distribution & Logistics
<b>Course Contact:</b>	<a href="mailto:CTE.Standards@tn.gov">CTE.Standards@tn.gov</a>
<b>Course Code(s):</b>	C31H##
<b>Prerequisite(s):</b>	<i>Supply Chain Management I: Foundations &amp; Principles</i> (C31H##)
<b>Credit:</b>	1
<b>Grade Level:</b>	10-12
<b>Focused Elective Graduation Requirements:</b>	This course satisfies one of three credits required for an elective focus when taken in conjunction with other <i>Marketing</i> courses.
<b>POS Concentrator:</b>	This course satisfies one out of two required courses to meet the Perkins V concentrator definition, when taken in sequence in an approved program of study.
<b>Programs of Study and Sequence:</b>	This is the third course in the <i>Supply Chain Management</i> program of study.
<b>Necessary Equipment:</b>	None
<b>Aligned Student Organization(s):</b>	DECA: <a href="http://www.decatn.org">http://www.decatn.org</a> FBLA: <a href="http://www.fblatn.org">http://www.fblatn.org</a>
<b>Coordinating Work-Based Learning:</b>	Teachers who hold an active WBL certificate may offer placement for credit when the requirements of the state board's WBL Framework and the Department's WBL Policy Guide are met. For information, visit <a href="https://www.tn.gov/content/tn/education/career-and-technical-education/work-based-learning.html">https://www.tn.gov/content/tn/education/career-and-technical-education/work-based-learning.html</a> .
<b>Promoted Tennessee Student Industry Credentials:</b>	Credentials are aligned with postsecondary and employment opportunities and with the competencies and skills that students acquire through their selected program of study. For a listing of promoted student industry credentials, visit <a href="https://www.tn.gov/education/career-and-technical-education/student-industry-certification.html">https://www.tn.gov/education/career-and-technical-education/student-industry-certification.html</a> .
<b>Teacher Endorsement(s):</b>	030, 035, 039, 052, 054, 152, 153, 158, 202, 204, 311, 430, 435, 436, 471, 472, 474, 475, 476, 503, 776, 952, 953, 958
<b>Required Teacher Certifications/Training:</b>	None
<b>Teacher Resources:</b>	<a href="https://www.tn.gov/education/career-and-technical-education/career-clusters/cte-cluster-marketing.html">https://www.tn.gov/education/career-and-technical-education/career-clusters/cte-cluster-marketing.html</a> . Best for All Central: <a href="https://bestforall.tnedu.gov/">https://bestforall.tnedu.gov/</a>

## Course-at-a-Glance

CTE courses provide students with an opportunity to develop specific academic, technical, and 21st century skills necessary to be successful in career and in life. In pursuit of ensuring every student in Tennessee achieves this level of success, we begin with rigorous course standards which feed into intentionally designed programs of study.

Students engage in industry relevant content through general education integration and experiences such as career & technical student organizations (CTSO) and work-based learning (WBL). Through these experiences, students are immersed with industry standard content and technology, solve industry-based problems, meaningfully interact with industry professionals and use/produce industry specific, informational texts.

### Using a Career and Technical Student Organization (CTSO) in Your Classroom

CTSOs are a great resource to put classroom learning into real-life experiences for your students through classroom, regional, state, and national competitions, and leadership opportunities. Below are CTSO connections for this course, note this is not an exhaustive list.

- Participate in CTSO Fall Leadership Conference, DECA and FBLA Fall Leadership Camps, FBLA Regional and State Leadership Conferences, and DECA Emerging Leader Summit
- Participate in conferences that promote career development such as DECA Career Pathways and Career Development Conferences
- Participate in FBLA career competitive events that highlight career development, including developing an electronic career portfolio, interviewing skills, and career exploration
- Participate in DECA competitive events such as Integrated Marketing Campaign – Event, Product, and/or Service, and Marketing Management Team Decision Making
- Participate in FBLA competitive events such as Management Information Systems, Management Decision Making, Critical Thinking, Organizational Leadership, Spreadsheet Applications, and Supply Chain Management

For more ideas and information, visit Tennessee DECA at <https://www.decatn.org/> and Tennessee FLBA at <https://www.fblatn.org/>.

### Using Work-based Learning (WBL) in Your Classroom

Sustained and coordinated activities that relate to the course content are the key to successful work-based learning. Possible activities for this course include the following. This is not an exhaustive list.

- **Standard 1.1** | Job shadowing and industry tours with supply chain industry professionals for students to learn about personal and environmental safety practices.
- **Standards 2.1-2.2** | Virtual exchanges with supply chain industry professionals for students to learn about logistics organizational management practices and functions.
- **Standards 3.1-3.5** | Job shadowing and informational interviews with professionals from the supply chain industry for students to learn the various aspects of warehousing, including layout and warehouse management system (WMS) software.
- **Standards 5.1-5.2** | Integrated project with multiple interactions with professionals for students to practice solving various problems that can arise within the supply chain.
- **Standards 6.1-6.3** | Guest speakers from the supply chain industry to discuss new and upcoming trends within supply chain and logistics.
- **Standard 7.1** | Integrated project with multiple interactions with professionals from the supply chain industry.

## Course Description

*Supply Chain Management II: Warehousing and Distribution* prepares students for entry into the warehouse and distribution career field. Course content emphasizes a deep understanding of the dynamics of distribution and logistics operations, the warehousing skills needed for the tracking and managing of inventory, and the problem-solving skills used by logisticians in today's complex business environments. Upon completion of this course, a proficient student will have a thorough understanding of safety, tools, equipment, operations, processes, customer fulfillment, product lifecycle, future trends, and regulatory issues in the industry. Extensive use of Microsoft Office is required throughout this course.

## Course Standards

### 1. Occupational Safety

- 1.1 Safety Practices and OSHA 10 Certification: Identify the procedure for obtaining the **OSHA 10 General Industry Certification**. Investigate how businesses comply with **personal and environmental safety practices** associated with the appropriate handling and storage methods of materials in accordance with local, state, and federal safety and environmental regulations, specifically:
- Adherence to Occupational Safety & Health Administration (OSHA) policies regarding reporting of accidents and observed hazards as well as emergency response procedures.
  - Use of appropriate signs and symbols to identify hazardous materials within warehouses and during transportation of the materials.
  - Identification of dangerous goods and determination of the appropriate corrective actions if faced with a hazardous situation, as outlined by the *Emergency Response Guidebook* published by the U.S. Department of Transportation.

### 2. Logistics & Transportation

- 2.1 Logistics Functions: Synthesize information from textbook(s), print, and online industry sources to describe each of the following **functions found under the logistics umbrella**, how they interact with each other, and how **each affects product costs and profitability**.
- Transportation
  - Warehouse and storage
  - Intermodal freight transport
  - Materials handling
  - Inventory control
  - Order fulfillment
  - Inventory forecasting
  - Production planning/scheduling
  - Customer service
  - Facility location
  - Return goods handling
  - Parts and service support

m. Salvage and scrap disposal

- 2.2 Transportation and Inventory Costs: Describe the **tradeoffs** that occur between transportation and inventory costs. Use real products and companies to explain when it is more profitable to use more expensive transportation and maintain smaller inventory, and when it is more advantageous to use cheaper transportation and maintain larger inventories. Discuss the application of key concepts such as **Just-in-Time (JIT) strategy, lean dynamics**, and **Kanban systems**.
- 2.3 Lean Six Sigma: Define **Lean and Six Sigma philosophies** and differentiate between **value-added and non-value-added services**. Demonstrate an understanding of **Lean Manufacturing** and the **Lean principles** including minimizing categories of waste (DOWN TIME).
- 2.4 Planning of Material Management: Create a **viable Material Requirement Plan (MRP)** to demonstrate an understanding of the proper planning of material management. Define lot size, lead time, planning factors, and safety stock. Perform inventory calculations to minimize costs and use algebraic reasoning and appropriate units to determine the Economic Order Quantity (EOQ) and Reorder Point (ROP) for a given product. Identify the correlation between the Material Requirement Plan (MRP) and the Bill of Materials (BOM).
- 2.5 Microsoft Excel and Information Management: Demonstrate proficiency with **Microsoft Excel** to manage and analyze data, keep records, and solve problems. Use the **Microsoft Excel Solver add-in** to practice solving optimization problems by performing a **what-if analysis**.

### 3. Warehousing

- 3.1 Warehousing Requirements: Compare and contrast the **warehousing requirements to manufacture various products** including perishable foods, hazardous chemicals, large items like furniture and appliances, school supplies, seasonal items, and subassemblies.
- 3.2 Warehouse Layout Design: Identify the **principles of warehouse layout design**. Explain the different warehouse layouts (I, U, L) and the purpose and strengths of each. Identify and explain the purpose of material handling and equipment systems. Design a warehouse layout with a list of and rationale for necessary material handling equipment.
- 3.3 Warehouse Management Systems (WMS): Investigate various **warehouse management system (WMS) software programs** and create a comparison chart to assist a warehouse manager to select software to meet the specific needs of the operation.
- 3.4 Automation Processes: Analyze **automation processes** that have replaced human labor within nodes of supply chain channels. Identify the costs and benefits associated with the use of human laborers versus automation systems, specifically in warehouses. Debate their

ramifications on efficiency, productivity and local economic indicators and determine when it is advantageous to replace laborers with machines.

3.5 Warehouse Documents: Demonstrate the ability to complete and interpret **warehouse documents** including: packing slips, bills of lading, advance shipment notices, distribution sheets, pick lists, invoices, special orders, and inventory forms. Research **storage and shipping documentation** required by government and regulatory agencies.

#### 4. Support Roles and Partnerships

4.1 Maintenance of Storage and Distribution: Evaluate the **role of maintenance in the safety and efficiency of storage and distribution**, including vehicle, pipeline, building, and other maintenance areas. Examine actual instances where inadequate maintenance practices disrupted a company's supply chain distribution.

4.2 Supply Chain Security: Assess the importance of **supply chain security** and describe the **Customs-Trade Partnership against Terrorism's (CTPAT)** use of supply chain regulations and protocols to keep the United States safe from terrorism. Research how a local company addresses safety and security within their supply chain channels.

4.3 Third-Party Logistics (3PL): Define **third-party logistics (3PL)** and describe services third-party logistics companies provide to other businesses. Justify why a business would choose to use third-party logistics services instead of performing the supply chain functions themselves to determine how and why make versus buy (insource versus outsource) decisions are made. Research **local third-party logistics companies** and describe the services they offer local businesses to analyze the risks and benefits of the source decisions.

4.4 Negotiation Practices: Investigate the **importance of negotiation** in business in general and specifically in supply chain management. Debate and negotiate to determine a **make versus buy decision** for a specific business situation.

4.5 Agency Regulation of Supply Chain: Generate a list of **international, national, state, and local agencies and organizations** that **regulate some part of the supply chain**, including their respective roles and areas of jurisdiction. Example agencies include:

- a. U.S. Department of Transportation (DOT)
- b. U. S. Customs and Border Protection (CBP)
- c. Homeland Security (HS)
- d. Environmental Protection Agency (EPA)
- e. Occupational Safety and Health Administration (OSHA)
- f. World Shipping Council
- g. United Nations, including the International Maritime Organization (IMO)
- h. International Organization for Standardization (ISO)
- i. World Customs Organization (WCO)
- j. City and county laws and ordinances
- k. State laws

## 5. Problem Solving

5.1 Warehousing and Transportation Problems: Solve **problems related to transportation of goods and warehousing**. Evaluate data and present solutions or recommend appropriate decisions and calculate “what if” scenarios as appropriate. Problems should include scenarios such as:

- a. Selecting routes and modes of transportation between a distribution center and various markets
- b. Calculating the carbon footprint of similar products shipped from different locations and by different modes of transportation
- c. Optimizing warehouse usage
- d. Maximizing trailers for shipping
- e. Comparing offsite vs. onsite warehousing
- f. Planning for the moving and handling of hazardous goods
- g. Analyzing the impact of natural disasters on supply chain
- h. Forecasting potential threats related to the geography of a company’s supply base
- i. Designing of contingency plans in times of natural disasters
- j. Developing strategies for working toward the sustainable use of specific materials and modes of transportation

5.2 Goods and Services Problems: Given a selected case, plan for the **storage, movement, and delivery of a specified good or service** from one location to another. Use logistics data and apply concepts learned in the course to justify the tradeoff decisions (e.g., mode of transport, holding time, delivery constraints such as fuel cost) in the proposed plan and explain the logic behind each choice as if presenting to a senior manager.

## 6. Trends

6.1 Retail Logistics Operations: Analyze case studies of various retail companies’ logistics operations to see how they **plan for and adjust their operations** to compete with companies such as Amazon, WalMart, and Kroger.

6.2 Trends Affecting Supply Chain: Use information from transportation, distribution, and logistics professional organizations to **identify trends** (e.g., rising fuel costs, movements toward fully automated warehouses, and greening the supply chain) that affect **local, regional, national, and international supply chains** and include the following:

- a. Description of the trend and explanation of how it affects the supply chain
- b. Examples of how various businesses are responding to the trend
- c. An outline of the information that must be considered before a business implements any change, including a formal cost-benefit analysis

6.3 E-Commerce: Analyze **eCommerce’s influence** on traditional supply chains. Examine how continual technological changes have affected the delivery of goods and services in both the business-to-business and business-to-consumer segments of the supply chain.

## 7. Project

7.1 Supply Chain in Tennessee: Using resources such as Tennessee Economic and Community Development, Tennessee Department of Transportation, maps of Tennessee, and other sources analyze the **geographical and infrastructural benefits** to the state of Tennessee. Create a professionally designed **promotional handout** to include pros and cons of businesses locating in close proximity to one another to form industrial parks and how this proximity affects the supply chain channels within the state.

### Standards Alignment Notes

\*References to other standards include:

- P21: Partnership for 21st Century Skills [Framework for 21st Century Learning](#)
  - o Note: While not all standards are specifically aligned, teachers will find the framework helpful for setting expectations for student behavior in their classroom and practicing specific career readiness skills.
- *Emergency Response Guidebook*: <https://www.phmsa.dot.gov/hazmat/erg/emergency-response-guidebook-erg>