

**PROGRAM CONCENTRATION: Business and Computer Science**  
**CAREER PATHWAY: Business Logistics Management**  
**COURSE TITLE: Logistics Materials Management**

**Course Description:** Logistics Materials Management is the third course in the Business Logistics Management program of study. Materials Management is concerned with planning, organizing, and control flow of materials from their initial purchase to destination. Topics include product receiving, proper materials storage, order processing in relation to warehouse operations, packaging materials, inventory control, safe handling of hazardous materials, transportation modes, dispatch, routing and tracking operations.

Students will be instructed through the use of lecture, guided inquiry, project-based learning, interviews with industry professionals, job shadowing, teamwork, problem solving, simulations, and/or a school-based enterprise. Students should also participate in leadership development activities with a Career Technical Student Organization. Successful completion of this course will prepare students for the Certified Logistics Technician (CLT) exam. Students must complete Supply Chain Management and Business Logistics Operations courses and pass the Certified Logistics Associate exam in order to be eligible to take the CLT exam.

**BCS-LMM-1. Describe product receiving in terms of orderly receipt of all materials entering into the warehouse/distribution center, providing the assurance that the quality and quantity of such materials are as ordered and disbursing materials to storage or to other organizational functions requiring them. Students will:**

- a. Describe the essential activities of receiving.
- b. Identify procedures for handling in-bound trucks.
- c. Assess load and security conditions prior to unloading in accordance to logistics regulations and homeland security regulations.
- d. List and describe standard product receipt documents including bill of lading (B/L), carrier freight bill, delivery receipt (D/R), and air waybill.
- e. Create a procedural checklist for inventorying and reporting inbound products during unloading.

**Academic Standards:**

*ELA11W1. The student produces writing that establishes an appropriate organizational structure, sets a context and engages the reader, maintains a coherent focus throughout, and signals a satisfying closure. The student*

- d. Uses precise language, action verbs, sensory details, appropriate modifiers, and active rather than passive voice.*
- e. Writes texts of a length appropriate to address the topic or tell the story.*
- f. Uses traditional structures for conveying information (i.e., chronological order, cause and effect, similarity and difference, and posing and answering a question).*

- g. Supports statements and claims with anecdotes, descriptions, facts and statistics, and specific examples.*

*SP1. Students will analyze the relationships between force, mass, gravity, and the motion of objects.*

- c. Compare graphically and algebraically the relationships among position, velocity, acceleration, and time.*

**BCS-LMM-2. Demonstrate knowledge related to proper product storage techniques based on product life, risk of damage, hazards, weight and size. Students will:**

- a. List methods of determining destination and direction of unloaded products.
- b. List and describe forms in which products are stored, including rack, shelving, palletized, break bulk, plastic totes, metal and wire mesh containers, military crates, corrugated paper pallets, slip sheets, and drum and barrel and the key issues associated with those forms of storage such as volume, density, and size.
- c. Examine automated storage and retrieval systems (AS/RS), including Man-on-Board and other methods of storage retrieval to include vertical lift modules (VLMs), A-frame dispensing system, flow rack, and the mezzanine

***Academic Standards:***

*SCSh3. Students will identify and investigate problems scientifically.*

- a. Suggest reasonable hypotheses for identified problems.*
- b. Develop procedures for solving scientific problems.*
- c. Collect, organize and record appropriate data.*
- d. Graphically compare and analyze data points and/or summary statistics.*
- e. Develop reasonable conclusions based on data collected.*
- f. Evaluate whether conclusions are reasonable by reviewing the process and checking against other available information.*

**BCS-LMM-3. Demonstrate knowledge of order processing in terms of picking processes and how they impact warehouse operations, including order cycle, value of properly staged orders, importance of picking accuracy, forms associated with logistics and methods of identifying customer requirements. Students will:**

- a. Define the three main picking processes.
- b. Explain pick ticket inspection and identify processes for accurately pulling products from storage identified in the pick ticket process, including the area system/single order pick, zone pick, multi-order batch pick as well as process pick-to-order, batch-picking, and pick-by-line or pick-to-zero.
- c. Compare and contrast the processes for improving accuracy and efficiency with and without technologies to include pick by label, issue pack optimization, pick task

simplification, order batching, move to forward a pick location, bar codes, radio data terminals, pick-to-light systems, and voice technology.

- d. Conduct a simulated audit to ensure accuracy and quality of pulled-products.
- e. Accurately process paperwork for a packing manifest in a simulated environment to include staging of pulled products, proper use of logistics forms, and transportation modes.

**Academic Standards:**

*ELA11W3 The student uses research and technology to support writing. The student*

- a. *Formulates clear research questions and utilizes appropriate research venues (i.e., library, electronic media, personal interview, survey) to locate and incorporate evidence from primary and secondary sources.*
- b. *Uses supporting evidence from multiple sources to develop the main ideas within the body of a researched essay, a composition, or a technical document.*
- c. *Synthesizes information from multiple sources and identifies complexities, discrepancies, and different perspectives found in a variety of media (i.e., almanacs, microfiche, news sources, in-depth field studies, speeches, journals, technical documents).*

*MM2P1. Students will solve problems (using appropriate technology).*

- a. *Build new mathematical knowledge through problem solving.*
- b. *Solve problems that arise in mathematics and in other contexts.*
- c. *Apply and adapt a variety of appropriate strategies to solve problems.*
- d. *Monitor and reflect on the process of mathematical problem solving.*

**BCS-LMM-4. Demonstrate an understanding of various types of packaging materials best suited for different product size, weight, function and design for shipment.**

**Students will:**

- a. Define packing for product and transportation to include primary packaging, secondary packaging, third layer, and manifests.
- b. Select the appropriate packaging configuration and tools best suited for handling and packaging products considering product size, weight, function and design.
- c. Discuss the need for product protection against threats (shock, compression, vibration, moisture, heat, cold) and determine the level of protection needed based on type and value of product being shipped.
- d. List and describe package materials (corrugated dividers, moisture barriers, cardboard inserts, paper “filler” material, foam-filled cushions and foam “peanuts”) for best product protection and carrier requirements.
- e. Research various labeling techniques, technologies and procedures, including bar coding, radio frequency identification (RFID), and long-hand information labels.
- f. Identify steps to ensure that packages are securely loaded into trailers and correctly distributed based on safe loading procedures and techniques, including floor loading, loading palletized goods, securing the load, and carrier loading requirements.

- g. Given a scenario, properly label, package, check for accuracy and quality control, load and ship a product order in accordance with domestic and international regulations and company policy.

**Academic Standards:**

*SCSh6. Students will communicate scientific investigations and information clearly.*

- a. *Write clear, coherent laboratory reports related to scientific investigations.*
- b. *Write clear, coherent accounts of current scientific issues, including possible alternative interpretations of the data*
- c. *Use data as evidence to support scientific arguments and claims in written or oral presentations.*
- d. *Participate in group discussions of scientific investigation and current scientific issues.*

**BCS-LMM-5. Demonstrate understanding of how inventory control affects overall operations. Students will:**

- a. Describe fundamentals of inventory control to include types of inventory (raw material stock, Work-in-Progress (WIP), finished goods) and levels of inventory management (aggregate inventory management, Item inventory management).
- b. Research and describe inventory control methods to include Just-in-time (JIT), ABC inventory, First-in-first-out (FIFO), Last-in-first-out (LIFO), cyclical ordering, fixed-order quantity system, and Material Requirements Planning (MRP).
- c. Identify inventory accountability practices and procedures, including manual, automated, random, cycle, and wall-to-wall physical counts.
- d. Examine how automated data capture is accomplished by utilizing flow and directional devices.
- e. Identify the importance of proper signage and labeling of warehouse space to identify building number, aisle number, bay and level, etc.
- f. Outline the function of Reverse Inventory Control (returns) in terms of inspection of product, special handling procedures, re-stocking, damage reporting and procedures (salvage, refurbishment).

**Academic Standards:**

*SSEF1. The student will explain why limited productive resources and unlimited wants result in scarcity, opportunity costs, and tradeoffs for individuals, businesses, and governments.*

- a. *Define scarcity as a basic condition that exists when unlimited wants exceed limited productive resources.*
- b. *Define and give examples of productive resources (factors of production) (e.g., land (natural), labor (human), capital (capital goods), entrepreneurship).*
- c. *List a variety of strategies for allocating scarce resources.*
- d. *Define opportunity cost as the next best alternative given up when individuals, businesses, and governments confront scarcity by making choices.*

*SSEF2. The student will give examples of how rational decision making entails comparing the marginal benefits and the marginal costs of an action.*

- a. Illustrate by means of a production possibilities curve the tradeoffs between two options.*
- b. Explain that rational decisions occur when the marginal benefits of an action equal or exceed the marginal costs.*

**BCS-LMM-6. Discuss safe handling of hazardous materials, including classification, regulations, specifications, and methods of shipping and routing of dangerous goods. Students will:**

- a. Discuss organizations involved in developing and enforcing Hazardous Materials (hazmat) rules and regulations to include U.S. Department of Transportation (USDOT), Pipeline and Hazardous Materials Safety Administration (PHMSA), Occupational Safety and Health Administration (OSHA).
- b. Categorize and outline types of HM according to the nine standard classifications (explosives, gasses, flammable liquids, flammable solids, oxidizer and organic peroxides, poisonous, radioactive, corrosive, and other).
- c. Analyze Hazmat documentation requirements to include, shipping papers, marking, labeling and packaging, and emergency information.
- d. Given a scenario identify procedures for identifying HM, preparing shipping documentation, the unloading and loading of HM, the transfer and storage of HM, and methods for shipping and routing of dangerous goods.

**Academic Standards:**

*SPS3. Students will distinguish the characteristics and components of radioactivity.*

- a. Differentiate among alpha and beta particles and gamma radiation.*
- c. Explain the process half-life as related to radioactive decay.*

*SPS6. Students will investigate the properties of solutions.*

- a. Describe solutions in terms of solute/solvent, conductivity, concentration*
- b. Compare and contrast the components and properties of acids and bases.*
- e. Determine whether common household substances are acidic, basic, or neutral.*

*SSCG15. The student will explain the functions of the departments and agencies of the federal bureaucracy.*

- a. Compare and contrast the organization and responsibilities of independent regulatory agencies, government corporations, and executive agencies.*

**BCS-LMM-7. Discuss common transportation modes used to transport goods and cargo, including air, marine, rail, pipeline, and intermodal. Students will:**

- a. Compare and contrast the modes of transportation in terms of their advantages and disadvantages to determine optimum choices considering cost, safety, customer requirements, nature of shipment and timeliness.

- b. Describe issues related to transportation routes/networks including trade-offs (full truckload, less-than-truckload), geographical region, shipment to multiple facilities, freight forwarders, integrated carriers, next flight out services, small package carriers, expedited carriers, time definite, and specialty carriers.
- c. Discuss common measure of transportation quality to include claims-free shipment percentage, damage-free shipment percentage, distance between accidents, on-time arrival percentage, on-time departure percentage, perfect delivery percentage, perfect route percentage, in-transit time variability, vehicle/load/unload time, detention time, delayed in traffic time.
- d. Outline the use of information on different modes to include product characteristics, method of loading or delivery, restrictions at the point of delivery or lading, covered terrain, fuel type, vehicle configuration, body types, legal requirements, vehicle economy, drivers' cab types, additional equipment required, vehicle security, vehicle restrictions, vehicle monitoring.
- e. Research the importance of proper freight documentation and management to freight rate negotiations, including the need for historical and projected shipping volumes, required delivery times, guidelines for claims and dispute resolution, historical carrier performance records, required information systems support capability, preferred payment terms, carrier's competitive position, and knowledge of carrier's customer base and competitive positions.

**Academic Standards:**

*SSWG6 The student will describe the interaction of physical and human systems that have shaped contemporary Europe.*

- c. Analyze the importance of Europe's coastal location, climatic characteristics, and river systems regarding population, economic development, and world influence.*
- e. Explain why Europe has a highly integrated network of highways, waterways, railroads, and airline linkages.*
- f. Analyze the impact of geography on Russia in terms of population distribution, trade, and involvement in European affairs.*

*SCSh3. Students will identify and investigate problems scientifically.*

- c. Collect, organize and record appropriate data.*
- d. Graphically compare and analyze data points and/or summary statistics.*
- e. Develop reasonable conclusions based on data collected.*
- f. Evaluate whether conclusions are reasonable by reviewing the process and checking against other available information.*

**BCS-LMM-8. Demonstrate understanding of concepts related to dispatch, routing and tracking operations, and basic customs terminology and documentation. Students will:**

- a. Explain shipping documentation, including dispatch and shipping schedules, shipping manifest, shipping orders, bills of lading, carrier freight bills, load weight limits, and delivery/receipt (D/R).

- b. Describe main factors related to vehicle routing, including distance factors, customer requirements, driver availability, vehicle restrictions, highway construction and road closures, multiple calls per trip, multiple day trips, simultaneous delivery and collection options, regulations, and HM regulations.
- c. Outline means to track cargo within yard and en route.
- d. Research key features of intermodal transportation, including containers, handling equipment, road vehicles, water transport vehicles, and rail vehicles.
- e. Define basic customs terminology and documentation (commercial invoice, Import/Export license, certificate of origin, customs entry, insurance document), including export, import, duties and tariffs, governing bodies (U.S. Customs and Border Protection, U.S. State Department, Drug Enforcement Agency, Food and Drug Administration, World Trade Organization), trade regulations (International Traffic in Arms Regulations, Container Security Initiative, Advanced Manifest Regulations), and free trade agreements.

**Academic Standards:**

*SSWG7. The student will describe the interaction of physical and human systems that have shaped contemporary Latin America.*

- h. Explain how Latin American countries such as Brazil are developing their resources to compete in the global market and to improve industrial productivity.*

**BCS-LMM-9. Apply basic measurement and conversion techniques to handle and ship materials. Students will:**

- a. Discuss the significance of weight of materials for both incoming and outgoing shipments in terms of shortages, accuracy of received goods, pallet and unit loads within the capacity of storage facility platforms, correct stacking height limits, and loads within weight limits for transport.
- b. Compare and contrast the three types of scales found in most warehouses to include bench scales, floor scales, and counting scales.
- c. When given a U.S. Standard measurement, convert to global metric unit of measurement utilizing basic formulas for converting measurements from one system to another including measurements of length, weight, volume, temperature, and force.

**Academic Standards:**

*SCSh4. Students will use tools and instruments for observing, measuring, and manipulating scientific equipment and materials.*

- a. Develop and use systematic procedures for recording and organizing information.*
- b. Use technology to produce tables and graphs.*
- c. Use technology to develop, test, and revise experimental or mathematical models.*

## Reading Across the Curriculum

### Reading Standard Comment

After the elementary years, students engage in reading for learning. This process sweeps across all disciplinary domains, extending even to the area of personal learning. Students encounter a variety of informational as well as fictional texts, and they experience text in all genres and modes of discourse. In the study of various disciplines of learning (language arts, mathematics, science, social studies), students must learn through reading the communities of discourse of each of those disciplines. Each subject has its own specific vocabulary, and for students to excel in all subjects, they must learn the specific vocabulary of those subject areas in context.

Beginning with the middle grades years, students begin to self-select reading materials based on personal interests established through classroom learning. Students become curious about science, mathematics, history, and literature as they form contexts for those subjects related to their personal and classroom experiences. As students explore academic areas through reading, they develop favorite subjects and become confident in their verbal discourse about those subjects.

Reading across curriculum content develops both academic and personal interests in students. As students read, they develop both content and contextual vocabulary. They also build good habits for reading, researching, and learning. The Reading Across the Curriculum standard focuses on the academic and personal skills students acquire as they read in all areas of learning.

MRC. Students will enhance reading in all curriculum areas by:

- Reading in all curriculum areas
  - Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas.
  - Read both informational and fictional texts in a variety of genres and modes of discourse.
  - Read technical texts related to various subject areas.
- Discussing books
  - Discuss messages and themes from books in all subject areas.
  - Respond to a variety of texts in multiple modes of discourse.
  - Relate messages and themes from one subject area to messages and themes in another area.
  - Evaluate the merit of texts in every subject discipline.
  - Examine author's purpose in writing.
  - Recognize the features of disciplinary texts.
- c. Building vocabulary knowledge
  - Demonstrate an understanding of contextual vocabulary in various subjects.
  - Use content vocabulary in writing and speaking.
  - Explore understanding of new words found in subject area texts.
- d. Establishing context
  - Explore life experiences related to subject area content.



- Discuss in both writing and speaking how certain words are subject area related.
- Determine strategies for finding content and contextual meaning for unknown words.

## **CTAE Foundation Skills**

The Foundation Skills for Career, Technical and Agricultural Education (CTAE) are critical competencies that students pursuing any career pathway should exhibit to be successful. As core standards for all career pathways in all program concentrations, these skills link career, technical and agricultural education to the state's academic performance standards.

The CTAE Foundation Skills are aligned to the foundation of the U. S. Department of Education's 16 Career Clusters. Endorsed by the National Career Technical Education Foundation (NCTEF) and the National Association of State Directors of Career Technical Education Consortium (NASDCTEc), the foundation skills were developed from an analysis of all pathways in the sixteen occupational areas. These standards were identified and validated by a national advisory group of employers, secondary and postsecondary educators, labor associations, and other stakeholders. The Knowledge and Skills provide learners a broad foundation for managing lifelong learning and career transitions in a rapidly changing economy.

**CTAE-FS-1 Technical Skills:** Learners achieve technical content skills necessary to pursue the full range of careers for all pathways in the program concentration.

**CTAE-FS-2 Academic Foundations:** Learners achieve state academic standards at or above grade level.

**CTAE-FS-3 Communications:** Learners use various communication skills in expressing and interpreting information.

**CTAE-FS-4 Problem Solving and Critical Thinking:** Learners define and solve problems, and use problem-solving and improvement methods and tools.

**CTAE-FS-5 Information Technology Applications:** Learners use multiple information technology devices to access, organize, process, transmit, and communicate information.

**CTAE-FS-6 Systems:** Learners understand a variety of organizational structures and functions.

**CTAE-FS-7 Safety, Health and Environment:** Learners employ safety, health and environmental management systems in corporations and comprehend their importance to organizational performance and regulatory compliance.

**CTAE-FS-8 Leadership and Teamwork:** Learners apply leadership and teamwork skills in collaborating with others to accomplish organizational goals and objectives.

**CTAE-FS-9 Ethics and Legal Responsibilities:** Learners commit to work ethics, behavior, and legal responsibilities in the workplace.

**CTAE-FS-10 Career Development:** Learners plan and manage academic-career plans and employment relations.

**CTAE-FS-11 Entrepreneurship:** Learners demonstrate understanding of concepts, processes, and behaviors associated with successful entrepreneurial performance.