CEE 587
Global Trade, Transportation and Logistics Management
Professor Goodchild
Spring 2011

Course Learning Objectives

This document lists the course's major subject areas and the knowledge, comprehension, application, analysis, synthesis and evaluation skills that they are designed to impart.

Communication

Communication skills are essential for engineers. Calculations, creativity, designs and recommendations are only of value if they can be effectively communicated to fellow engineers, decision makers and the general public. Upon completion of this class, the student will be able to:

- Discuss logistics concepts in a clear, concise and effective manner.

Global Supply Chain Flows

This information will set the context for evaluation of logistics operations, and give the student a perspective on the scale of global goods flows and the value of the industry. By the completion of the course the student will be able to answer the following questions:

- What are the general patterns to global goods movement, and North American goods movement? How have these changed over the last 50 years?
- What are the characteristics of the goods that move through the West Coast Ports and across the US/Canadian border in Washington State? What are these volumes?
- How large is the United States goods movement industry, and how does this compare to the size of the industry in other countries? What are the implications of this, and the reasons for this?
- What are some common business practices and how have these changed global goods movement?

The student will also be able to define supply chain, supply chain management, logistics, and freight transportation. The student will be able to explain the difference between the Industrial Engineering, Civil Engineering, Economic, and Business approach to these topics.

Historical Perspective

A historical perspective on goods movement will allow the student to understand current practice. By the completion of the course the student will be able to:

- Identify key policies and regulations and how these have contributed to the development of transportation practice in the United States.
- Describe key trends in the historical development of infrastructure and the consequences for the current freight transportation system.

CEE 587
Global Trade, Transportation and Logistics Management
Professor Goodchild
Spring 2011

Supply Chain Cost Structures

Logistics practices are driven by the desire to minimize the cost of moving goods. To understand logistics practice, and the resulting freight transportation system, students must understand the essential drivers of cost. By the completion of the course the student will be able to:

- Identify the sources of cost in a supply chain.
- Define inventory and types of inventory in a supply chain.
- Define transportation cost and identify the factors that contribute to this cost.
- Demonstrate the relationship between inventory cost, transportation cost, headway, capacity restrictions, shipment frequency and shipment size.
- Calculate inventory cost and transportation cost for a logistics problem.
- Define fixed and variable cost.
- Understand the economies of scale in transportation and inventory cost.
- Identify the characteristics of transportation and inventory cost for transportation modes and the consequences for logistics practice.
- Be able to draw a cumulative number of items diagram and identify logistics features on the diagram.
- Describe the cost characteristics in intermodal transfers.
- Utilize the optimal cost formula to plan a least cost logistics operation.

Logistics Operations

This section of the course will focus on the consequences of logistics cost structures for logistics operations. The activities within supply chains, and the resulting freight transportation system, can now be explained. Metrics for measuring activity will be presented and considered, current practice described, and tools studied for logistics planning and operations. By the completion of the course the student will be able to:

- Identify logistics strategies to minimize inventory cost.
- Describe marine terminal operations, and the use of related landside infrastructure.
- Identify the strengths and weaknesses of common terminal productivity measures.
- Be able to describe contemporary warehousing activity.
- Identify factors that determine warehousing location decisions.
- Define the vehicle routing problem and the traveling salesman problem.
- Calculate the impact of flexibility and time windows on the cost of routing and scheduling.
- Use common vehicle routing algorithms and solution tools.
- Understand the real world constraints on vehicle routing and scheduling.
- Define the location/allocation problem.
- Identify ways in which technology is changing logistics practice and logistics operations.
- Understand and use the economic order quantity formula.

- Calculate optimal shipment size (lot size problem).

Logistics Analysis

In this section of the course students will learn additional methods for analyzing logistics systems and their structure. By the completion of the course the student will be able to:

- Identify network structures and explain their logistics benefits and costs, service quality, and management concerns.
- Determine network flow when cost is a function of flow.
- Describe distribution decisions and analysis of distribution systems.
- Describe the types of logistics decisions (time scale, purpose) and their relationship to data availability.
- Identify 3 forms of queue discipline and the impact on individual delay time.
- Identify 3 methods for logistics systems analysis and describe their differences.

Logistics Systems

This section of the course will consider the combined effects of transportation companies making logistics decisions. These decisions, in aggregate, create the freight transportation system. By the completion of the course the student will be able to:

- Be familiar with some of the contemporary issues in transportation and the relevant contribution of freight transportation.
- Identify the key stakeholders in the freight transportation system.
- Identify possible methods for freight transportation system control.
- Explain induced demand.
- Describe the impact of uncertainty on logistics systems and specific logistics decisions.
- Identify the economic and environmental implications of infrastructure development
- Describe the revenue generating mechanisms for companies involved in freight transportation.
- Identify aspects of the freight transportation system that are not sustainable.

Current Challenges

This section of the course will consider contemporary challenges of logistics activities to society. By the completion of the course the student will be able to:

- Define sustainable freight transportation and understand how logistics activities can be changed to affect sustainability metrics.
- Understand how freight transportation supports economic activity.