The syllabus provided considers a course with 45 hours of contact (as 15 classes of 3 hours each). It assumes that students will have taken a core course in Operations Management and/or Operations Research where they have had exposure to basic lot sizing and safety stocks.

1. **Course Description and Objectives**

Supply chain management is unique and, to some degree, represents a paradox because it is concerned with one of the oldest and also the most newly discovered activities of business. Supply chain activities - inventory management, warehousing, sourcing, communication, transportation, and facility location - have been performed since the start of commercial activity. It is difficult to visualize any product that could reach a customer without logistical support. Yet it is only over the last few years that firms have started focusing on logistics and supply chain management as a source of competitive advantage. There is a realization that no company can do any better than its supply chain. This becomes even more important given that product life cycles are shrinking and competition is intense. Supply chain management today represents a great challenge as well as a tremendous opportunity for most firms.

Other terms that have recently appeared in the business jargon are *demand chain, value chain,* and *value stream*. We will use the phrase supply chain management to cover all these ideas.

In this course we view the supply chain from the point of view of a general manager. Logistics and supply chain management is all about managing the hand-offs in a supply chain - hand-offs of information, product, or funds. The design of a supply chain is critically linked to the objectives of the supply chain. Our goal in this course is to understand how supply chain design and planning decisions impact the performance of the firm as well as the entire supply chain. The key will be to understand the link between supply chain structures and logistical capabilities in a firm or supply chain.

1. **Learning Outcomes and Competencies**
2. Teach students fundamental problem areas of “Supply Chain Management” and, to introduce the relation between planning and control activities, as well as issues related to SCM design.
3. Teach approaches that utilize mathematical modeling and optimization to solve problems and emphasize the importance of solving a planning and control problem analytically.
4. Be able to use different techniques and modern planning tools for engineering practice
5. Be able to work in a team and confident in presenting and defending his work
6. **Course Materials and other Readings**
* The textbook: Supply Chain Management: Strategy, Planning, and Operations (2016) by S. Chopra and P. Meindl (C&M), 6th Edition.

Some other textbooks on the subject that may be of interest:

1. Global Logistics and Supply Chain Management by J. Mangan, C. Lalwani, T. Bitcher, R. Javadpour
2. Modeling the Supply Chain by Jeremy F. Shapiro.
3. Designing and Managing the Supply Chain by D. Simchi-Levi, P. Kaminsky, E. Simchi-Levi.
4. Introduction to Materials Management by J.R.T. Arnold, S.N. Chapman, and L.M. Clive

**3. Grading Scheme:**

|  |  |
| --- | --- |
| Case Studies and Assignments (group) | 10% |
| Midterm Exam (individual) | 30% |
| Term Paper (group) (10% report, 10% presentations) | 20% |
| Final Exam (individual) | 40%  |

**4. Topics, Tentative Schedule and Assignments**

* *All* **cases must be read before the class** they are to be discussed in (*whether a submission is required or not*).
* Lectures will follow the book (C&M). Chapters from C&M are assigned as background reading with the material being covered. The **book chapters are best read right after the lecture** to reinforce the concepts discussed. The book also provides technical details that may not be discussed in class.

The cases and readings to be covered are specified below for each week.

***A Strategic Framework to Analyze Supply Chains (Classes 1-2)***

**Class 1:** Syllabus presentation, Read Chapter 1 of C&M.

We will discuss supply chain management and its importance to the success of a firm. We will discuss *different views of a supply chain* and raise a variety of supply chain related questions that need to be answered by any firm. We start developing a *framework* within which supply chain decisions may be analyzed and appropriate tradeoffs considered.

**Class 2** Read Chapter 2 of C&M (Read Chapter 3 after class).

Our goal is to build a framework that allows for the consideration of strategic questions such as – “Is Dell right in returning to the sale of its computers through retail stores?” We will discuss the notion of *Tailored Supply Chains* and its importance in today’s environment. This will be an important concept that we will refine in the context of different logistical drivers in the course of the quarter.

*Supply chain decisions* will be divided into three categories - *strategic/design, planning, and operational*. We start discussion on the issues involved in supply chain design.

**Class 3:** Chapter 5: of C&M. ***Designing the Supply Chain Network***

We will finish discussing models for network design. We will use Excel workbooks to discuss various models for network design.Our objective will be to optimally structure the distribution network, taking into account cost and customer service factors.

***Planning in a Supply Chain – Seasonal Inventory(Classes 4-6)***

**Classes 4, 5, and 6** : in class 5, **Submit** *managing growth at sportstuff.com* (Pages 139-141 of C&M)

 **(**Skim Chapters 7-10 in C&M (read carefully after lecture)

The network in a supply chain defines the resources available. The design decisions are updated infrequently and tend to stay in place for years. On a more regular basis (monthly or quarterly), management must make *decisions regarding the near term use* of these *resources*. In these sessions we will discuss concepts and methodologies associated with *sales and operations planning* in a supply chain. Our goal is to understand the role that *planning technologies* play in the success of a supply chain. An important exercise is to *forecast demand and then plan the use of resources, outsourcing, buildup of inventories, as well as future actions (such as promotions) that impact expected demand*. We will discuss seasonal inventory in this setting.

**Class 7: Proposals of the project due**!

Each group will have 25 minutes to present their ideas

**Class 8 :** **MIDTERM EXAM**

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***Managing Cycle Inventory in the Supply Chain***

**Class 9**

**Submit** *Mintendo Game Girl* (the end of chapter 9, Pages 248-249 of C&M)

Read Chapter 11 of C&M (read carefully after lecture)

We will start discussion on the *management of inventory* in the supply chain to ensure fit with stated strategic goals. Our goal is to understand the *buildup of cycle inventory* and *managerial actions* *that can improve supply chain performance* in terms of cycle inventory. We will focus on the *link between cycle inventory and pricing*. We will discuss the *effect of volume discounts* and *short term discounts* on order sizes and thus inventory and cycle times in the supply chain.

***Managing Safety Inventory and Availability in the Supply Chain (Classes 10-12)***

**Class 10 (Submit some assigned** problems from Chapter 11; Read Sections 12.1 – 12.3 (read the rest of the chapter after class)

We will discuss the role of safety inventory. We will discuss various *measures of customer service* such as cycle service level and fill rate and derive precise *relationships* *between these customer service measures and safety inventory*. We will then discuss various managerial levers for decreasing safety inventory. Our goal is to identify *strategies* that allow a supply chain *to provide high variety at reasonable costs*.

You can access the Excel workbooks associated with examples in this chapter online.

**Class 11** Read Chapter 12: Managing Uncertainty in a Supply Chain

We will finish the discussion on pooling and postponement. A key objective will be to understand the role of *pooling inventories in the face of independent demands* and how this understanding can be used strategically to construct innovative business models, as well as to improve operations. We will discuss a variety of business models that rely on this ability to pool uncertainty. We will then discuss *how a firm selects the appropriate level of service* to provide customers. You can access the Excel workbooks associated with examples in chapter 12 of C&M online.

**Class 12 Submit** ALKO case (pages 351-353 of Chapter 12 in C&M)

Read Chapter 13.

We will discuss the *ALKO* case to identify various *factors that affect the organization of inventories within the distribution system*. The case illustrates the inventory, transportation, and facility tradeoffs when designing a supply chain.

We will discuss various models for determining the optimal level of product availability. Based on an understanding of the tradeoffs involved in setting the *optimal level of availability*, we will discuss actions a manager can take to improve supply chain profitability.

***Managing Transportation in the Supply Chain***

**Class 13 Submit** some problems from Chapter 13; Read Chapter 14

We will discuss the role of *transportation* in the supply chain and raise various *tradeoffs* involved *in designing and operating a transportation network* (Chapter 14 of C&M). We will discuss the different *transportation models* available. We will motivate the *link between transportation and inventory costs* in the design of transportation networks. We will also consider different problems that are relevant when making transportation decisions.

***Project Presentations***

**Classes 14 and 15** in Class 15, **Submit** *Designing the Distribution Network for Michael’s Hardware* (pages 426-427 of C&M)

Each group will have 45 minutes for their presentations

***Final Exam will be on* …….**