

## **MSE 3220: Operations & Management Methods**

**Credit hours and contact hours:** 3-0-0-3

**Instructor:** Sundaresan Jayaraman

**Textbook:** Robert Jacobs and Richard Chase. *Operations and Supply Chain Management*, 15<sup>th</sup> Edition, McGraw-Hill, 2018.

### **Specific course information**

**Catalog description:** Principles and applications of production and operations management to the manufacturing enterprise, including process flow analysis, production planning and scheduling, optimization, quality management and facilities planning.

**Prerequisites:** MSE 2001 – Principles & Applications of Engineering Materials and MSE 3210 – Transport Phenomena or MSE 4775 - Polymer Science & Engineering I

**Course:** Selected Elective

### **Specific goals for the course**

#### **Outcomes of instruction:**

1. Apply the principles of operations and supply chain management for the successful operation of a global materials/textile/fiber/polymer enterprise.
2. Understand and apply the various manufacturing practices and paradigms (e.g., Just-in-Time, Lean, Six Sigma quality) and tools and techniques such as product planning, process flow analysis, facilities location, enterprise resource planning, and cost computations to set up a global materials enterprise for producing a chosen product within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
3. Work in teams and evaluate performance of fellow team members objectively.
4. Understand the professional and ethical responsibility as a materials engineer.
5. Communicate effectively in both written reports and oral presentations.
6. Demonstrate a broad understanding of the impact of materials engineering solutions in a global, economic, environmental, and societal context.
7. Recognize the need for, and the ability to engage in, life-long learning.

#### **Student Outcomes:**

- (1) An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

- (2) An ability to apply engineering design to produce solutions that meet specified needs with consideration for public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- (3) An ability to communicate effectively with a range of audiences.
- (4) An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
- (5) An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

**Topics covered:**

- 1. The Materials/Polymer/Fiber/Textile Enterprise in the Global Marketplace
- 2. Materials/Polymer/Fiber/Textile Enterprise Operations and Supply Management
- 3. Product and Process Design
- 4. Enterprise Strategy: Capacity Planning and Optimization
- 5. Quality Management: Six-Sigma and Continuous Improvement
- 6. Lean Manufacturing
- 7. Facilities Planning, Layout and Management
- 8. Supply Chain Management and Electronic Commerce
- 9. Enterprise Resource Planning
- 10. Demand Management and Forecasting
- 11. Information Technology and Materials Enterprise Management

**Correlation between Outcomes of Instruction and Student Outcomes:**

Outcomes of Instruction	Student Outcomes						
	1	2	3	4	5	6	7
1. Apply the principles of operations and supply chain management for the successful operation of a global materials/textile/fiber/polymer enterprise.	X			X	X		
2. Understand and apply the various manufacturing practices and paradigms (e.g., Just-in-Time, Lean, Six Sigma quality) and tools and techniques such as product planning, process flow analysis, facilities location, enterprise resource planning, and cost computations to set up a global materials enterprise for producing a chosen product within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.	X	X	X	X	X		
3. Work in teams and evaluate performance of fellow team members objectively.					X		

4. Understand the professional and ethical responsibility as a materials engineer.				X			
5. Communicate effectively in both written reports and oral presentations.			X				
6. Demonstrate a broad understanding of the impact of materials engineering solutions in a global, economic, environmental, and societal context.				X	X		
7. Recognize the need for, and the ability to engage in, life-long learning.					X		

### **School of Materials Science and Engineering Student Outcomes:**

- (1) An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- (2) An ability to apply engineering design to produce solutions that meet specified needs with consideration for public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- (3) An ability to communicate effectively with a range of audiences.
- (4) An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
- (5) An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
- (6) An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- (7) An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.