

MSE 3220: Operations & Management Methods (required)

Catalog Description: (3-0-3)
Prerequisite: MSE 3210 or MSE 4775
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. Restricted to MSE majors.

Textbook: Operations and Supply Chain Management, 13th Edition, Jacobs and Chase, McGraw-Hill Book Company, 2011.

Additional Resources: Articles related to contemporary developments in operations and supply chain management will be assigned during the course.

Course Coordinator: Dr. Sundaresan Jayaraman

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

Course Outcomes: Specifically, at the end of the course the students will be able to:

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.
8. Demonstrate knowledge of contemporary issues.

Correlation between Course Outcomes and Student Outcomes:

Course Outcomes	Student Outcomes										
	a	b	c	d	e	f	g	h	i	j	k
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		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	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		
8. Demonstrate knowledge of contemporary issues.										x	
Entire Course	2	0	3	3	3	3	3	3	1	3	2
0 = None or insignificant; 1 = Some; 2 = Moderate; 3 = Strong											

School of Materials Science and Engineering Student Outcomes:

- k) an ability to apply knowledge of mathematics, science and engineering
- l) an ability to design and conduct experiments, as well as to analyze and interpret data

- m) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- n) an ability to function on multidisciplinary teams
- o) an ability to identify, formulate, and solve engineering problems
- p) an understanding of professional and ethical responsibility
- q) an ability to communicate effectively
- r) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- s) a recognition of the need for, and an ability to engage in life-long learning
- t) a knowledge of contemporary issues
- u) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice