

MSE 4025 Fiber Product Manufacturing (required)

Catalog Description: (3-0-3)

Prerequisites: MSE 4775

The manufacture of fiber products and their process-structure-property relationships are detailed, covering fibers, yarns, fabrics, non-wovens, carpets, composites and related materials.

Textbook: Colier, B.J, Bide, M, and Tortora, P.G, *Understanding Textiles*, 7th Edition, Pearson, Prentice Hall, 2009.

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Topics Covered:

1. Polymer/Fiber/Fiber Products Manufacturing Complex
2. Fiber Structure, Properties and Their Control
3. Natural Fibers (Cellulose Proteins) and Their Properties
4. Synthetic Fibers and Their Properties
5. Filament and Staple Yarn Formation Processes
6. Fabric Formation Processes and Structures
7. Application of Colorants, Chemicals and Polymers to Fiber Products
8. Carpet Formation Processes and Structures
9. Nonwoven Fabric Formation Processes and Structures
10. High Performance Fibers and Their Properties
11. Composite Formation Processes and Structures
12. Miscellaneous Fiber Products and Their Properties
13. Design and Specifications for Manufacturing Processes

Course Outcomes:

Outcome 1: The student will develop a working knowledge of polymer materials manufacturing.

- 1.1 The student will demonstrate a basic understanding of manufacturing processes for a range of materials and products.
- 1.2 The student will demonstrate a basic understanding of several polymer and fiber manufacturing processes.
- 1.3 The student will demonstrate a basic understanding of the process-structure-property relationships for polymer and fiber products.
- 1.4 The student will demonstrate an understanding of the application of colorants and other chemicals to polymer and fiber products.

Outcome 2: The student will gain experience in applying manufacturing knowledge to practical manufacturing engineering problems.

- 2.1 The student will demonstrate the ability to analyze polymer and fiber structures to predict their mechanical behavior.

- 2.2 The student will demonstrate the ability to work with mathematical models presented in the literature for polymer and fiber products and structures.
- 2.3 The student will demonstrate an ability to work in teams to design a manufacturing plant for making a polymer or fiber product.
- 2.4 The student will demonstrate an ability to apply textile chemistry knowledge to analyze realistic chemical processes for manufacturing polymer and fiber products.

Correlation between Course Outcomes and Student Outcomes:

Course Outcomes	Student Outcomes										
	a	b	c	d	e	f	g	h	i	j	k
Course Outcome 1.1	X				X	X		X		X	
Course Outcome 1.2	X				X						X
Course Outcome 1.3	X	X	X		X						X
Course Outcome 1.4	X		X		X						
Course Outcome 2.1	X	X	X		X						
Course Outcome 2.2	X	X			X						X
Course Outcome 2.3	X	X	X	X	X	X	X	X		X	X
Course Outcome 2.4	X	X	X		X			X			X
Entire Course	3	3	3	1	3	1	1	2	0	1	3
0 = None or insignificant; 1 = Some; 2 = Moderate; 3 = Strong											

School of Materials Science and Engineering Student Outcomes:

- (a) an ability to apply knowledge of mathematics, science and engineering
- (b) an ability to design and conduct experiments, as well as to analyze and interpret data
- (c) 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
- (d) an ability to function on multidisciplinary teams
- (e) an ability to identify, formulate, and solve engineering problems
- (f) an understanding of professional and ethical responsibility
- (g) an ability to communicate effectively
- (h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- (i) a recognition of the need for, and an ability to engage in life-long learning
- (j) a knowledge of contemporary issues
- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.