TMS 211 Introduction to Fiber Science

COURSE OVERVIEW

Course Description:

In this course, students are introduced to fibers used in traditional textiles (e.g. cotton, wool, polyester) and non-traditional high performance and technical textiles (e.g. Kevlar™, polypropylene and fiberglass).

Students will learn how the chemical structures of various fibers are different and how that structure determines the properties of the fiber. Mechanical, optical, thermal and chemical properties will be discussed along with how the fiber behaves in the presence of moisture. Throughout the course, students will be introduced to various techniques of fiber identification and be required to demonstrate competency in using those techniques for fiber identification.

Knowing the specific properties of a fiber allows one to know for what applications that fiber is most suited. Also, upon successful completion of this course, a student will be able to investigate the fibers contained in a specific product to determine whether it contains those fibers listed on the label, and whether the percentage contribution of each is accurate. The course concludes with a final activity where a student must demonstrate this competency.

Course Prerequisites: TT105 or PCC101 and co-requisites are MA 131 or 141

Course Website: http://go.ncsu.edu/tms211-601-moodle

STUDENT LEARNING OUTCOMES

Upon completion of this course, a student will be able to…

- Define a polymer and a fiber
- Name common textile fibers and their chemical structures
- Describe how common textile fibers are produced
- Describe primary and secondary textile fiber properties and relative values of each for a variety of textile fibers
- Measure or evaluate various fiber properties including length, strength, fineness, thermal and flame resistance, and optical
- Identify optimal fiber choices for a specific end product and end use
- Identify common textile fibers based upon evaluation of properties carried out in the laboratory
- Characterize a yarn comprising an unknown fiber blend in terms of fiber type and percent by weight

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COURSE STRUCTURE & FORMAT

Grade Components

Component	% of Final Grade
Unit Quizzes	15%
Interactive Participation & Labs	15%
Fiber Comparison Project	10%
Tests	30%
Forensic Textiles Unknown Blend Report	10%
Final Exam	20%

Grading Scale

A+	97-100
A	94-96
A-	90-93
B+	87-89
B	84-86
B-	80-83
C+	77-79
C	74-76
C-	70-73
D+	67-69
D	64-66
D-	60-63
F	0-59

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NC STATE

COURSE SCHEDULE

Unit	Topic
Unit 1	Getting Started: Course Orientation
Unit 2	Fiber Classification
Unit 3	Fiber Characteristics & Morphology: Macrostructure
Unit 4	Fiber Characteristics & Morphology: Microstructure
Unit 5	Fiber Characteristics & Morphology: Fine Structure FIRST TEST
Unit 6	Mechanical Properties of Fibers
Unit 7	Chemical, Sorptive, and Thermal Properties of Fibers
Unit 8	Natural Cellulosic Fibers
Unit 9	Natural Protein-Based Fibers
Unit 10	Manufactured Fiber Extrusion SECOND TEST
Unit 11	Nylon
Unit 12	Polyester
Unit 13	Olefin
Unit 14	Rayon
Unit 15	Acetate
Unit 16	Acrylic
Unit 17	Elastomers
Unit 18	Performance Fibers THIRD TEST
Unit 19	Forensic Textiles *Analysis of an unknown blend*
Unit 20	CUMULATIVE FINAL EXAM