

Physical Analysis of Textiles
Fall Semester 2007

Course number: TXMI 8110

Credit: 3 hours

Location: Dawson 308

Course time: TU TH 11:00 -12:15

Instructor: Dr. Patricia A. Annis

Office: 309 Dawson Hall

Office hours: M W F 2:30 – 3:30

Office phone: 542-4889

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Open Labs: T 5:00 – 6:15, W 1:00 – 2:15, Th 3:30 – 4:45 (open lab hours are subject to change)

Course Description: The physical properties of textiles important for quality control and research. New techniques and instrumentation for physical analysis of textiles.

Textile Testing Defined by TXMI 8110 Students: The measurement of characteristics and properties of textile materials to predict their end use performance.

Student Outcomes:

Upon completion of the course, a student will be able to:

1. To plan and obtain fabric specimens for testing using randomized sampling techniques.
2. Obtain accurate testing data.
3. Calculate descriptive statistics appropriate for analyzing laboratory data.
4. Perform tests to evaluate the characteristics and mechanical properties of fibers, yarns, and fabric.
5. Evaluate textile testing data according to a specific set of performance guidelines.
6. Determine the suitability of a fabric for a specific end use.
7. Find, summarize and present both written and oral reports on various physical analysis techniques applied to textile samples based on primary [research papers] and secondary [textbook] sources.
8. Determine the suitability of physical analysis techniques to answer particular research questions.

Textbook

1. Textile Testing and Analysis, Prentice-Hall, Inc., New Jersey, 1999.

References:

1. Understanding Textiles, 6th Edition, Prentice-Hall, Inc., New Jersey, 2001 or equivalent.
2. Annual Book of ASTM Standards, Vol. 7.01 and 7.02, American Society for Testing and Materials, Philadelphia, Pennsylvania, 2006.
3. AATCC Technical Manual, American Association of Textile Chemists and Colorists, Research Triangle Park, North Carolina, 2007.
4. Saville, B.P., Physical Testing of Textiles, CRC, Woodhead Publishing Limited, Cambridge, England, 2002.
5. Weaver, J.W., editor, Analytical Methods for a Textile Laboratory, American Association of Textile Chemists and Colorists, Research Triangle Park, North Carolina.
6. Technical articles provided by instructor and students.

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Required Materials and Supplies:

1. Each student is required to purchase two woven fabrics 3 – 3.5 yards long for use during testing units; yardage depends on fabric width. The fabrics may differ in fiber content or other structural characteristics, but should also have some similar characteristics. The characteristics and properties of the two fabrics will be compared throughout the semester and similarities and differences used to theoretically explain your laboratory results. Light colors are easier to work with than dark colors. Do not choose white or black or a very light or dark color. Avoid fabrics with very large prints or woven designs because it is hard to include each color in a small test specimen. Small prints and woven designs are OK. **Do not choose the same fabric, but a different color, as another student in the class. Every student must have their own unique fabrics.**

If you are unsure about what are appropriate fabrics, Dr. Annis will approve swatches of your fabrics before you buy them. Record price/yard, manufacturer, and all company and label information, etc., on the Fabric Purchasing Sheet when you buy your fabric. **Save** your sales receipt(s).

2. Supplies needed throughout the semester include: shears (for cutting fabric; not pinking or scalloped), calculator, and a 3-ring notebook (for turning in all labs at the end of the semester). Label all supplies with your name. There is room in Dawson 308 to safely store supplies.

Course Requirements and Evaluation:

Point Distribution (approximate):

	<u>Points</u>	<u>Percent, %</u>
Exams	≈ 350	41
Labs and Lab Reports	≈ 250	29
Worksheets/assignments	≈ 50	6
Independent Study Project & Presentation	≈ 130	16
Summary Project and notebook	≈ 70	8
Estimated total	≈ 850 points	100%

The instructor reserves the right to assign extra points during the course of the semester.

Grading scale (percentage):

A = 100 – 90, A- = 89 – 87, B+ = 86 – 84, B = 83 – 80, B- = 79 – 77, C+ = 76 – 74, C = 73 – 70, C- = 69 – 67, D = 66 – 60, F = 59 and below

Discussion of Grading System:

1. Exams: The exams will consist of questions based on material covered in class, the textbook, technical readings provided by students and the instructor, and laboratory experiments. Exam questions will be in the form of multiple choice, true/false, and short answer/essay. The number of points for the exams will vary. You may bring a calculator. The final exam will be comprehensive.

2. Laboratory reports. Testing results from each laboratory will be recorded and presented in standard laboratory report format, ie.,:

- a) title
- b) introduction and definitions
- c) objectives
- d) methods and materials
- e) results and discussion; comparison of your two fabrics and explanation of similarities or differences.

Lab Reports should contain the following sections:

1. Name, date, title
2. Introduction: give purpose of the experiment and overview of the importance of the property, major factors that affect the characteristic/property, and major methods of measuring/testing the property.
3. Procedure: in your own words, give brief overview of procedures used and any deviations in standard procedure
4. Results and Discussion: present data and statistics in table form, if possible and discuss major findings.
5. Conclusions: Report information required from the test method used; compare your two fabrics and give explanation for similarities or differences, which method of twist determination would be preferred for the yarns in your fabrics? Why?

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Due dates for the lab reports are listed in the tentative class schedule. The number of points for the lab reports varies. Lab reports should be typed.

3. Worksheets/assignments will be used during the semester to assist students in understanding various concepts discussed in class. The number of points for the worksheets and assignments will vary. Due dates for the worksheets and assignments are listed in the tentative class schedule.

4. Independent Study (IS) Project and Presentation: A topic for independent study on an advanced physical analysis technique will be selected by the student. The presentation should address the following points:

- a) Definition of property of interest and overview of applications
- b) Theoretical/technical/mathematical explanation of property of interest.
- c) What standard test methods or procedures are used to evaluate the property of interest? What questions can be answered by these test methods?
- d) What materials are suitable for this analysis? How are these materials sampled and prepared for analysis?
- e) What are the various types of instrumentation that are used to measure/evaluate the property of interest? Who makes and distributes these instruments? How much do they cost? How are they maintained and/or calibrated. What are the operating principles and how do they work?
- f) Data reduction and analysis: What is the instrumental raw data? How are the final results calculated? What are the comparison values or standards?
- g) How is this property communicated and/or promoted to consumers?

Individual meetings with the instructor will be required prior to the presentation to evaluate topic, methodology, outline, and presentation slides. Laboratory demonstrations and directed experiments (if applicable) will be part of the presentation.

5. Final Project and Notebook. Results of experiments conducted on your test fabric will be summarized and suitability for a specific end use determined using an ASTM Performance Specification. Lab reports related to your test fabric will be compiled into a notebook that will be due at the end of the semester. Directions and grading criteria will be provided.

Policies:

1. Class Attendance: **ATTENDANCE IS EXPECTED AND WILL BE TAKEN REGULARLY.** There will be no provision for making up missed lectures, demonstrations, or group experiments. Some group experiments cannot be made up even if an absence is excused because of the nature of the experiment.

Examples: **dimensional stability, staining, and colorfastness labs.** You will be unable to earn full credit if you are absent during a group laboratory experiment. Excused absences apply only to sickness and other extreme circumstances. Appropriate documentation must be provided.

3. Open Labs. Each lab is scheduled for a 1 1/4 hour time slot. This time period, which includes answering questions, demonstrating use of equipment, and returning checked labs is not long enough to accommodate all students at all work stations. Therefore, the testing lab will be open to allow students to complete experiments.

4. Makeup Exams. Students are to be present on all testing days. If a previously scheduled and important event coincides with an examination date, a written request to take a make-up exam will be considered. Such requests must be submitted **at the beginning of the semester.** Any request for make-ups based on illness or family emergency must be accompanied by written documentation that establishes the veracity of the excuse. All make-ups are administered at the professor's discretion.

5. Student with Disabilities: The University of Georgia is committed to full inclusion of all students. Students who, by nature of a documented disability, require academic accommodations should contact the instructor at the beginning of the semester.

6. Late adds will not be approved except on exceptional circumstances

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6. Academic Honesty. All academic work must meet the standards contained in "A Culture of Honesty". Students are responsible for informing themselves about those standards before performing any academic work. Each student is expected to complete each assignment and laboratory independently. Each student must do his/her own testing. **Laboratory reports and assignments that are identical in wording or plagiarized will be penalized. For more information see <http://uga.edu/ovpi/academichonesty/academic-honesty.htm>**

7. Electronics. Use of cell phone calculators and other electronics are prohibited during tests. Hand held calculators are OK. Please turn off cell phones with audible ring. **No laptop computers!**

8. The Family Educational Rights and Privacy Act is adhered to at UGA. If anyone objects to being identified by name during class, when tests and labs are returned, or when attendance sheets are circulated, please see the instructor.

Tentative Schedule

8/16 Introduction
Textile testing defined
Textile components

Week 1

8/21 Textile quality
Scope of the textile testing industry
Textile Review lab assigned
Chapters 1 and 5

8/23 Standard writing organizations
ASTM/AATCC Worksheet
Chapter 2

Week 2

8/28 Sampling and Sampling Plans
ASTM/AATCC Worksheet DUE
Fabrics and Purchasing Sheet DUE
Questions on Textile Review lab
Chapter 3

8/30

Textile Review Lab DUE

Inspection, grading, and yarn distortion

Fabric preparation

Week 3

9/4 **Sampling Plan DUE**

Analysis of testing data

Statistics worksheet

Chapters 3 and 4

9/6 **Discuss and Select Topic for Independent Study Project (ISProject)**

Fiber and yarn characterization

Statistics worksheet DUE

Chapter 5

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Week 4

9/11 Questions on fiber and yarns characterization

Fabric characterization

Chapter 5

Cut Fabrics DUE

9/13 **Fiber and yarns lab DUE**

Fabric characterization lab

Week 5

9/18 Fabric characterization

Individual consultation with Dr. Annis – **ISProject Literature Review DUE**

9/20 **Fabric characterization lab DUE**

Week 6

9/25 Strength testing

Chapter 6

9/27 Strength testing lab

Week 7

10/2 Questions on strength testing

Pilling and abrasion resistance

Chapter 7

Individual consultation with Dr. Annis – **ISProject Methodology DUE**

10/3 Midterm

10/4 **Strength Testing Lab DUE**

Pilling and abrasion resistance lab

Week 8

10/9 Questions on pilling and abrasion resistance

Dimensional stability (DS) and smoothness appearance (SA)

Chapters 8 and 9

10/11 **Test #1**

Week 9

10/16 DS and DP lab

Individual consultations with Dr. Annis – **ISProject Outline DUE**

10/18 Questions on DS and DP lab

Pilling and Abrasion Resistance Lab DUE

Week 10

10/23 **DS and DP Lab DUE**

10/25 **Fall Break!**

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Week 11

10/30 Colorfastness testing

Individual consultations with Dr. Annis – **ISProject Draft Slides/Handouts DUE**

Chapters 10 and 11

11/1 Colorfastness lab (Part 1)

Week 12

11/6 **ISProject Presentation #1**

Colorfastness lab (Part 2)

11/8 Flammability (FR) testing

Chapter 14

Week 13 (schedule revision to be determined, Dr. Annis at AATCC Research Committee meetings)

11/13 FR lab and demonstrations

11/16 Friday - **Colorfastness Lab DUE**

Week 14

11/20 **Test #2**

11/22 **Thanksgiving Holiday!**

Week 15

11/27 **ISP Presentations #2 and #3**

11/29 **ISP Presentations #4 and #5**

Week 16

12/3 Monday – **Flammability Lab DUE**

12/4 Tuesday - Follow Friday schedule

12/6 Thursday – Last day of classes

Review for final exam

End Use Summary Report and Rationale DUE

12/7 Friday - Reading Day

Week 17

12/10 Pick up End Use Summary Report
Questions on final exam

12/11 **Tuesday, Final Exam, Noon - 3:00 p.m.**

Happy Holidays!!!

**The course syllabus is a general plan for the course; deviations announced to the class by the instructor may be necessary.