Introduction to
GENERAL TEXTILES
Laboratory Manual

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LABORATORY MANUAL

by

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INTRODUCTION TO TEXTILES

I. Introduction
   A. Purpose of clothing in its relation to fabrics selected
      1. Appearance: affected by
         a. Kinds of fibers used
         b. Construction process for making fabric
         c. Finishing processes, including dyeing and printing
      2. Protection from the elements: temperature, wind, rain: afforded by
         a. Kinds of raw materials used
         b. Methods of construction
         c. Specific finishes used on fabrics
      3. Comfort in regard to heat and humidity: related to
         a. Way in which fabric is made
         b. Adaptability of fabrics to certain garment construction processes
      4. Psychological effect:
         a. Quality of fabric used
         b. Assurance that fabric will perform services desired

   B. Textile fabrics used for clothing
      1. Kinds of garments for which the textile fabrics are needed
      2. Kinds of fabrics most suitable for these specific needs

   C. Types of textiles available for garment purposes
      1. Fabrics of different fibers or blends of fibers
      2. Fabrics of different kinds of construction
      3. Fabrics with different kinds of finishes, for general and specific purposes

   D. Points to consider in the selection of the fabrics for garment use
      1. The specific purpose for which it is needed.
      2. The comfortableness of the fabric if used for that purpose
      3. The emotional reactions likely to result when wearing garments of that fabric
      4. The cleanability of the garments
      5. The effect of the stress and strain and abrasion on the wearing qualities of the fabric
      6. The effect of sunlight on the fabric
      7. The problems connected with storage of the fabric or garment

   E. Properties of the fabric to fulfill these purposes affected by:
      1. Fiber content
      2. Yarn structure
      3. Fabric structure
      4. Finishes applied

II. Fiber content
   A. Kinds: natural and synthetic

   B. Lengths: staple and filament

   C. Characteristics: physical properties such as strength, elasticity, resiliency; chemical properties such as reaction to light, bleaches, and detergents

III. Yarn structure
   A. Carded or combed (natural fibers)

   B. Extruded, stretched, thrown (synthetic fibers)

   C. Twist: amount and direction

   D. Size and evenness

   E. Single strand or ply

   F. Characteristics: strength, texture, luster, etc.

IV. Fabric structure
   A. Weaves: plain and variations; Twill, satin and sateen, fancy weaves

   B. Knitting: filling and warp types

   C. Nets, braids, and laces

   D. Non-woven: felted, bonded, sheet-form

V. Finishes
   A. Temporary, durable, and permanent types

   B. Pre-treatments

   C. Dyeing and printing

   D. Treatments for specific purposes
      1. "Hand" and appearance
      2. Resistants, repellents, retardants and "proof"
      3. Coated and impregnated

1st week: General Introduction.
Yarns: Construction, variations, characteristics.

2nd week: Fabrication: Plain weave and its variations, construction. Kinds of fabrics, use and care of them.

3rd week: Fibers: Cotton, its characteristics and their effect on the fabrics. Spinning processes and their effect on the fabrics.

4th week: Fibers: Cotton continued: Different kinds of cotton fabrics. Their good and poor qualities. Finishes used on them.

5th week: Fabrication: Twill weave, its characteristics and the effect on the fabric. Different kinds of plain and fancy twills. Difference of twill constructions with different types of fibers.

6th week: Fabrication: Satin and sateen and damask weaves. Their relationship to the twill weave. Difference in the fibers out of which they are made. The uses and care of them.

7th week: Fibers: Wool, its characteristics and the effect of the fabric. Variations in the spinning processes and the effect on the fabrics.

8th week: Fibers: Wool continued, good and poor qualities of wool fabrics. Finishes used on them. Launderability and dry cleanability. Detergents.

9th week: Fabrication: Gauze or Leno weaves: Pique (Bedford cord or fancy birdseye, waffle or honeycomb, huckaback; pile weaving and its variations; double weaving; spot, swivel and lappet; brocade and tapestry.

10th week: Fibers: Viscose and curpammonium rayons. Fiber composition and characteristics. Fabric construction and characteristics. Launderability and dry cleanability.

11th week: Fibers: Acetate and Nylon. Fiber composition and characteristics. Uses and care of fabrics. Their launderability and dry cleanability.

12th week: Blends and minor synthetics: Kinds of fibers used in blending. Purposes and effects of blending. Classification of synthetic fibers.

13th week: Fabric constructions other than weaving: Knitting, lace-making, felting, bonding, sheet-form.

14th week: Minor natural fibers: silk, linen, ramie. Characteristics of the fibers as they affect the fabrics. Uses and care of the fabrics.

15th week: Finishes: Emphasis on dimensional stability. Finishes for specific purposes.

16th week: Summary and comparison of fiber characteristics with the comparison or contrast of care necessary.

REFERENCES

Text Book:

Hess, Katherine P. 1948. Textile Fibers and Their Uses. J. B. Lippincott Co., New York.

The yarn and fabric construction methods are well explained and diagrammed. The different textile fibers with the characteristics that make them desirable for clothing fabrics are discussed as well as the manufacturing processes. A discussion of the selection and care of fabrics for the home is also included.

Supplemental Books:

A.S.T.M. Committee D-13. 1950. A.S.T.M. Standards on Textile Materials. American Society for Testing Materials, Philadelphia, Pa.

Any research work on textiles that is done accurately uses this book for definite procedures on the tests being performed. It is the only way in which results of one laboratory can be compared with another with any real meaning.

Bendure and Pfeiffer. 1947. America's Fabrics. The Macmillan Co., New York.

The yarn and fabric construction processes are not only well explained, but are quite complete. There are also good photographic illustrations of practically all of the well-known fabrics on the market. The back part of the book contains a short glossary of the various fabrics.

Carmichael, Linton and Price. 1947. Callaway Textile Dictionary. Callaway Mills, LaGrange, Ga.

This dictionary has come out of the experience of mill men and explains many terms that are either not found in general dictionaries or are so buried among other definitions that they are difficult to separate out of the group.

Higgins and La Vault, 1948. A Comprehensive Dictionary of Textile Terms. Dover Press, Fall River, Mass.

This dictionary is the result of twenty years of the collection of textile terms by persons with a wide experience in many phases of the industry. Trade names are used only when necessary to explain the meaning of the term.

Hoye, John. 1942. Staple Cotton Fabrics. McGraw-Hill Book Co., Inc. New York.

Another book written by and for people in the textile business. As its title indicates it is only concerned with cotton fabrics and mainly the staple ones. It explains clearly enough all of the basic weaves and many of the fancy ones in such a way that most of them can be easily recognized and many could even be duplicated with a minimum of equipment.

Mauersberger, Herbert R. (Editor). 1947. Matthew's Textile Fibers. John Wiley & Sons, Inc., London

The revision has brought this material up-to-date with the same care as the original text. It is valuable for a more detailed study of the fiber construction and characteristics than the text-books.

Sherman and Sherman, 1946. The New Fibers. D. Van Nostrand Co., Inc. New York.

Much of the recent information on new fibers has been collected into this book. It also contains recent improvements on the older ones of the synthetic fibers, such as, rayon.

Supplemental Periodical References: To be used with each unit or with the summary section (16th week) as a review. See Appendix I.

INDIVIDUAL EQUIPMENT

Textbook

Laboratory Manual

Notebook and pencil or pen

Ruler - plastic

Scissors

Pins

Tri-Chem-Pen or a
needle and thread for marking fabrics

Scotch tape for labeling equipment and attaching samples

Work To Be Handed In

Detachable sheets in laboratory manual:

Charts containing results of tests

Definitions

Answers to questions

Conclusions drawn from experiments and readings

YARN STRUCTURE

1st Week

Topics:

Yarns: construction, variations, characteristics
Fiber content: natural or synthetic
Fiber length: staple or filament
Characteristics of fibers: strength elasticity, resiliency
Spinning: carded, or combed (natural and staple fibers)
extruded, stretched, thrown (synthetic fibers), amount and direction of twist.
Characteristics of yarns: size, evenness, ply, strength, texture, and luster
Types of yarns: evenly twisted yarns, different ply twisted with uneven tension, twisted with flocks added, thick and thin

References:

Textbook: Hess, pp. 70-104, 212-215, 247-250, 296-297, 301-302-333

Supplemental: Hoye, pp. 102-105
A.S.T.M. Standards on Textile Materials. 1950 pp. 12-13.
Bendure and Pfeiffer, pp. 254-304
Callaway Textile Dictionary
A Comprehensive Dictionary of Textile Terms

Materials: Yarns from dress and drapery fabrics of different types of yarns:

Of different sizes and ply
Of different fibers
With differences in eveness and fiber length
Raw fibers such as cotton, wool and rayon

Procedure: Twisting of wool or cotton fibers by hand to make a yarn. Make as fine and even as possible and test for strength. Then twist and fold (or lap) to make a 2 ply yarn.

Examination of warp and filling yarns from different kinds of fabrics for relative size and evenness.
Determination of the direction and amount of twist in the yarns. Record by using S and Z symbols.
Determination of the length of the fibers that make up the yarns. Note which are short fibers and which are long filaments.
Untwisting of yarns to determine the number of ply.
Examination, with microscope, if necessary, to determine:
1. Whether the fibers are parallel to distinguish between carded and combed yarns.
2. Whether irregularly twisted to form fancy or novelty yarns or evenly twisted to form regular or simple yarns.

SAMPLES OF YARNS OF DIFFERENT TYPES

Opposite the kind of yarn of each type attach a sample (3-4 inches long) with Scotch tape. Number the samples and indicate with a "W" or "F" whether they were taken from the warp or filling direction of the fabric.

Yarns of different fibers

1. Cotton
2. Wool
3. Viscose rayon
4. Cuprammonium rayon
5. Acetate
6. Nylon
7. Blended (indicate which fibers are blended)

Yarns of different twists

Direction of twist

8. S
9. Z

Amount of twist

10. High
11. Medium
12. Low

Yarns of different ply

13. One ply or single strand
14. Two ply
15. Three or more ply

Yarns of different sizes

16. Coarse
17. Medium
18. Fine

Novelty or irregular yarns with additions

21. Slub yarn (from filling of cotton shantung)

22. Flock yarn (from tweeds)

23. Flake yarn (from novelty rayons)

With uneven tension

24. Spot yarn (from fancy curtain marquisette)

25. Loop or boucle (from novelty drapery fabric)

26. Gimp or ratine (from ratine type suiting)

27. Core yarn (a lastex yarn or similarly covered yarn)

With change of pressure on spinning solution

28. Thick and thin yarn (from thick and thin rayon fabric)

With evenness of twist but differences in sizes, colors, or tensions of the ply

29. Corkscrew yarns

30. Filament yarns

31. Staple yarns

Select from these as many different samples as possible and complete the chart on page 4.

Name _____

YARN STRUCTURE

Yarn Sample	Warp or Filling	Size of Yarn	Number of ply	Direction of twist	Amount of twist	Even or Uneven twist	Staple or Filament	Fiber Content

Name _____

DEFINITIONS

1. Warp
2. Filling
3. Ply
4. Cable
5. Carded yarns
6. Combed yarns
7. Filament
8. Filament yarn
9. Staple Fiber
10. Spun rayon yarn
11. Monofilament yarn
12. Multifilament yarn
13. S. Twist
14. Z. Twist
15. Crepe twist yarn
16. Slub yarn
17. Thick and thin yarn
18. Spiral or corkscrew yarn
19. Boucle or loop yarn
20. Nub or seed or knot or spot yarn
21. Ratine or gimp yarn
22. Flock yarn
23. Core yarn
24. Characteristics of fibers, yarns, and fabrics.
25. Property
26. Elasticity
27. Resiliency
28. Yarn number
29. Denier

Name _____

QUESTIONS

1. Is there any difference in the elasticity of the different yarns? Can you see any reason for it?

2. What differences are there in the strength of the different yarns? Give reasons for it.

3. Are the fibers in the yarns all the same length? If different, what variations are there?

4. What differences did you find in the natural fineness or coarseness, curliness, or straightness of the fibers that make up the yarns?

5. What different causes did you find for uneveness or bumpy effects of some of the yarns?

6. What effect does a combination of different directions of twist have on the texture of the fabric?

7. What is the difference in appearance under the microscope between carded and combed yarns?

8. What examples of these can you find in your own or your friend's wardrobe?

Conclusions about the different ways in which the kinds of yarns affect the fabrics made from them.

FABRICATION

2nd Week

Topics:

Plain weave and its variations
Construction of the plain weave fabrics
Kinds of fabrics made with plain weave
Characteristics of plain woven fabrics
Fibers used in making of plain woven fabrics
Yarn types used for plain weaving
Principal uses of plain woven fabrics
Care in the handling and use of plain woven fabrics

References:

Textbook: Hess, pp. 12-22

Supplemental: Hoye, Staple Cotton Fabrics, pp. 5-65. Bendure and Pfeiffer, America's Fabrics, pp. 306-316, 329-334.

Material:

Plain woven fabrics:
Cotton fabric: dress or shirt fabric, gingham or chambray
Wool fabric: dress sheer or plain suiting
Rayon fabric: Crepe and/or taffeta and/or shantung

Basket weave fabrics:
Dress, suiting or drapery fabric

Rib weave fabrics:
Dimity or pajama check, or broadcloth or poplin

Procedure: Demonstration of plain weaving on small table loom.

Make a sample of the plain weave and the variations. Mount samples with the warp yarns vertical and label.
Use a magnifying glass, if necessary and count the number of yarns in one half inch in each direction. Multiply each by two and record on chart.
Grasp the fabric between thumbs and forefingers and test to see if the yarns will slip apart in either direction. Record ease or difficulty.
Rub something rough on the surface to see if it will catch and snag, (as fabrics do against a rough chair).
Examine each fabric and record what there is about its appearance or feel that distinguishes it from the other plain woven fabrics.
Cut samples 6" x 4" and break on a breaking strength machine.
Test samples 5" x 5" on abrasion machine. Record the number of strokes or revolutions for the first break in each of the warp and filling.

Name _____

PROPERTIES OF PLAIN WOVEN FABRICS

Fabric		Yarn Count			Breaking Strength in lbs.		Abrasion Resistance	
Sample	No.	Warp per in.	Filling per in.	Yarn per sq. in.	Warp	Filling	Warp	Filling

No.	Slippage	Snagging	Outstanding characteristics of appearance and hand of the different fabrics

Name _____

DEFINITIONS

1. Fabric

2. Cloth

3. Weave

4. Slippage

5. Count per sq. in.

6. "Hand or Handle" of fabric

7. Breaking Strength

8. Abrasion

9. Plain or Tabby or Taffeta

10. Basket Weave

11. Rib Weave

12. Appearance

13. Snagging

Name _____

QUESTIONS

1. What are the advantages of plain weave?

2. What are the disadvantages of plain weave?

3. If the same yarn is used what difference would a high or low yarn count per square inch make?

4. How does the use of novelty yarns in the plain weave change the appearance and hand of the fabric?

5. How does the use of yarns of different kinds of fibers change the appearance and hand of the fabric?

6. What are some of the differences in the plain weave that might make a difference in the resistance to abrasion?

7. What variations in the plain woven fabrics might make them more liable to slippage and snagging?

Conclusions in relation to the differences in appearance, hand, uses, and wearing qualities that can be obtained in fabrics all of which are plain weave.

COTTON FIBERS

3rd Week

Topics:

Characteristics of the cotton fibers and their effects on the fabrics
Differences in the spinning processes and their effects on the fabrics
Different kinds of clothing fabrics made of cotton fibers
Recent improvements in cotton fibers

References:

Textbook: Hess, pp. 267-303

Supplemental: Matthews, pp. 175, 201, 231-263
Bendure and Pfeiffer, pp. 63-83
Hoye, pp. 1-236

Materials:

Long and short cotton fibers. Cotton fabrics of different qualities in regard to kinds of fibers they contain and the methods of construction of the yarns and fabrics.

Procedure:

Sketches of cotton fibers; long, short, and neps, using the microscope.
Physical measurements of long and short staple; length and elasticity, and strength. Use a piece of heavy velvet or plush to line up the fibers for measuring.
Examination of the warp and filling yarns of the various fabrics for twist, carded or combed, neps, length of fibers.

Name _____

FIBERS

Fiber Sketches	Length		Waviness	Elasticity	Strength	Sketch fibers and nep if microscope is available
	Range	Average				
Short Staple Cotton						Short Staple
Long Staple Cotton						Long Staple
Nep						Nep

YARNS

Yarn Samples	Warp or Filling	Amount of Twist	Carded or Combed	Strength	Elasticity	Fiber Length	
						Range	Average

Name _____

DEFINITIONS

1. Raw Cotton

2. Carded

3. Combed

4. Neps

5. Short staple cotton

6. Long staple cotton

7. Chambray

8. Broadcloth

9. Batiste

10. Dimity

11. Chintz

12. Seersucker

Name _____

QUESTIONS

1. In what ways would poor quality of cotton fibers affect the quality of the fabric?

2. List the characteristics of cotton fibers which would indicate poor quality fabrics.

3. Four characteristics that would indicate a cotton fabric of excellent quality.

4. From the standpoint of the physical properties of the cotton fiber what are its advantages for dress fabrics? Its disadvantages?

5. From the standpoint of the chemical properties of the cotton fiber what are its advantages? Its disadvantages?

6. Be able to identify most commonly used cotton fabrics such as batiste, broadcloth, chambray, chintz, corduroy, dimity, dotted swiss, gabardine, gingham, pique, crepe, poplin, lawn, longcloth, madras, marquisette, muslin, organdy, outing flannel, percale, sateen, seersucker, terry cloth, velveteen, voile.

Conclusions as to the different ways in which the characteristics of the cotton fiber makes it suitable for clothing purposes.

Name _____

DEFINITIONS

1. Mercerization

2. Napping

3. Bleaching

4. Sizing

5. Embossing

6. Dyeing

7. Calendering

8. Printing

9. Singeing

10. Moisture regain

11. Residual shrinkage

12. Relaxation shrinkage

Name _____

QUESTIONS

1. What are the reasons for the different general finishes that are used on cotton fabrics?

2. What specific finishes are used on cotton fabrics and what is the reason for each?

3. How are cotton fabrics best cared for when not in use?

4. What are the conditions for the best results in laundering cotton garments?

5. What are some of the dangers in laundering cotton garments?

Conclusions as to the desirability of cotton fabrics for different clothing purposes.

TWILL WEAVES

5th Week

Topics:

Twill weave and its variations
Construction of twill weave fabrics
Fibers used in making twill woven fabrics
Serviceability of twill woven fabrics in relation to both wear and care

References:

Textbook: Hess, pp. 22-23

Supplemental: Hoye, pp. 72-93
Bendure and Pfeiffer, pp. 334-337

Materials:

Obtain samples of the following fabrics:
Even twill weave, example serge
Warp faced left hand twill, example cotton twill suiting
Warp faced right hand twill, example wool flannels
Uneven one and two twill, example, rayon "so-called" gabardine
Steep twills - a real gabardine or tricotine
Herringbone twill, example heavier materials, suiting and drapery fabrics

Procedure:

Demonstrate twill weaves on small table loom
Analyze each of the different kinds of twill fabrics and make a diagram of each attaching sample of fabric to the diagram.
Record on the chart the kind of twill of each fabric
Count the yarns per square inch to compare the closeness of weave
Test fabrics for snagging and slippage as done previously
Examine each fabric to determine its distinguishing characteristics and record results.

Name _____

TWILL WOVEN FABRICS

Fabric Sample	Kind of Twill Weave	Yarn Count per in.			Slippage	Snagging	Outstanding characteristics of hand & appearance that identify these fabrics; sketch weave
		W	F	Sq. In.			

Name _____

DEFINITIONS

1. Twill Weave

2. Even twill weave

3. Uneven twill weave

4. Steep twill

5. Left-hand twill

6. Right-hand twill

7. Warp faced twill

8. Filling faced twill

9. Herringbone twill

10. Gabardine

11. Tricotine or Cavalry Twill

12. Flannel

13. Serge

14. Wool broadcloth

15. Drill

16. Jeans

17. Khaki cloth

18. Canton Flannel

Name _____

QUESTIONS

1. Why are twill weaves often chosen for men's wear?

2. What is the difference in texture between warp faced twill and filling faced twill?

3. How does the amount of twist in the yarn affect the finished fabric?

4. How would the selection of short fibers or long fibers make a difference in the finished fabric?

5. Do some twills snag more than most plain woven fabrics, and if so, why or why not?

6. A twill weave is often chosen when it is necessary to make a fabric strong, such as in canvas. Why?

7. Which would be more likely to wear longer, a loosely spun and woven twill or a tightly spun and woven twill. Why?

Conclusions in relation to the best uses of fabrics made by the twill weaves.

SATIN, SATEEN, AND DAMASK

6th Week

Topics:

Satin weave construction and its relation to twill weave
Kinds of fibers used in making satin weave
Uses of satin weave fabrics
Launderability of satin weave fabrics
Sateen: construction, fibers used, uses of sateen fabrics
Relationship of damask to twills, satins, and sateens
Construction difficulties in making damask fabrics
Single and double damask
Fibers used in damask construction
Uses of damask fabrics

References:

Textbook: Hess, pp. 24, 31-32

Supplemental: Hoye, pp. 94-101, 153-154, 173-174, 178, 184-186
Pfeiffer, pp. 92, 204, 591, 624, 628

Materials:

Samples of at least two or three of the following:
Lingerie Satin
Crepe back Satin
Shoe Satin
Permanently crisp Satin
Milliner's Satin
Samples of very loosely woven sateen and a closely woven sateen
Two or three samples of damask in either dress fabrics, table damask, or drapery fabrics.

Procedure:

Examine the fabrics to determine the kind of weave and record on chart.
Choose one sample each of the five shaft satin weave, and of the eight shaft satin, a sample of single damask and one of the double damask. Diagram each and attach samples.
Test fabrics with the hands for slippage
Determine yarn count and finish wherever the information is available
Determine the outstanding characteristics that could help you in making selections when buying these fabrics.

Name_____

DEFINITIONS

1. Satin weave

2. Sateen weave

3. Single damask

4. Double damask

5. Floats

6. Crepe back satin

7. Milliner's satin

8. Shoe satin

9. Warp faced satins

10. Filling faced satins

11. Bridal satins

12. Dress satin

13. Lingerie satin

Name_____

QUESTIONS

1. Why are sateens more lustrous than plain woven cotton fabrics?

2. What finishes are used on sateens?

3. Why are satins more lustrous than sateens?

4. Why do some satins tend to slip at the seams?

5. Why do some satins and damasks have a tendency to snag easily?

6. What precautions are necessary in the washing and ironing of satins and damasks?

Conclusions as to the best uses of satins, sateens and damask weaves.

WOOL FIBERS

7th Week

Topics:

Characteristics of the wool fibers and their effect upon the fabrics
Damage to the fibers from natural causes, manufacturing processes and wear
Differences between woolens and worsteds
Recent improvements in the making of wool fabrics
Adaptability of the wool fibers to different methods of fabrication

References:

Textbook: Hess, pp. 180-214

Supplemental: Matthews, pp. 450-611
Bendure and Pfeiffer, pp. 8-21

Materials:

Samples of fine and coarse wool fibers, raw and scoured.
Two or three samples of dress fabrics such as flannel or wool sheers

Procedure:

Draw sketches of fine and coarse fibers using high power on the microscope.
Examine fine and coarse wool fibers and record characteristics.
Ravel yarns from fabric samples in both warp and filling directions and note the direction and amount of twist of each.
Determine whether the yarn is woolen or worsted using low power microscope.
Make slides of fibers in both warp and filling directions of each fabric to determine if made of fine or coarser wools.
Determine whether the yarns are even or irregular. If novelty, note which kind.

Name _____

FIBERS

Fiber Sketches	Length		Crimp	Elasticity	Strength
	Range	Average			
Fine Wool					
Coarse Wool					

YARNS

Yarn Samples	Warp or Filling	Twist		Ply	Regular or Novelty	Woolen or Worsted
		Direction	Amount			

Name _____

DEFINITIONS

1. Raw wool

2. Scoured wool

3. Fine wool

4. Coarse wool

5. $\frac{1}{2}$ blood

6. Woolen

7. Worsted

8. Crimp

9. Resilience

10. "Break"

11. Plasticity

12. Sheared wool

13. Pulled wool

Name _____

QUESTIONS

1. Wool is said to have resilience. What advantages would this afford in clothing?

2. Compare wool and wool blends to non-wool for men's suitings.

3. Why do some wools wrinkle more than others?

4. Why do woolen suits apparently need more pressing than worsted suits?

5. How do fine wools differ from coarse wools in physical properties?

6. What effect do these physical properties have upon the comfort and wearability of clothing?

7. Of two fabrics made in the same thickness, one of wool and one of cotton, which would be lighter weight? Why?

8. What use is made in clothing of this difference?

9. What are the advantages of the wool fiber for use in bathing suits in mountainous or northern areas?

10. How do wool fabrics react in contact with flame?

11. What kinds of insects cause damage to wools? How prevented at home?

Conclusions as to the versatility of wools for use for different kinds of clothing purposes.

WOOL FIBERS (Continued)

8th Week

Topics:

Good and poor qualities of wool fabrics
Versatility in the use of wool fabrics
Launderability and dry cleanability of wool garments
Kinds of finishes used on wool fabrics

References:

Textbook: Hess, pp. 215-232

Supplemental: Bendure and Pfeiffer, pp. 33-62

Materials:

Woolen fabrics of at least two different weaves and one worsted fabric.
Wool fabrics (the above may be included) with at least two specific finish treatments, such as, treatment for dimensional stability, for spot or moth resistance, for felting resistance.

Procedure:

Use both woolen and worsted fabrics, preferably in both close and loose weave.
Prepare for laundering as in cotton assignment.
Note differences in good laundry methods.
Calculate the dimensional changes per yard and record.
Record any evidences of fading and bleeding.
Test abrasion and breaking strength and record.
Take yarn count for comparison.
Test for rapidity of water penetration when laid on surface of water.

Name _____

LAUNDERING TESTS

Fabric Sample	Dimensions in inches						Fading	Bleeding
	Before Laund.		After Laund.		Changes in 1 yd.			
	W	F	W	F	W	F		

Fabric Number	Fiber Composition	Abrasion Resistance		Yarn Count			Breaking Strength			
		W	F	W	F	Sq. In.	Warp		Filling	
							Dry	Wet	Dry	Wet

Name _____

QUESTIONS

1. What are the chief advantages in using wool fibers in outer clothing?

2. What are its chief disadvantages?

3. Why can wool be pressed and yet when worn tends not to wrinkle badly?

4. How can some wools be washed? Why should some garments be dry-cleaned?

5. What results if wool fabrics are washed at a high temperature, with strong soap, and rubbed?

6. How does felting take place? What treatments prevent felting?

7. What happens to the underarm sections of some woolen garments if perspiration is not prevented? How can perspiration be controlled?

8. How can the manufacture prevent insect damage in wool fabrics?

9. Of what value is "Guaranteed five years against moth damage"?

Conclusions as to the possibilities and desirability of laundering woolen fabrics and what precautions are necessary?

FANCY WEAVES

9th Week

Topics:

Construction of gauze or leno weaving
Different kinds of pique (Bedford cord) birdseye pique
Birdseye, waffle or honey comb, huckaback weaves
Fabrication methods of different kinds of pile weave and double weaving
Extra thread weaves; spot, swivel, and lappet
Brocade

References:

Textbook: Hess, pp. 24-51

Supplemental: Hoye, pp. 54-56, 60-71, 102-120, 121-129, 133, 177-181, 191-192, 204-217
Bendure and Pfeiffer, pp. 318-324, 339-353

Materials:

Secure samples of as many different fancy weaves as possible, at least one each, representing the more used types: such as,
Gauze weave used in marquisette dress fabrics.
Pile weave in velvets, velveteens or corduroys.
Extra thread weaves (lappet, swivel, knot or spot) used in dotted swiss or dotted scrim.
Dobby weaves (birdseye, huckaback, honey-comb) as in towelings or madras dress or shirting fabrics.
Pique fabrics of different kinds.

Procedure:

Examine each fabric with pick glasses if necessary to determine which one of the weaves within the group it is and record on chart.
Pull out one of a pair of warp yarns in the marquisette and see what happens to the other.
Pull out some pile fibers from the velvet, velveteen and corduroy and examine to see whether they look like "W" or "V" and determine its cause.
Pull out yarns forming the designs made by the extra thread weaves and determine whether they are extra warp or filling yarns.
Note the difference in the dobby weave fabrics and compare with the fancy piques.
Note the fiber content of the different fabrics and record in the chart those you know.

Name_____

FANCY WEAVES

No.	Name of Weave	Outstanding characteristics of this type of weave	Name of Fabric	Samples

Name _____

DEFINITIONS

1. Loop pile weave

2. Terry weave

3. Velvet

4. Velveteen

5. Corduroy

6. Damask

7. Brocade

8. Lame

9. Matelasse

10. Leno weave

11. Gauze weave

12. Marquisette

13. Pique weave

14. Birdseye Pique

15. Waffle Pique

16. Swivel

17. Dotted Swiss

18. Lappet

Name _____

QUESTIONS

1. Why are velvets, velveteens and corduroy usually chosen for fall and winter?

2. What causes velvet and velveteen to have richness and depth of color?

3. What effect is produced by a greater number of tufts per square inch?

4. What are the particular advantages of fabrics woven on the Jacquard loom?

5. Give three examples of characteristics of the weave which are apt to shorten the length of life of the fabric.

6. Give three examples of characteristics of the weaves which are apt to prolong the length of life of the fabric.

7. How would these characteristics influence your choice in selecting fabrics for garments?

8. Name four different types of fabrics woven on the Jacquard loom.

9. What advantages does the dobby attachment have?

10. How does leno and gauze weave differ from all others?

11. How are embroidered effects obtained in fabrics?

Conclusions as to the best uses for fabrics made by fancy weaves.

VISCOSE AND CUPRAMMONIUM RAYONS

10th Week

Topics:

Regenerated rayons; bright, dull, high tenacity viscose and cuprammonium.
Modification of the viscose fiber.
Fiber composition and characteristics.
Different constructions used for rayon fabrics and their characteristics.
Launderability and dry cleanability.

References:

Textbook: Hess, pp. 345-369

Supplemental: Sherman and Sherman, pp. 211-225, 229, 235-243
Matthew, pp. 738-787
Bendure and Pfeiffer, pp. 164-221

Materials:

Regenerated rayon fibers: bright and dull viscose and cuprammonium. Fabrics of regenerated rayons in different weaves.

Procedure:

Sketches of fibers: bright and dull viscose and cuprammonium.
Examination of fabrics and determination of their identification.
Testing of samples for abrasion resistance, yarn count, and breaking strength, wet and dry.
Pressing wet and dry samples with heat set at rayons.

Sketches of fibers:

Bright Viscose

Dull Viscose

Cuprammonium

Name _____

REGENERATED RAYONS

No.	Fabric Sample	Fiber Composition	Abrasion Resistance		Yarn Count			Breaking Strength			
			W	F	W	F	Sq. In.	Warp		Filling	
								Dry	Wet	Dry	Wet

Name_____

DEFINITIONS

1. Synthetic fiber

2. Regenerated rayon

3. Viscose rayon

4. Cuprammonium rayon

5. Striations

6. Deluster

7. Stretch spinning

8. High tenacity rayon

9. Multifilament

10. Microscopy

11. Blend

12. Mixtures

13. Thick and thin yarns

Name _____

QUESTIONS

1. What differences microscopically are there between the viscose and the cuprammonium rayon fibers?

2. What differences are there between the bright and the delustered (dull) rayon fibers?

3. How do these rayon fibers differ from cotton and wool fibers?

4. What are some of the ways in which these differences affect clothing fabrics made from them?

5. What effect should the use of high tenacity rayon have on the fabric?

6. What differences are noted between wet and dry breaking strength?

7. How does this difference in strength affect your care in handling rayons?

8. What advantages result from a blend of rayon and cotton fibers in a fabric?

9. What advantages result from a rayon and wool blend?

10. What is a recommended procedure for pressing regenerated rayons?

11. Why are mild soaps or soapless detergents recommended for use with most rayons?

12. What are some of the finishes used on rayons?

Conclusions: The three most important conclusions in regard to the usefulness of rayon fabrics for clothing purposes.

ACETATE AND NYLON

11th Week

Topics:

Composition and characteristics of acetate fiber
Different constructions of acetate fabrics and their uses
Launderability and dry cleanability
Composition and characteristics of nylon
Construction of nylon fabrics; their uses; their cleaning and storage

References:

Textbook: Hess, pp. 349-370, 377-384

Supplemental: Sherman and Sherman, pp. 225-231
Matthews, pp. 790-853, 855-875
Bendure and Pfeiffer, pp. 183-221, 222-229

Materials:

Bright and dull acetate fibers. Nylon fibers. Acetate and nylon fabrics of different fabrication.

Procedure:

Sketches of bright and dull acetate and nylon fibers.
Examination of fabrics to determine identification; microscopically, burning, and with acetone.
Testing for abrasion resistance and testing for breaking strength wet and dry.
Pressing wet and dry samples with heat set at rayon.

Name _____

ACETATE AND NYLON

No.	Fabric Sample	Fiber Composition	Abrasion Resistance		Breaking Strength			
			Warp	Filling	Warp		Filling	
					Dry	Wet	Dry	Wet

Name _____

DEFINITIONS

1. Acetate

2. Ester of cellulose

3. Nylon

4. Polyamide

5. Polymerization

6. Molecule

7. Cold drawing

8. Pigmented yarns

9. Abraded yarns

10. Crimped fibers

11. "Preset"

12. Thermoplastic

13. Laminated fabrics

Name _____

QUESTIONS

1. How does the appearance of the acetate fibers differ from the regenerated rayon fibers?

2. How do the characteristics of the acetate fibers differ from those of the regenerated rayon fibers?

3. How does the appearance of the nylon fiber compare with the cuprammonium fiber?

4. How do the characteristics differ?

5. How do the acetone and burning tests distinguish between acetate and nylon?

6. How do acetate, nylon and viscose rayon compare in regard to wet and dry breaking strength?

7. What are the recommended procedures for pressing acetate and nylon?

8. What finishes are commonly used on acetate and nylon fabrics?

Conclusions: concerning the appropriateness of acetate and nylon for clothing purposes.

BLENDS AND MINOR SYNTHETICS

12th Week

Topics:

Blended fabrics and their advantages
Different methods of combining two or more fibers in the same fabric
Testing methods for recognition of the different fibers combined
Characteristics of differently blended fabrics
Cleanability of differently blended fabrics
The compositions and characteristics of promising new synthetics

References:

Textbook: Hess, pp. 370-377, 384-393

Supplemental: Sherman and Sherman, pp. 13-32, 71-84, 87-104, 131-163, 279-303
Matthews, pp. 875-908
Bendure and Pfeiffer, pp. 230-248

Materials:

Fabrics of blends of natural fibers, of synthetic fibers and of natural and synthetic.

Procedure:

Examination of the fabrics for characteristics of "hand" and appearance.
Determination of type of weave used in the construction of the fabric.
Laundering of the samples to determine the best methods for each.
Place designed fabric of viscose and acetate blend or mixture in acetone and see what part of design disappears.

Name _____

BLENDED FABRICS

Fabric Sample	Weave	Characteristics of Hand and Appearance	Fiber Content		Launderability
			W	F	

Name _____

DEFINITIONS

1. Fabric construction

2. Yarn construction

3. Fiber content

4. Fiber identification

5. Trade names

6. Polyester

7. Acrylic

8. Co-polymer

9. Vinyl

10. Azlons

11. Elastomers

Name _____

QUESTIONS

1. Give four methods of combining different fibers together in one fabric.

2. What advantages does a blend or mixture of viscose rayon and acetate give to a fabric?

3. What effect does the combining of cotton and wool in the fabric have?

4. What advantages does a combination of rayon and cotton give to a fabric?

5. What advantages are there in combining wool and silk?

6. What about the combination of nylon with each of the others?

7. What are the advantages of blending or mixing the newer synthetics with natural fibers?

8. Do the different methods of combining the fibers in the construction of the fabric affect the hand or appearance of the fabric?

9. Do the different methods of combining the fibers in the construction of the fabrics affect the launderability of the fabric?

10. What is meant by "engineered fabrics"?

Conclusions: concerning the general wear and care precautions needed to receive the most usefulness from blended fabrics.

FABRIC CONSTRUCTION OTHER THAN WEAVING

13th Week

Topics:

Different types of knitting used for clothing purposes.
Characteristics of knitted fabrics that make them most suitable for certain kinds of garments.
Characteristics of a lace fabric that make it desirable for clothing purposes.
Some of the distinctions between hand-made and machine-made laces.
Other methods of making fabrics that do not use yarns as a basis.
Best methods of handling these fabrics for cleaning and storage.

References:

Textbook: Hess, pp. 3-12, 51-67

Supplemental: Bendure and Pfeiffer, pp. 358-420

Materials:

Fabrics of filling or weft knitting illustrating the different stitches.
Warp knit fabrics showing the different kinds.
Machine-made lace dress fabrics of different types of construction.
Some hand-made laces to distinguish between hand-and machine-made laces.
Felts of one kind of fiber and of blended fibers.
Illustrations of other fabrication methods where samples are available.

Procedure:

Examination of knitted fabrics and garments to determine the type of knitting and the different stitches used.
Handling of knitted fabrics to determine elasticity, ease of snagging and running.
Examination of lace fabrics for recognition purposes.
Examination of felted, bonded, or sheet forms of fabrics.

Name _____

KNITTED FABRICS

Fabric Sample	Construction		Fiber Content	Gauge Number	Number Courses	Bursting Strength
	Classes	Types				

FABRICS OF LACE AND OTHER CONSTRUCTIONS

Fabric Sample	Type	Fiber Content	Bursting Strength	Other Characteristics

Name _____

DEFINITIONS

1. Knitting

2. Wales

3. Courses

4. Gauge number

5. Stockinette stitch

6. Rib knitting

7. Filling knitting

8. Jersey

9. Warp knitting

10. Denier

11. Lace making

12. Hand-made lace

13. Machine-made lace

14. Needlepoint lace

15. Bobbin lace

16. Pillow lace

17. Felting

18. Bonded fabrics

Name _____

QUESTIONS

1. What characteristics of knitting make it especially suitable for undergarments?

2. What is the difference in elasticity between filling knit and warp knit fabrics?

3. What does that suggest as to their uses for clothing purposes?

4. What are some of the disadvantages of knitted garments?

5. Are these qualities characteristics of all of the knitted fabrics?

6. What different fibers are used in making jersey fabrics and how does the construction of each differ?

7. What fibers are used most in making the lace fabrics?

8. What characteristics of lace fabrics make them desirable for clothing purposes?

9. Name several ways of distinguishing hand-made laces from machine-made laces of the same type.

10. What are the characteristics of the fibers that are necessary to make a good felted fabric?

11. What conditions in regard to the wearing of wool sweaters and other wool garments cause felting on certain parts of the garment?

Conclusions regarding the usefulness of garments of non-woven structures as compared to woven fabrics.

MINOR NATURAL FIBERS

14th Week

Topics:

Minor natural fibers in most common use
Characteristics of silk, linen, and ramie fibers
Kinds of fabrics made from minor fibers
Improvements in the processes that make them more available
Cleanability of fabrics made from these fibers

References:

Textbook: Hess, pp. 233-266, 310-334

Supplemental: Matthews, pp. 305-367, 379-735
Bendure and Pfeiffer, pp. 106-162

Materials:

Examples of the processes of the making of fabrics of linen, ramie, and silk.
Fiber samples of the minor fibers available
Fabric samples of the linen, silk, and ramie fibers

Procedure:

Examination of exhibit materials to understand sources of the silk, linen and ramie fibers.
Identification of the fibers using microscopical and burning tests.
Determination of physical properties of "hand" and appearance.
Testing to determine abrasion resistance and breaking strength.
Test for laundering.

Name _____

Fabric Sample	Dimensional Stability Before Laund. W	Dimensional Stability Before Laund. F	Dimensional Stability After Laund. W	Dimensional Stability After Laund. F	Changes in. per yd. W	Changes in. per yd. F	Bleeding	Fading

Fabric Samples	Fiber Content	Characteristics Appearance and hand	Abrasion Resistance W	Abrasion Resistance F	Breaking Strength W	Breaking Strength F

Name _____

QUESTIONS

1. To what different classes of the natural minor fibers do the linen, ramie, and silk belong?

2. What other natural minor fibers are used for clothing purposes?

3. Why is silk degummed before finishing?

4. How do raw silk and weighted silk differ? How can you distinguish between them?

5. What are the characteristics of silk that make it desirable for clothing purposes?

6. What are the characteristics of linen that make it desirable for clothing purposes?

7. Why is it difficult for these fibers to compete with the major fibers on the clothing market?

8. How does the ironing temperature of these fabrics differ?

9. To what extent are garments made of these fibers washable?

10. To what extent are they attacked by mildew? By insects?

Conclusions as to the desirability of these fabrics in comparison to the major fabrics.

FINISHES

15th Week

Topics:

Temporary, durable, and permanent types
Finishes that are pre-treatments
Methods of dyeing and printing
Finishes applied principally to improve "hand" and appearance of fabric
Resistant, repellent, retardant, and "proof" treatments
Impregnated and coated finishes

References:

Textbook: Hess, pp. 95-125, 140-160

Supplemental: Bendure and Pfeiffer, pp. 56-60, 99-103, 193, 449-572

Materials:

Fabrics for testing dimensional stability.
Fabrics to determine the effect that specific finishes have on "hand" and appearance.
Laundry testing for its effect on color and other surface finishes.
Testing of water repellent or fire retardant finishes.

Procedure:

Preparing and laundering samples for dimensional stability.
Laundering of fabrics with specific finishes to determine loss of sheen, crispness, and color.
Treating and testing for fire retardancy.
Testing pre-treated fabrics for water repellency.
Wetting and penetration test: lay one inch squares of different fabrics on surface of water and see

a. If they sink immediately when surface becomes wet or not.
b. What their relative rates of sinking are.
c. Repeat test using water at higher temperature.
d. Repeat test using a detergent in the water.

Name _____

FINISHES

Fabric Samples	Dimensional Stability				Changes in. per yd.		Surface Finishes		
	Before Laund.		After laund.				Color	Sheen	Crispness
	W	F	W	F	W	F			

Name _____

DEFINITIONS

1. Finishes of textiles

2. Temporary finish

3. Durable finish

4. Permanent finish

5. Residual shrinkage

6. Dimensional stability

7. Water repellent

8. Permanent sizing

9. Moth-repellent

10. Germicidal

11. Calendaring

12. Tentering

13. Moireing

14. Embossing

15. Leuminescent finish

16. Crease resistance

Name _____

QUESTIONS

1. Why are finishes used on fabrics?

2. How would you tell by laundering a piece of sheer crisp fabric whether the finish was temporary, durable, or permanent?

3. What are some of the causes of shrinking and stretching of fabrics when laundered?

4. What are the causes of fading or change of color in fabrics?

5. What can you do to prevent this fading?

6. Why are water repellent finishes desirable on clothing fabrics?

7. On what kinds of fabrics are they most desirable?

8. For what purposes are resin finishes used on fabrics? Cellulose finishes?

9. What is being done to eliminate the shrinkage caused by felting on some wool fabrics?

10. Is this desirable on all wool fabrics? Why or why not?

Conclusions as to the value of the finishes in relation to the usefulness of garments made from the fabrics.

SUMMARY OF FIBER CHARACTERISTICS

16th Week

Topics:

The relative density of the different fibers
The relationship of the different fibers in regard to elasticity and resiliency.
A comparison of the effect of moisture upon the strength of the fibers
The effect of heat upon the plasticity of the fibers

References:

Textbooks: Hess, pp. 169-178, 188, 202, 266, 302-303, 335, 358, 368-369

Supplemental: Matthews, pp. 38, 70
Sherman and Sherman, pp. 13-32

Materials:

Samples of new fabrics or those used previously containing different fibers to illustrate the differences in the characteristics reviewed.

Procedure:

Make a chart of comparative physical properties of different fibers.
Comparison of fabrics of different fibers, but of same method of construction to illustrate the characteristics under discussion.
Give as many illustrations as possible from your previous work that seem to agree with the comparison of the physical properties of the different fibers.

Name _____

AVERAGE PHYSICAL PROPERTIES OF FIBERS

Fiber	Spec. Gravity	Tenacity		Resilience	Elasticity
	See A.S.T.M. 1950 p. 100	Dry	Wet		
		gms/den	% of dry		
Acrilan					
Dacron					
Nylon, reg.					
Silk, degummed					
Wool					
Acetate, reg.					
Linen					
Viscose Rayon, reg.					
Cuprammonium, Rayon					
Ramie					
Cotton					

Fiber	Elongation at Break		Ignition	Moisture Regain 70° F - 65% RH	Thermo-plasticity
	Dry	Wet			
Acrilan					
Dacron					
Nylon, reg.					
Silk, degummed					
Wool					
Acetate, reg.					
Linen					
Viscose Rayon, reg.					
Cuprammonium Rayon					
Ramie					
Cotton					

Name _____

QUESTIONS

1. Of what value in the making of clothing is the knowledge of the relative weights (specific gravity) of the different fibers?

2. What relation to ease or difficulty of laundering of clothing fabrics do the differences in dry and wet tenacity have?

3. To what extent do the relative values of elasticity and resiliency parallel each other in the different fibers? Of what value is this in the use of the fabrics for clothing purposes?

4. What is the difference in the wearing qualities of the garments made of the different fibers in relation to the elastic and resilient qualities?

5. To what phase of the care of clothing is the question of thermoplasticity most closely connected?

Conclusions as to the value of finishes on clothing fabrics.

APPENDIX I

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