

DOC. #324

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ON

COURSE OUTLINE

COURSE TITLE: PAPER TESTING

CODE NO.: PPE241-4

SEMESTER: II

PROGRAM: PULP AND PAPER ENGINEERING TECHNOLOGY

AUTHOR: JACK BETHUNE

DATE: NOVEMBER 1994

PREVIOUS OUTLINE DATED: MAY 1988

APPROVED:

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TOTAL CREDITS 64

PREREQUISITE(S): PPE120-4

I. PHILOSOPHY/GOALS:

This course allows the student to develop and use sampling techniques and procedures for the preparation of samples for testing. The student will learn to perform a wide variety of standard tests to determine quantity, strength, optical, absorptive and surface properties of paper and paperboard. Comparison of commercial pulps and papers will be made. The majority of the testing procedures will be drawn from the Standard Methods published by the Technical Section of the Canadian Pulp and Paper Association.

II. STUDENT PERFORMANCE OBJECTIVES (OUTCOMES):

Upon successful completion of this course the student will:

- 1) Demonstrate ability to correctly operate the Valley and/or PFI beaters in order to prepare pulp stock at a range of freeness levels.
- 2) Demonstrate ability to prepare paper handsheets of uniform basis weights from the pulp stocks beaten in the Valley and/or PFI mills.
- 3) Demonstrate ability to carry out selected basic physical, mechanical and optical tests on paper handsheets made on pulp stocks.
- 4) Demonstrate ability to compare a range of properties from two commercial pulps and to correctly interpret differences found between the pulps.
- 5) Demonstrate ability to compare selected properties of commercially made papers or paperboards and to interpret the differences noted.
- 6) Demonstrate ability to establish, carry out and interpret a comparative evaluation of a selected consumer paper product.
- 7) Demonstrate ability to design, manufacture and test a simple package for a consumer item.

III. TOPICS TO BE COVERED:

- 1) Introduction to Lab Equipment
- 2) Processing Pulps with Valley and PFI Mills
- 3) Determining Strength Properties of Handsheets
- 4) Measurement of Brightness and Opacity of Paper
- 5) Measurement of Colour of Paper
- 6) Comparison of Properties of Two Paper or Paperboard Samples
- 7) Aspects of Package Design
- 8) Consumer Product Survey

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IV. LEARNING ACTIVITIES/REQUIRED RESOURCES

Topic/Unit - Introduction to Lab Equipment

Learning Activities:

- Listen to presentation on paper testing and functions and purpose of testing equipment
- View equipment in test lab
- Discuss lab safety procedures, hazards, housekeeping and the writing of Lab Reports

Resources:

- Laboratory Manual for PPE241

Topic/Unit - Processing Pulps with the Valley and PFI Mills

Learning Activities:

- Discuss theory of beating
- Review consistency solids content and Canadian Standard Freeness testing
- Process pulps in Valley and PFI Mills
- Prepare handsheets

Resources:

- Laboratory Manual for PPE241
- Pulp and Paper Testing Methods 01, 03, 09, 10, 13, 14
- CPPA Testing Methods C.1, C.4, C.7, D.3, D.16
- Valley and PFI Mills
- Handsheet Makers
- Freeness Testers

Topic/Unit - Determining the Strength Properties of Handsheets

Learning Activities:

- Discussion of tests and test equipment
- Demonstrations of equipment functions
- Practice sample calculations
- Preparation of heater curves

Resources:

- Laboratory test equipment, Millen, Tensili & Tear testers
- Laboratory Manual for PPE241
- Pulp and Paper Testing Methods
- CPPA Testing Methods

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IV. **LEARNING ACTIVITIES/REQUIRED RESOURCES**

Topic/Unit - Measurement of Brightness and Opacity of Paper

Learning Activities:

- Discussion of brightness and opacity tests
- Theory of brightness and opacity
- Measurement of brightness and opacity

Resources:

- Commercial Pulp samples
- Laboratory Manual for PPE241
- Pulp and Paper Testing Methods
- CPPA Testing Methods
- Laboratory Technibrite Instrument

Topic/Unit - Measurement of Colour of Paper

Learning Activities:

- Discussion on Theory of Colour and its Measurement
- Theory of dye use in papermaking
- Preparation of dyed handsheets
- Testing of dyed handsheets

Resources:

- Class Handouts
- Lab Manual for PPE241
- Pulp and Paper Testing Methods
- CPPA Testing Methods
- Laboratory Technibrite Instrument

Topic/Unit - Comparison of Properties of Two Paper or Paperboard Samples

Learning Activities:

- Cutting and Preparation of Samples
- Determination of MD, CD, wireside and felt side
- Measurement of strength properties, smoothness, brightness and colour

Resources:

- Class Handouts
 - Commercial Pulp and/or Paper Samples
 - Lab Manuals for PPE241
 - CPPA Testing Methods
 - Laboratory Testing Equipment
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IV. LEARNING ACTIVITIES/REQUIRED RESOURCES

Topic/Unit - Aspects of Package Design

Learning Activities:

- Discussion of requirements of design and importance of packaging
- Establish performance criteria
- Design and fabricate prototype package
- Develop performance test
- Evaluate performance

Resources:

- Paper and Paperboard and adhesives
- Lab Manual for PPE241

Topic/Unit - Consumer Product Survey

Learning Activities;

- Discuss need function and operation of product quality surveys
- Establish criteria as specifications
- Carry out mechanics of a product quality survey
- Interpret the data generated

Resources:

- The Canadian Consumer
- Consumer Reports
- Product such as Facial Tissue
- Lab Manual for PPE241

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V. EVALUATION METHODS:

Students will be graded on the basis of their completion of and performance in seven laboratory exercises and two lab tests. The proportion of total marks for the course assigned to each of these components is as follows:

Laboratory exercises (10% each)	= 70%
Laboratory tests (15% each)	= 30%
Total	= 100%

Letter grades will be assigned as follows:

A+ = 90 - 100%, A = 80 - 89%, B = 70 - 79%, C = 60 - 69%,
R = less than 60%

Students must successfully complete all seven laboratory exercises in order to obtain credit for the course. Students having a final standing of "R" and who have a course average of at least 55% may be permitted to write a supplemental test covering ONLY the theory part of the entire course.

VI. PRIOR LEARNING ASSESSMENT:

Students who wish to apply for advanced credit in the course should consult the instructor.

VII. REQUIRED STUDENT RESOURCES

- 1) Laboratory Manual for PPE241 Paper Testing (available in College bookstore)
- 2) Pulp and Paper Testing Methods for PPE120 and PPE241 (available in college bookstore)

VIII. ADDITIONAL RESOURCE MATERIAL

- 1) CPPA Technical Section Standard Test Methods (available in Laboratory)
- 2) TAPPI Test Methods (available in Laboratory)
- 3) a. Pulp and Paper Canada
b. TAPPI Journal
c. The Canadian Consumer
d. Consumer Reports
e. Pulp and Paper and various other journals available in college library

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IX. SPECIAL NOTES

Students with special needs (eg. physical limitations, visual impairments, hearing impairments, learning disabilities) are encouraged to discuss required accommodations confidentially with the instructor.

Your instructor reserves the right to modify the course as he/she deems necessary to meet the needs of students.

Apart from Lab Exercise 1, the order of completion of lab exercises is not important. Due to limitations in equipment, the lab exercises could be run in random order.

The first hour of most lab periods will be utilized to introduce the students to the theory and practice of paper testing and the safe use of the equipment. Due to the nature and length of several of the experiments it may be necessary to complete some of the work outside official class time.