

SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY
SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

COURSE TITLE: RAW MATERIALS AND TESTING
CODE NO. PPE 151-5 SEMESTER
PROGRAM: PULP AND PAPERMAKING OPERATIONS
AUTHOR: ADAM SUGDEN
DATE: APRIL 1990 PREVIOUS OUTLINE DATED: MARCH 1989

APPROVED: 
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RAW MATERIALS & TESTING

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TOTAL CREDIT HOURS: 80

PREREQUISITE: NONE

I. PHILOSOPHY/GOALS:

There are two major parts to this course. The first (and larger part) is the theory portion that will provide the student with the information required to understand the biology of wood, how its quality affects pulp and paper properties, how it is grown and harvested, how it is processed at the mill before pulping and how it is stored.

The second (and smaller part) is a laboratory portion designed to develop some basic laboratory skills commensurate with those an entry-level employee may be required to use. Included in this part are tests to determine consistency, freeness, permanganate number, pulping liquor and leach liquor strengths. Additionally, the students will be taught how to do some basic tests on paper. Actual laboratory experiments performed may vary depending on the interests of the group of students.

II. STUDENT PERFORMANCE OBJECTIVES:

The overall educational objective of this course is that the student will be able to demonstrate basic knowledge of the nature, use and processing of woody raw material prior to pulping. Further, the student will demonstrate his or her ability to carry out a number of standard industry tests to the desired level of accuracy.

Upon successful completion of this course the student will be able to:

1. Demonstrate a basic knowledge of the biology of wood, how it is structured, how a tree grows and how forests grow.
2. Demonstrate a working knowledge of the major effects of wood qualities on pulp and paper properties.
3. Demonstrate a knowledge of how woody raw materials are harvested, measured and transported to the mill.
4. Demonstrate a knowledge of the processes used to prepare wood for pulping, such as debarking, chipping and storage.
5. Demonstrate an ability to accurately perform a variety of physical tests on pulp. ^^
6. Demonstrate an ability to accurately perform a variety of chemical tests on pulp and process liquors.

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III. TOPICS TO BE COVERED:

(NOTE: Lab numbers (a) and (b) indicate alternate labs depending on student needs.)

WEEK	TOPIC
1.	<ul style="list-style-type: none">- Introduction to course and topics covered- Laboratory safety, behaviour and responsibility- Introduction to lab exercises, use of equipment- Importance of raw materials
2.	<ul style="list-style-type: none">- Canadian forests, tree growth, tree biology- Organization of wood in trees- LAB 1. DETERMINATION OF MOISTURE FREE MASS OF PULP
3.	<ul style="list-style-type: none">- The cellular basis of wood- Anatomical, chemical and physical properties- Specific gravity, water content of wood- Sapwood and heartwood
4.	<ul style="list-style-type: none">- Fibres, the building blocks of pulp and paper- Fibre wall structure- Fibre length- Fibre width and fibre wall thickness
5.	<ul style="list-style-type: none">- How wood quality affects pulp and paper- Effects of anatomical properties- Effects of chemical and physical properties- Review of Chapters 1, 2, 3 and 4
6.	<ul style="list-style-type: none">- Theory Test 1 (Chapters 1, 2, 3 and 4)- Lab 2A. SODIUM SULPHITE COOKING LIQUOR STRENGTH- LAB 2B. FREENESS OF DIFFERENT PULPS
7.	<ul style="list-style-type: none">- Forest ownership and management in Canada- Forest harvesting- Sawmill chips- Log and chip transport

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7. - LAB 3. ANALYSES OF KRAFT PULPING LIQUORS
8. - Wood measurement
- Wood handling at the mill
- Unloading, transport and storage
- LAB 4. RAW PULP TESTING BY KAPPA AND
PERMANGANATE NUMBERS
10. - Preparing wood for pulping
- Sorting for quality
- Deicing and slashing
- Debarking, bark handling and disposal
11. - Lab Test 1. (Labs 1, 2, 3 and 4)
- Chippers, chipping
- Chip screening
- Chip washing
12. - LAB 5. STRENGTH OF CHLORINE BLEACH LIQUORS
13. - Chip storage
- Chip delivery to pulping process
- Chip quality, its measurement and effects
- Costs of poor chip quality
14. - LAB 6A. STRENGTH PROPERTIES OF COMMERCIAL PAPER
LAB 6B. MAKING PAPER HANDSHEETS
15. - LAB 7. SURFACE AND OPTICAL PROPERTIES OF PAPER
16. - Review of Chapters 5, 6, 7 and 3
- Theory Test 2 (Chapters 5, 6, 7 and 8)
- Lab Test 2 (Labs 5, 6 and 7)

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IV. EVALUATION METHODS: (INCLUDES ASSIGNMENTS, ATTENDANCE REQUIREMENTS ETC.)

The total grade for this course will be based on the two major components. For the theory part, students will be graded on the basis of their performance on two tests each worth 50 marks given at appropriate intervals during the semester. The laboratory part will be graded on the basis of the student's performance on seven lab exercises, each worth 10 marks, and two lab tests, each worth 15 marks. Thus, the total possible marks for the course will be 200. Students must successfully pass both parts of the course in order that credit be granted.

Letter grades will be assigned according to the standard Sault College system. Students having a final overall cumulative percentage in the theory part of the course of between 50% and 59% may be permitted to write a supplemental examination that will cover only the theory material from the entire course. There will be no opportunity to rewrite the lab portion of the course.

V. REQUIRED STUDENT RESOURCES

TEXTBOOK(S):

A prepared text, "A Course Manual for PPE 151: Raw Materials & Testing", will be available from the College Bookstore.

VI. ADDITIONAL RESOURCE MATERIALS AVAILABLE IN THE COLLEGE LIBRARY BOOK SECTION:

In addition, a reference book is recommended for this and other courses. This book is:

Smook, G., Handbook for Pulp & Paper Technologists. Joint Textbook Committee of the Paper Industry, CPPA, Montreal, 1982.

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VII. SPECIAL NOTES

NATURE OF PRESENTATION

(a) Full-time post secondary students:

The course will be given for 4 hours per week. It will consist of one open-ended double period and two single periods per week. Laboratory work will be scheduled periodically during the semester.

(b) Part-time post secondary students:

The course is given for three hours per week, in one three-hour evening class. Laboratory work is scheduled periodically for the duration of the course.

(c) Distance Education students:

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As the course is designed around a prepared study guide, much of the work will be based on the student's independent study. Students will meet the instructor for two hours per week using telephone conference links. ^{ne}laboratory work will be completed at Sault College or an alternate location in a selected one-week period.

