


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

COURSE OUTLINE

COURSE TITLE; PULPING PROCESSES
CODE NO.: PPE 152-5 **SEMESTER:**
PROGRAM: PULP AND PAPERMAKING OPERATIONS
AUTHOR: ANNE TUNNEY
DATE: SEPTEMBER 199 J **PREVIOUS OUTLINE DATED:** MARCH 1989

APPROVED: 
DEAN **DATE/ '**

PULPING PROCESSES

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TOTAL CREDIT HOURS: 80

PREREQUISITE(S): None

I. PHILOSOPHY/GOALS:

This course provides the student with the basic knowledge of the most important mechanical, chemimechanical, semichemical and full chemical pulping processes in current use. Chemical recovery systems, where applicable, will be studied and particular attention will be given to energy requirements and the environmental issues involved.

The major emphasis will be the understanding of the process flows. The theory behind each process will be dealt with in less detail.

Upon successful completion of the course the student will be able to demonstrate a broad knowledge of the different pulping processes, their inherent advantages and disadvantages.

II. STUDENT PERFORMANCE OBJECTIVES:

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

1. Demonstrate knowledge of the theory of fibre separation during pulping processes.
2. Demonstrate knowledge of the major differences between mechanical and chemical pulping processes.
3. Demonstrate the ability to understand the "alphabet soup" of pulping processes, e.g. SGW, PGW, RMP, TMP, CTMP etc.
4. Demonstrate a knowledge of the specific equipment used for the production of mechanical pulps, e.g. grinders, refiners.
5. Demonstrate a knowledge of the structure and operation of batch and continuous digesters.
6. Demonstrate knowledge of the kraft and some soluble-base bisulphite pulping processes.
7. Demonstrate a knowledge of chemical recovery systems for kraft and bisulphite processes.

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III. TOPICS TO BE COVERED:

1. Introduction to Course.
2. Mechanical Pulping.
3. Chemical Pulping.
4. Semi Chemical Pulping.
5. Pulping Safety.

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IV. LEARNING ACTIVITIES:

REQUIRED RESOURCES:

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| 1.0 <u>Introduction to Course</u> | Text "Course Manual for PPE152 Chapter 1 |
| 1.1 Introduction to method of presentation, grading etc. | Read Chapter 1 |
| 1.2 Review of material from previous courses. | Complete Review Questions at end of Chapter 1 |
| 1.3 Overview of course. | |
| 2.0 <u>Mechanical Pulping</u> | Text "Course Manual for PPE152" Chapters 2 - 4. |
| 2.1 Principles of ground-wood pulping & raw materials. | Read Chapter 2, section 2.1 & 2.2 |
| 2.2 Stone Groundwood Process. | Read Chapter 2, section 2.3 |
| 2.3 Pressurized Groundwood Process. | Read Chapter 2, section 2.4 Complete review questions at end of Chapter 2. |
| 2.4 Principles of refiner pulping & raw material. | Read Chapter 3, section 3.1 & 3.2 |
| 2.5 Refiner mechanical pulping process. | Read Chapter 3, section 3.3 |
| 2.6 Thermo mechanical pulping process. | Read Chapter 3, section 3.4 |
| 2.7 Chemithermo mechanical pulping process. | Read Chapter 3, section 3.5. Complete Questions at end of Chapter 3. |
| 2.8 Economic properties of mechanical pulps. | Read Chapter 4, section 4.1. |
| 2.9 Physical properties of mechanical pulps. | Read Chapter 4, section 4.2. |

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IV. LEARNING ACTIVITIES:(cont'd)

REQUIRED RESOURCES:

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| 2.10 | Optical Properties of Mechanical Pulps. | Read Chapter 4, section 4.3. |
| 2.11 | Uses of mechanical pulps. | Read Chapter 4, section 4.4. Complete Questions at end of Chapter 4. TEST I - Chapters 1 - 4 . |
| 3.0 | <u>Chemical Pulps</u> | Text "Course manual for PPE152" chapters 5 - 8. |
| 3.1 | Principles of chemical Pulping. | Read Chapter 5, section 5.1. |
| 3.2 | Description of chemical pulping equipment. | Read Chapter 5, section 5.2. Complete Questions at end of Chapter 5. |
| 3.3 | Raw Materials for sulphite pulping. | Read Chapter 6, section 5.1. |
| 3.4 | Sulphite pulping reactions. | Read Chapter 6, section 5.2 |
| 3.5 | Sulphite pulping process. | Read Chapter 6, section 5.3 |
| 3.6 | Bisulphite pulping process. | Read Chapter 6, section 5.4. Complete Questions at end of Chapter 6. |
| 3.7 | Raw materials for Kraft pulping. | Read Chapter 7, section 7.1. |
| 3.8 | Kraft pulping reactions. | Read Chapter 7, section 7.2. |
| 3.9 | Kraft pulping process. | Read Chapter 7, section 7.3, 7.4, 7.5 & 7.6. Complete Questions at end of Chapter 7. |
| 3.10 | Principles of Chemical recovery processes. | Read Chapter 8, section 3.1 - 8.4. |
| 3.11 | Pulping chemical preparation. | Read Chapter 8, section 8.5. |

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IV. LEARNING ACTIVITIES:(cont'd;

REQUIRED RESOURCES:

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| 3.12 | Energy recovery. | Read Chapter 8, section 8.6 |
| 3.13 | Other uses for waste liquor. | Read Chapter 8, section 8.3. Complete questions at end of Chapter 8. |
| 4.0 | <u>Semi Chemical Pulping Processes</u> | Text "Course Manual for PPE152" Chapters 9-11. |
| 4.1 | Principles of semi-chemical pulping. | Read Chapter 9, section 9.1. |
| 4.2 | Equipment used in semi-chemical pulping. | Read Chapter 9, section 9.2 |
| 4.3 | Semichemical mechanical pulping process. | Read Chapter 9, section 9.3 |
| 4.4 | Semichemical and other high yield pulping processes. | Read Chapter 9, section 9.4. Complete review questions at end of Chapter 9. |
| 4.5 | Economic properties of chemical & semi chemical pulp. | Read Chapter 10, section 10.1. |
| 4.6 | Physical properties of chemical & semichemical pulps. | Read Chapter 10, section 10.2. |
| 4.7 | Optical properties of chemical & semichemical pulps. | Read chapter 10, section 10.3. |
| 4.8 | Uses of chemical & semi-chemical pulp. | Read chapter 10, section 10.4. Complete review questions at end of Chapter 10. |
| 5.0 | <u>Pulp Safety</u> | |
| 5.1 | Chemical Safety. | Read Chapter 11, section 11.1 |
| 5.2 | Operational Safety | Read Chapter 11, section 11.2, |
| 5.3 | Equipment Safety. | Read Chapter 11, section 11.3 Complete Questions at end of Chapter 11. |
- TEST III, Sections 8-11.**

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V. EVALUATION METHODS

A final grade will be derived from the results of three tests of equal value. The grading system will be as follows:

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

VI. REQUIRED STUDENT RESOURCES:

Kelly R. et al, Course Manual for PPE152, Pulping Process, Sault College of Applied Arts & Technology, Sault Ste. Marie, 1990.

VII. ADDITIONAL RESOURCE MATERIALS AVAILABLE IN THE COLLEGE LIBRARY:

Leask, R.A. & Kocurek, M.J. Eds. Pulp and Paper Manufacture 3rd. Edition, Vol 2: Mechanical Pulping Joint Textbook Committee, CPPA Montreal, 1987. T.S1105.P87V02.

Periodical Section -

TAPPI Journal

Pulp & Paper Journal

VIII. SPECIAL NOTES

Students with special needs (e.g. 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.