

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

COURSE OUTLINE

COURSE TITLE: PAPERMAKING WET END PROCESSES
CODE NO. PPE 240-3 SEMESTER: 4
PROGRAM: PULP & PAPER ENGINEERING TECHNOLOGY
AUTHOR: JACK BETHUNE
DATE: MAY 1995 PREVIOUS OUTLINE DATED: MAY 1991

APPROVED:

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TOTAL CREDIT HOURS: 48

PREREQUISITE(S): None

I. PHILOSOPHY/GOALS:

This is the first course dealing with the technology of papermaking processes. The history of papermaking is briefly reviewed, highlighting technological developments that have led to today's processes. Modern processes for stock preparation, stock proportioning and paper colouring are studied. Wet-end technology including stock delivery and distribution, headbox and slice design and their operation are studied in detail. The operation of fourdriniers, twin-wire formers and cylinder machines is thoroughly investigated. Aspects of wet-end stock balances and stock testing are included. Press section operations including wet press performance will be previewed.

II. STUDENT PERFORMANCE OBJECTIVES:

The overall educational objective of this course is that the student will be able to demonstrate knowledge of the theory, practice and control of all aspects of wet-end paper technology. More specific objectives are as follows:

1. Demonstrate knowledge of the history of papermaking and of those technological developments leading to modern processes.
2. Demonstrate knowledge of the important aspects of stock preparation including refining, stock proportioning, blending, cleaning and storage.
3. Demonstrate knowledge of the nature, function and effect of non-fibrous additives used in papermaking.
4. Demonstrate ability to trace stock flow along the various types of paper machines.
5. Demonstrate knowledge of stock approach, dilution and distribution systems.
6. Demonstrate knowledge of headbox and slice design, their function and operation.
7. Demonstrate knowledge of dewatering theories, practice, control and effects on paper.

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II. STUDENT PERFORMANCE OBJECTIVES: (cont'd)

8. Demonstrate knowledge of the structure, function and effects on paper properties of forming fabrics.
9. Demonstrate knowledge of equipment used in and operation of single wire, twin-wire and cylinder machines.
10. Demonstrate awareness of nature and function of the wet-pressing operation.

III. TOPICS TO BE COVERED:

WEEK

TOPIC

1. - Introduction to course and topics covered
- History of papermaking
2. - Spread of papermaking technology
- Development of processes
3. - Stock preparation overview
- Repulping
- Refining
4. - Stock preparation controls
- Stock proportioning
5. - Non-fibrous additives
- Retention of fines and additives
- Sizes, fillers etc.
6. - Sizes, fillers (continued)
- Test 1
7. - Paper colouring
- Dye types and functions
8. - Colour measurement and control

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III. TOPICS TO BE COVERED: (cont'd)

WEEK	TOPIC
9.	- Paper machine overview
10.	- Approach flow system - Flow measurement and control - TEST 2
11.	- Flow spreaders - Headboxes
12.	- Slice design, operation and function - Single-wire fourdrinier overview
13.	- Forming fabrics - Dewatering technologies
14.	- Twin-wire machines - Cylinder machines
15.	- Review - Test 3

IV. METHOD OF ASSESSMENT:

The course will be given for 3 hours per week using one single and one double period. The course material will mainly be presented in lecture format with problem sets and other materials used in support.

Students will be graded on the basis of their performance in three tests to be given at appropriate intervals during the semester. Each of the tests will be of equal value. Letter grades will be assigned as follows:

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

Students having a final standing of "R" and who have a course average of at least 55% and have at least attended 85% of the lecture hours may be permitted to write a supplemental test covering the entire course.

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V. REQUIRED STUDENT RESOURCES:

There is no single text or reference book that is appropriate for this course. However, the general reference book (Smook, Handbook for Pulp & Paper Technologists) will be used throughout the course.

VI. ADDITIONAL RESOURCE MATERIALS:

Biermann, Christopher J., (1993), Essentials of Pulping and Papermaking, Academic Press Inc., New York. Ref TS1175 B5 1993.

Britt, Kenneth W., ed., (1970), Handbook of Pulp and Paper Technology, Van Nostrand Reinhold Company, New York. Ref TS1105 B59 1964 c.2

Casey, James P., ed., (1980), Chemistry and Chemical Technology, Third Edition, John Wiley & Sons, Inc. Ref TS 1105 C29 1980 V.2

Libby, C. Earl, ed., (1962), Pulp and Paper Science and Technology, volume II Paper, Joint Textbook committee of the Paper Industry, USA, TS 1105 P99 V.2

MacDonald, Ron G., ed., (1970), Pulp and Paper Manufacture Volume III: Papermaking and Paperboard Making, Joint Textbook Committee of the Pulp and Paper Industry, USA Ref TS 1105 J65 1969

Periodicals:

Tappi Journal

Pulp and Paper Canada

Pulp and Paper

VII. 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.