

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

COURSE OUTLINE

Course Title: PAPER MANUFACTURE
Code No.: PPE 161-6
Program: PULP AND PAPERMAKING OPERATIONS
Semester: SEMESTER II
Date: MARCH 1989
Author: ADAM SUGDEN

New:

Revision:

APPROVED:


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Date

CALENDAR DESCRIPTION

PAPER MANUFACTURE

PPE 161-6

COURSE NAME

COURSE NUMBER

PHILOSOPHY/GOALS :

The course is designed to provide the student with the basic knowledge of the entire papermaking process starting with the nature of the fibres and stock preparation. It progresses through stock proportioning, use of chemical additives, to stock delivery on the paper machine. Wet-end papermaking specifics for single and twin wire fourdrinier as well as cylinder type machines will be covered.

Press types and their operation, wet press felts and felt cleaning will be studied. Paper dryers, their operation and energy consumption will be explored. Size presses, on-machine controls, overall operation and paper quality will be studied.

METHOD OF ASSESSMENT :

Students will be graded on the basis of their performance in four tests to be given at appropriate intervals during the semester.

Letter grades will be assigned according to the standard Sault College system. Those students having a cumulative percentage between 50 and 59% may be permitted to write a supplemental test covering material from the entire course.

TEXTBOOK(S) ;

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

OBJECTIVES ;

The overall educational objective of this course is that the student will be able to demonstrate knowledge of all parts of the papermaking process from stock preparation to the reel. The specific objectives of the course include the following:

1. Demonstrate knowledge of the nature of fibres and how they are modified during refining or beating.
2. Demonstrate knowledge of the many and various techniques and equipment used in stock preparation.
3. Demonstrate knowledge of basic stock proportioning and additive mixing systems.
4. Demonstrate knowledge of means of delivering stock to the forming wire for fourdrinier and cylinder machines.
5. Demonstrate knowledge of stock dewatering systems such as foils, suction boxes, couch roll etc.
6. Demonstrate knowledge of machine clothing such as forming fabrics and wet press felts.
7. Demonstrate knowledge of drying theory and structure and operation of paper dryers.
8. Demonstrate knowledge of size presses and other on-machine treatment processes.
9. Demonstrate knowledge of reeling, on-line machine control systems and the effects of machine conditions on paper quality.

NATURE OF PRESENTATION;

This course will be given for 6 hours per week using two double and two single periods. Periodically, the double periods may be used for guest speakers or audio-visual presentations. Much of the material will be presented in a lecture format with the remainder in the form of exercises and assignments.

TOPICS COVERED:

WEEK

TOPIC

1. Introduction of course and topics to be covered
Introduction to papermaking, a preview
Fibrous raw materials for papermaking
The nature of fibres
Refining and beating of fibres
- Stock preparation overview
Processes and equipment used
Chemical additives, dyes etc.
- Stock process control
Stock proportioning
Additive mixing systems
Test 1
- Stock delivery systems to one-wire fourdriniers
Flowspreaders
Headboxes
Slice technology
- Stock delivery systems to twin-wire fourdriniers
Stock delivery systems for cylinder machines
- Stock dewatering equipment
The role of the forming fabric
Hydrofoils and their function
Suction boxes and rotobelts
Test 2
- Field trip to paper mill (equivalent to 6 hours)

WEEK

TOPIC

- 8.
 - Dandy rolls, lumpbreaker rolls
 - Couch roll types and use
 - Tension and fabric steering rolls
 - White water collection and return

- 9.
 - The press section, overview
 - Theory of pressing
 - Press designs, operation and loading

- 10.
 - Press felts, use, conditioning, problems
 - Paper sheet consolidation and strength gain
 - Press problems
 - Test 3

- 11.
 - Drying overview
 - Drying theory and technology
 - Dryer design and use
 - Dryer felts

- 12.
 - Energy use and conservation in drying
 - Changes to paper during drying
 - Size presses and other equipment

- 13.
 - Reeling
 - On-line machine control of moisture, weight etc.
 - Overall operating limitations

- 14.
 - Paper quality affected by paper machine
 - Test 4