SAULT COLLEGE OF APPLIED ARTS St TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

Course Title: PULP TESTING II

Code No.: PPE 220-4

Program: PULP & PAPER ENGINEERING TECHNOLOGY

Semester:

Date: JANUARY 13, 1984

Author: ADAM SUGDEN

New: Revision:

APPROVED: /h^„'S/A/

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CALENDAR DESCRIPTION

PULP TESTING II — PPE 220-4

Course Name — Course Number

PHILOSOPHY/GOALS:

This laboratory course concentrates on aspects of chemical testing of raw materials and pulp. It complements the earlier course based on physical tests. The course deals with such tests as ash, extractives, lignin, cellulose and hemicellulose content of wood and pulp and how these influence or are affected by pulping processes. Standard techniques for determining degree of cooking (Kappa number), pulp viscosity and pH will be learned. The student will learn testing procedures for green, white, and black sulphate liquors and for bisulphite liquors. Tests on bleach liquors will be investigated through experimental laboratory bleaching of krafi pulp. Test methods used in this course will be drawn from the Standard Methods published by the Technical Section, Canadian Pulp and Paper Association. Where necessary, other official methods will be used.

STHOD OF ASSESSMENT (GRADING METHOD):

The completion of a number of assigned laboratory exercises and the preparation of lab reports on these exercises will constitute 80% of the mandatory requirement of the course. Completion of all laboratory exercises is a mandatory requirement of the course. The remaining 20% of the final grade will be based on one or more laboratory tests that concentrate on the theoretical aspects of pulp testing.

Letter grades will be assigned based on the following performances:

A = 79+%
B = 70-79%
C = 60-69%
R = -60%

Students having a final standing of 55-59% will be permitted to write a supplemental test on the theory part only.

TEXTBOOK(S):

•?.£,a-nd/\rd Meth/)ds, Technical Section, Canadian Pulp and Paper Association, Monureal, 19-63.

MULP TESTING II
PPE 250-4

OBJECTIVES

Upon completion of the course the student will be able to perform tests on wood, pulp and pulping liquors in order to determine the chemical composition, degree of pulping, pH, viscosity, etc. of a variety of substrates encountered in the pulp and paper industry. In addition, the student will have drown on skills in preparing chemical solutions that were learned in previous courses.

The student will retain his or her familiarity with the nature, scope and use of the Standard Methods issued by the Canadian Pulp and Paper Association. For those students who are already not membei of that Association, opportunity to join will be given.

Upon completion of the course, the student will have learned how to perform the tests outlined above and detailed in the Laboratory Manual and many other laboratory skills with precision. At the same time, emphasis will be placed on laboratory safety and careful use of the equipment.

4. By the end of the course, the student will understand the relationships that exist between various chemical properties of wood, pulp and pulping liquors and the qualities and end-use properties of the finished fibres.

On completing the course, the student will have had many opportunitie to further develop his or her skills in laboratory report writing. Emphasis will be placed on the following areas of the reports: Precision; Clarity; Completeness; Accuracy; Correct English Usage.

The ultimate, overall objective of this course is to provide all students with a broad understanding of the nature and use of chemical tests that are in constant use in the pulp and paper industry. While the graduate Pulp & Paper Technologist may not he in a position to actually perform such tests during his employment, i is necessary that he or she be aware of the information that is available from these tests.

IATURE OF PRESENTATION:

Each meeting is designed to last 4 hours. In most cases, the first hour of each meeting will be utilized as a laboratory lecture to discuss the approach and significance of the lab topic. Since a Laboratory Manual will be available from the beginning of the course, it is required that the studen familiarize themselves with Lhe clay's topic prior to the lab period.

Since there is a limited amount of equipment available for the entire class, the laboratory exen.ises will not necessarily be done in a particular order. In order to accommodate this procedure, reports will be handed in for marking three times during the semester. The appropriate times for this activity and for lab tests will be noted early during the semester.

The remaining three hours of the lab period will be spent in carrying ou the various lab exercises, collating data and preparing reports. Assistance from the faculty member responsible for the course will be available througho' the laboratory period.

LABORATORY TOPICS;

The following topics will constitute the laboratory program. A more complete description of the individual laboratory exercises will be found in le Laboratory Manual and its summary section. Please note that the topics listed below do not each constitute a Laboratory Exercise. In many cases, several of the following topics will be combined into one Exercise.

- Introduction to Pulp Testing II. Discussion of scope, reasons and objectives of the course.
- Laboratory procedures, hazards, safety and care of equipment.
- Review of appropriate CPPA Standard Methods as well as other Standard Methods such as TAPPI, SCAN, ASTM, etc.
- Solvent extraction of pitch and resin from wood and pulp.
- Water soluble materials found in wood.
- Ash in wood, pulp or paper.
- Acid-insoluble lignin found in wood and pulp.
- Preparation of wood and pulp for chemical analysis.

- 1% sodium hydroxide solubility of wood.
- pH of pulp.
- Alkali-resistant cellulose in pulp.
- Alpha-, Beta- and Gamma-cellulose in pulp.
- Kappa number of pulp.
- Cupriethylenediamine (Ct;D) viscosity of pulp.
- Analysis of bisulphite liquor.
- Analysis of sulphate process green and white liquors.
- Analysis of sulphate process Mack liquor.
- Analysis of chlorine solution, hypochlorite bleath liquor and spent bleach liquor.

EVALUATION:

Students will be graded by their performance on laboratory exercises an on two laboratory tests that will be based on the material given in the laboratory lectures. Laboratory exercises (a total of 8) will each be worth 10% of the course. The remaining 20% of the course grade will be evenly spl between the two lab tests.

Letter grades will be assigned in respect to the following marks achiev at mid-term and at the end of the semester:

A = 79+%
B = 70 - 79%
C = 60-69%
R = -60%

Students having a final standing of 55-59% will be permitted to write a supplemental test based on the theory part only.

TEXTBOOK:

Standard Methods, Technical Section, Canadian Pulp & Paper Association, Montreal, 1983.