SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO

Sault College

COURSE OUTLINE

COURSE TITLE: PAPER QUALITY

CODE NO. : PPE 166-3 **SEMESTER:** 2

PROGRAM: PULP AND PAPERMAKING OPERATIONS
PULP AND PAPER ENGINEERING TECHNICIAN
PULP AND PAPER ENGINEERING TECHNOLOGIST

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DATE: FEB.2000 **PREVIOUS OUTLINE DATED:** DEC. 1999

APPROVED:

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DEAN **DATE**

TOTAL CREDITS: 3

PREREQUISITE(S): NONE

LENGTH OF COURSE: 15 WEEKS **TOTAL CREDIT HOURS:** 45

I. COURSE DESCRIPTION:

The philosophy of this course is to provide the student with theory as it relates to paper quality. The course is divided into four main paper testing categories; strength, surface, optical, and permeability. The goal is to provide the student with the knowledge and understanding of tests conducted on a finished paper which are used to monitor paper quality. Process control is tied directly to quality and paper testing. Therefore, the final section will briefly highlight the use of Statistical Process Control in the paper industry. The concept of a "zone control chart" is presented as a statistical tool used in some paper mill applications.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

Upon successful completion of this course, the student will demonstrate the ability to:

1. Understand the fundamentals of paper testing

   Potential Elements of the Performance:
   - List the four main paper properties
   - Name the three key components of paper testing
   - State who standardizes the test methods used in the Canadian paper industry
   - Explain why a poor test is sometimes worse than no test at all
   - Explain "readability"in terms of testing
   - Explain "sensitivity" as it pertains to testing
   - Define "accuracy" and "percision" as they relate to paper testing
   - Explain the way to get the smallest variation between tests
   - Define random sampling
   - Explain machine direction, cross direction and Z direction
   - List four possible ways to identify MD and CD
   - State the standard environment for testing paper in North America
   - Explain why folding endurance, tear and stretch increase as relative humidity increases
   - Explain why tensile and burst decrease as relative humidity increases

2. Indicate a knowledge of physical and strength properties

   Potential Elements of the Performance:
   - List the three physical properties of paper that are tested
   - List five strength properties of paper that are tested
   - Define basis weight with its units in Canada and the US
   - Define ream weight
   - Define caliper, density and bulk
   - Explain the interaction between caliper, density and bulk
   - List the four main variables which influence the strength properties of the paper produced
   - Define stiffness index, relative bonded area, jet to wire ratio, and dragging
   - Explain why machine made papers have higher CD stretch
   - List four factors that affect tensile strength
   - List four factors that influence stretch
   - List four factors which influence burst strength
   - Explain how long fibres improve strength

3. Indicate a knowledge of the surface properties of paper

   Potential Elements of the Performance:
   - Define paper smoothness and explain how it is measured
   - Name and explain four process steps which could improve smoothness
   - Define softness and explain how it is developed
   - Define pick resistance and explain ways to improve pick strength
   - Define abrasion resistance and ways to improve it
   - Explain why smoothness, pick resistance, and abrasion resistance are important for paper grades

4. Show an understanding of the optical properties of paper

   Potential Elements of the Performance:
   - State the wavelength of visible light
   - Explain diffused scattering
   - Explain the two reasons for adding colour to paper
   - Define colour and know what three colours reflected from a papers surface define its colour
   - Define opacity and brightness and list the wavelengths at which each is measured
   - Explain hue, brilliance, and dulling
   - Explain how a spectrophotometer works

- Explain subtractive mixing
- Define whiteness, brightness, and brightness reversion
- Define opacity, transparency, and gloss
- Be able to recognize obviously abnormal test results and recommend corrective action

5. Understand the barrier and resistance properties of paper

Potential elements of the performance:

- List four factors that affect the penetration of fluids into paper
- Explain pore structure
- Explain why water resistance is important to each of : offset printing; coating colour; folding boxes; and writing, bond, leger, and index papers
- Define constant angle and explain when maximum wetting occurs
- Define sizing
- Explain two methods of measuring water resistance
- Describe the dry indicator test and the water drop absorption test
- Describe the COBB size test
- Explain how oil and grease resistant papers are made

6. Understand the Basics of Statistical Process Control

Potential elements of the performance:

- Explain the purpose of statistical process control
- List and explain Deming's fourteen points on process control
- Define zone control chart
- Plot and interpret data on a zone control chart

III. TOPICS:

1. Fundamentals of Paper Testing
2. Physical and Strength Properties and Testing
3. Surface Properties and Testing
4. Optical Properties and Testing
5. Barrier and Resistance Properties and Testing

6. Statistical Process Control

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

Pevato, Kevin, "Study Guide for PPE 166, Paper Quality" Sault College of Applied Arts and Technology, Sault Ste. Marie, 1992

V. EVALUATION PROCESS/GRADING SYSTEM:

A final grade in this course will be based on the results of three tests weighted equally.

The following semester grades will be assigned to students in postsecondary courses:

Grade	Definition	Grade Point Equivalent
A+	90 - 100%	4.00
A	80 - 89%	3.75
B	70 - 79%	3.00
C	60 - 69%	2.00
R (Repeat)	59% or below	0.00
CR (Credit)	Credit for diploma requirements has been awarded.	
S	Satisfactory achievement in field placement or non-graded subject areas.	
X	A temporary grade. This is used in limited situations with extenuating circumstances giving a student additional time to complete the requirements for a course (see *Policies & Procedures Manual - Deferred Grades and Make-up*).	
NR	Grade not reported to Registrar's office. This is used to facilitate transcript preparation when, for extenuating circumstances, it has been impossible for the faculty member to report grades.	

VI. SPECIAL NOTES:

Special Needs:
If you are a student with special needs (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with the instructor and/or contact the Special Needs office, Room E1204, Extension 493, 717, or 491 so that support services can be arranged for you.

Retention of course outlines:
It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other postsecondary institutions.

Disclaimer for meeting the needs of learners:
The Professor reserves the right to change the information contained in this course outline depending on the needs of the learner and the availability of resources.

Substitute course information is available in the Registrar's office.

VII. PRIOR LEARNING ASSESSMENT:

Students who wish to apply for advanced credit in the course should consult the instructor.