



A POLYTECHNIC INSTITUTION

School of Manufacturing, Electronics and Industrial Processes

Program: Chemical Sciences Technology

Option:

**CHSC 4446****Pulp and Paper Technology 2**

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<b>Start Date:</b>	January, 2006	<b>End Date:</b>	May, 2006
<b>Total Hours:</b>	120	<b>Total Weeks:</b>	20
<b>Hours/Week:</b>	6	<b>Lecture:</b>	3
		<b>Lab:</b>	3
		<b>Shop:</b>	0
		<b>Seminar:</b>	0
		<b>Other:</b>	0

**Prerequisites**

Course No.	Course Name
CHSC 3346	Pulp and Paper Pulp and Paper 1

**CHSC 4446 is a Prerequisite for:**

Course No.	Course Name
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**■ Course Description**

Contemporary and emerging aspects of bleaching technology are covered in lecture and laboratory work. All aspects of papermaking technology are covered in lecture. Mill tours acquaint the learners with practical applications. Pollution abatement technology is discussed: while the material is mainly specific to the pulp and paper industry, it is applicable to pollution abatement in most industrial and municipal settings.

**■ Detailed Course Description**

To provide the learner with job-ready skills and knowledge in the areas of pulp bleaching, brightening, papermaking, and pollution abatement in the pulp and paper industry. Optical and strength properties of pulp and paper are emphasized in both lectures and practical laboratory assignments.

**■ Evaluation**

Examinations	75%	Comments: Five examinations, including Final. Each examination has equal weighting.
Laboratory	25%	
TOTAL	100%	

**■ Course Learning Outcomes/Competencies**

Upon successful completion, the student will be able to:

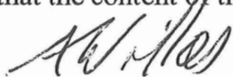
- plan and implement a bench scale bleaching sequence using current technology in the industry.
- explain the various aspects of bleaching technology, including common bleaching sequences, chemistry of bleaching, industrial equipment used, production and handling of bleaching chemicals on the industrial scale.
- state the objectives, methodology, and results of pulp stock refining prior to papermaking.
- discuss the common operation associated with stock preparation in general, including: stock blending, the nature, chemistry, and intended purpose of non-fibrous additives, secondary fiber recovery including current trends and status of the industry.

■ **Course Learning Outcomes/Competencies (cont'd.)**

- explain the purpose, operation, construction, and development of the paper machine headbox, with emphasis on recent design developments to control basis weight.
- identify the importance of formation and drainage on the forming table of a paper machine together with the factors controlling these phenomena.
- explain the purpose, construction, and operation of the press and drying sections of a paper machine, including the engineering principles employed in these sections.
- discuss the operations of calendaring, creping, and reeling of product, identifying equipment construction, principle of operation, and purpose.
- explain the purpose, operation, comparative advantages, and equipment construction for components found in coating and sizing sections, both on-line and off-line.
- describe the common printing process in present-day use: identify the properties of paper which affect printability and runability.
- explain the operation of twin wire formers.
- explain the operation of multiple formers.
- explain the nature and manufacture of newsprint.
- identify the potential sources of air pollution in a pulp and/or paper mill and the nature of these discharges.
- discuss the treatment process available for air pollution abatement.
- identify the potential sources of water pollution in a pulp and/or paper mill together with the nature of the offending compounds and possible deleterious effects on water quality of these compounds.
- explain the construction, principles of operation, and expected performance standards of wastewater treatment plants found in pulp and paper mills and in municipal settings.

■ **Verification**

I verify that the content of this course outline is current.

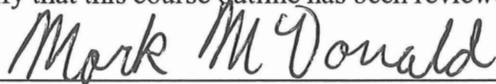


Authoring Instructor

2006-01-09

Date

I verify that this course outline has been reviewed.

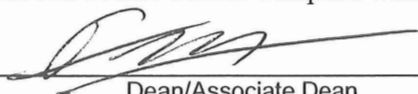


Program Head/Chief Instructor

Jan 9, 2006

Date

I verify that this course outline complies with BCIT policy.



Dean/Associate Dean

2006/01/09

Date

Note: Should changes be required to the content of this course outline, students will be given reasonable notice.

### ■ Instructor(s)

A. Wilkes	Office Location: SW1-1496	Office Phone: 604-432-8550
	Office Hrs.: Wednesday: 11:30–1:30	E-mail Address: alan_wilkes@bcit.ca
	Thursday: 11:30–1:30	

### ■ Learning Resources

*Handbook for Pulp and Paper Technologists* by G.A. Smook is a highly recommended text and is recommended for purchase by the student.

Handouts in lectures and laboratory procedures will be provided to the students.

Recommended reading for this term:

- *Bleaching — Principles and Practice* by Dense
- *Paper Machine Design and Operation: Descriptions and Operation* by Gavalin
- *Wet End Chemistry* by Scott
- Proceedings of the BCIT Pulp and Paper Technology Summer Institute — Selected papers on the topics covered. This volume is provided free of charge to Pulp and Paper Option students.

Calculators, eye protection, and lab coats are the responsibility of the student.

### ■ Information for Students

*(Information below can be adapted and supplemented as necessary.)*

The following statements are in accordance with the BCIT Student Regulations Policy 5002. To review the full policy, please refer to: <http://www.bcit.ca/files/pdf/policies/5002.pdf>.

#### **Attendance/Illness:**

In case of illness or other unavoidable cause of absence, the student must communicate as soon as possible with his/her instructor or Program Head or Chief Instructor, indicating the reason for the absence. Prolonged illness of three or more consecutive days must have a BCIT medical certificate sent to the department. Excessive absence may result in failure or immediate withdrawal from the course or program.

#### **Academic Misconduct:**

Violations of academic integrity, including dishonesty in assignments, examinations, or other academic performances are prohibited and will be handled in accordance with the 'Violations of Standards of Conduct' section of Policy 5002.

#### **Attempts:**

Students must successfully complete a course within a maximum of three attempts at the course. Students with two attempts in a single course will be allowed to repeat the course only upon special written permission from the Associate Dean. Students who have not successfully completed a course within three attempts will not be eligible to graduate from their respective program.

## Schedule

Lectures – Term 4 Material Covered
Bleaching
Refining of Stock
Stock Preparation
Non-fibrous Additives
Secondary Fiber-Deinking
Machine Headbox, Approach, and Slice
Formation and Drainage
Pressing
Drying
Calendaring, Creping, and Reeling
Coating and Sizing
Printing
Air Pollution
Water Pollution

Laboratory Procedures
<ul style="list-style-type: none"> <li>• Flat Screening of Brown Stock</li> <li>• Micro Kappa Determination</li> <li>• Bleach Sequence Preparation</li> <li>• Preparation of Bleaching Chemicals</li> <li>• D<sub>0</sub> Bleaching</li> <li>• Extraction Stage</li> <li>• D<sub>1</sub> Bleaching</li> <li>• Residual Determination</li> <li>• Brightness Determination</li> <li>• L, a, b Charts</li> </ul>
Note: Detailed outlines for these exercises are provided to the student.

Field trips are anticipated during this term. These will occur in laboratory periods, at the convenience of the sponsoring industries. Notice will be given and laboratory sessions will be adjusted accordingly.

### Schedule (cont'd.)

Tests
Bleaching
Refining and Additives, including Secondary Fiber
Headbox, Approach, Slice, Formation, and Drainage
Pressing, Drying, Reeling, Coating, Sizing, Printing, Calendaring
Pollution Control-Air and Water