

# CHEN 4100 – Pulp and Paper Processing Laboratory

## SYLLABUS

Fall 2010

### **Course Info**

CHEN 4100, Pulp and Paper Processing Laboratory, 2 credit hours

Meeting Times:

LECTURE

Wednesday 1:00 – 1:50 p.m., DAVIS 156

LAB

Wednesday 2:00 – 6:50 p.m., WILMORE 109

### **Instructor Info**

Instructor: Dr. W. Josephson, Visiting Assistant Professor, 149 Ross

Phone: 334-844-2483

E-mail: josephe at auburn dot edu

Office Hours: TBA

### **Catalog Description**

Experimental study of pulping and papermaking operations.

### **Prerequisites**

Departmental Approval or

(CHEN 2610 - Transport I and CHEN 3090 – Pulp and Paper Technology and CHEN 3820 – Chemical Engineering Laboratory I)

### **Reference Materials**

A copy of CHEN 4100 Lab Notes will be provided to the students at cost.

Various documentation associated with the course (lab handouts, safety rules, report formats, etc.) is available on-line via the CHEN 4100 home page:

[http://www.eng.auburn.edu/users/josephe/courses/CHEN4100\\_FALL2010/](http://www.eng.auburn.edu/users/josephe/courses/CHEN4100_FALL2010/)

### **Other References**

Technical writing skills are best developed by actually writing but there are some good references available if you have specific questions. The Elements of Style by Strunk and White is considered by some to be an authority for all genres of writing. My favorite in the technical writing field is The Technical Writer's Handbook by Matt Young. Its call # at RBD is T11.Y68. A wonderful book that gives guidance in the presentation of data is The Visual Display of Quantitative Information by Edward Tufte. This book can be treated as a reference work or just as an interesting, 'coffee-table' book.

### **Overall Course Objectives**

1. For the students to become familiar with the fundamental unit operations involved in the manufacture of pulp and paper.
2. For the students to become familiar with the use of pulp & paper laboratory testing procedures and TAPPI standards.
3. For the students to have developed their abilities in technical communications.

## **Outcomes**

**ABET Outcomes** ABET (Accreditation Board for Engineering and Technology) is the recognized U. S. accreditor of undergraduate programs in the fields of applied science, technology and engineering. ABET periodically reviews the engineering programs at Auburn and determines whether certain criteria and quality standards are being met. ABET evaluation teams identify program strengths and weaknesses and issue recommendations for improvements. One of the tools ABET uses in its analysis is a list of 11 outcomes commonly called “a-k” (spoken as “a through k”). These outcomes are listed below:

- a. An ability to apply knowledge of math, science and engineering
- b. An ability to design and conduct experiments, as well as to analyze and interpret data
- c. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- d. An ability to function on multi-disciplinary teams
- e. An ability to identify, formulate and solve engineering problems
- f. An understanding of professional and ethical responsibility
- g. An ability to communicate effectively
- h. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
- i. A recognition of the need for, and an ability to engage in life-long learning
- j. A knowledge of contemporary issues
- k. An ability to use the techniques, skills and modern engineering tools necessary for engineering practice

**Course Outcomes** Each course in the CHEN curriculum has an associated set of course outcomes. These course-specific results, when summed over the entire curriculum, result in the successful completion of the department’s program outcomes. In the case of CHEN 3820 these outcomes are:

*Upon successful completion of this course, students should be able to:*

1. Work in teams to plan and conduct experiments involving pulp and paper manufacturing processes.
2. Identify fibers using optical microscope and fiber staining techniques.
3. Measure the freeness and consistency of pulp samples.
4. Perform kraft cooks. Identify the major cooking variables and the effect of these variables on pulp yield and kappa number.
5. Perform kappa number tests and estimate pulp yields from typical kraft cooks.
6. Perform a three stage bleaching sequence. Measure pulp brightness and viscosity. Identify the major bleaching variables and the effect of these variables on pulp brightness and viscosity.
7. Perform beater runs and develop a beater curve.
8. Make Tappi standard handsheets from pulp beaten to different freeness levels.
9. Measure the following paper properties: basis weight, caliper, burst index, tensile index, tear index, air permeability, brightness and opacity.
10. Develop freeness vs. property curves.
11. Make Tappi standard handsheets with different levels of filler addition and retention aids. Calculate single pass filler retention for different cases. Identify the effect of filler levels and retention aids on the paper properties.
12. Prepare laboratory reports that clearly convey background information, experimental procedures, results and conclusions according to the report format.
13. Apply safety laboratory practices by adhering to safe work guidelines, adhering to specific lab operating procedures and adhering to personal protection policies.
14. Maintain a lab notebook and record data according to given guidelines

## **The Program for Students with Disabilities**

This university program provides reasonable accommodations and services for qualified students with documented disabilities who are attending Auburn University, enrolled in distance learning classes, or participating in programs sponsored by Auburn University. Under the Americans with Disabilities Act of 1990 (ADA) a disability is defined as a "mental or physical impairment which substantially limits one or more major life activities."

Walking, eating, talking, breathing, writing, listening, learning, etc. are all examples of major life activities. If you have a documented physical or mental impairment, you may be entitled to certain accommodations under the ADA.

Full information can be obtained from the office of The Program for Students with Disabilities, 1244 Haley Center, 844-2096 (V/TT). The office's web site is: <http://www.auburn.edu/academic/disabilities/>

Students who need accommodations are asked to arrange a meeting during office hours the first week of classes, or as soon as possible if accommodations are needed immediately. If you have a conflict with my office hours, an alternate time can be arranged. To set up this meeting, please contact me by E-mail. Bring a copy of your Accommodation Memo and an Instructor Verification Form to the meeting. If you do not have an Accommodation Memo but need accommodations, make an appointment with The Program for Students with Disabilities, 1244 Haley Center, 844-2096 (V/TT).

### **Grading and Other Policies**

CHEN 4100, like many lab courses, is writing-intensive; it is critical that all reports be completed on time. Late lab reports will be penalized 10%/day. Unsafe acts in the laboratory may result in the forfeiture of all grades associated with the experiment. Unexcused absences from the lab may result in the forfeiture of all grades associated with the experiment.

The format for reports will be given in class and is available on the course web site. Bring your calculator to all classes. Unannounced quizzes may be given at any time. Final numerical grades will be determined using the following weighting:

Laboratory Work & Reports	60%
Quizzes	10%
Final Exam	<u>30%</u>
	100%

Final letter grades may be curved at my discretion (e.g., it *may* be possible that a final numerical grade of 88 results in a letter grade of A).

NOTE: If normal class and/or lab activities are disrupted due to a high number of students experiencing illness or an emergency or crisis situation (such as a widespread H1N1 flu outbreak), the syllabus and other course plans and assignments may be modified to allow completion of the course. If this occurs, an addendum to the syllabus and/or course assignments will replace the original materials.

### COPY OF Acknowledgement & Consent Form CHEN 4100 Fall 2010

My signature below signifies that

- I have read and understood the syllabus for this course
- I am in full compliance with any and all pre-requisites and co-requisites for this course
- I agree to follow all procedures stated in the syllabus and other official communications
- I agree that non-identifying information about my performance in this course (including but not limited to exam records, written reports and observations by the instructor) may be used in studies that document the learning experience. In any sort of report that might be published no information will be released that will make it possible to identify me or any of my classmates.

Acknowledgement & Consent Form  
CHEN 41000  
Fall 2010

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Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Name: \_\_\_\_\_