WPS 355, PULP AND PAPER UNIT PROCESSES I, Fall, 2008

Location: Biltmore Rm. 2221, 8:30-9:45 AM TH

Instructor: Dr. Richard A. Venditti
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Prerequisite: CHE 205 with a C
GER:

Learning Outcomes. Upon passing the class the student will be able to:

- Extend the basic knowledge of chemical engineering obtained in CHE 205 to unit operations pertinent to the pulp and paper industry.
- Use skills in problem solving and computational techniques.
- To perform in advanced, applied courses in the Pulp and Paper Technology curriculum.
- Solve hydrostatic problems.
- Determine the appropriate pump needed for fluid transport applications
- Analyze heat conduction phenomena.
- Design heat exchangers for given heat transfer application
- Analyze humidity problems
- Solve simple diffusion problems
- Construct and solve simple differential equations.

Required Instructional Materials:

McCabe, W. L., Smith, J. C., and Harriot, P. Unit Operations of Chemical Engineering, 7th Edition, McGraw-Hill (2005). ($100)
Felder, R. M. and Rousseau, R. W., Elem. Principles of Chemical Processes, 2nd Edition, John Wiley & Sons (1986). (or 3rd Edition) ($120)
WPS 355 Course Pack (2007), Sir Speedy, 2526 Hillsborough St., ($23.10)

Course Overview:

1. Selected topics in chemical engineering as applied to problems in the Pulp and Paper Industry. Emphasis on computational practice. Emphasis will be on basic principles of fluid dynamics, heat transfer, mass transfer, and thermodynamics.
2. Reading assignments should be finished before the lecture on that material.
3. Working in groups on homework is encouraged.
4. Memorization will be minimal.
5. Class participation and questions are encouraged.
6. Regular class attendance is expected.
7. My door is open for questions or individual consultation. Appointments can be made. If you wish to know your grade at, see me.

Course Structure:
Classes held regularly during posted times. Students expected to be on-time and have course pack.

Homework: There will be one assignment per week. Some homework assignments will require the use of a computer based spreadsheet program. Each problem will be scored on a scale of 0 to 10. *No HW grade will be dropped.* All homework assignments are to be turned in at the beginning of the lecture on the due date. Late homework will not be accepted. It is expected that for urgent matters, there may be an excused late homework, however, this must be approved by the instructor before the assignment due date.
Questions about homework problems or tests will not be answered by the instructor or teaching assistant the day of the assignment.
Obviously identical solutions to homework problems (copied) will receive no credit. Students may confer on a homework assignment. Working in groups on homework is encouraged. However, each student is to perform every step of a problem individually. For problems performed on the computer, each individual student must perform every step of the problem individually. The same file printed in duplicate for multiple students will not be accepted. Independent solutions to the homework problems are expected and are essential to the development of your skills.

Quizzes: Quiz dates will be announced at least one week ahead of time. You will be allowed to bring one 8.5 X11 inch sheet of notes (writing only on one side) into the quizzes. The notes may not be photocopies of course material. The notes will be handed in with the quiz. You will be supplied with any tables or figures needed for the quiz. Bring a calculator.

Final Exam: *Date: Tuesday, December 9, 2008, 8:00-11:00 AM.* You will be allowed to bring two 8.5 X11 inch sheets of notes (writing only on one side) into the exam. The exam is expected to take between 2-3 hours to complete. You are required to show-up for the exam at 8:00 AM. You must receive at least a 60% grade on the exam to pass the course, despite your other grades in the course.

SUBJECT	READING ASSIGNMENT**	Lectures
Introduction/Unit Systems	Chpt 1, F&R	1
Mass & Energy Balances	F&R	1
Fluid Statics	Chpt 2, F&R	1
Fluid Flow Phenomena	Chpt 3	1
Basic Equations of Fluid Flow	Chpt 4	1
Flow of Incompressible Fluids	Chpt 5	3
Transportn/Metering/Agitation	Chpt 8 , 244-265	1
Heat Transfer by Conduction in Solids	295-297, Chpt 10	2
Heat Flow in Fluids	Chpts 11 and 12	4
Heat Transfer with Phase Change	Chpt 13	1
Heat Exchangers	Chpt 15	1
Evaporation	Chpt 16	2
Humidification Operations	Chpt 19	2
Drying of Solids	Chpt 24	1
Mass Transfer	521-525,Chpt 17	1
Differential Equations	Handout	3
Tests		3
Total		29

** Reading assignments are from McCabe, Smith and Harriot except for those from Felder and Rousseau (F&R).

Grading:

Homework Assignments	30%
Quizzes (3)	40%
Class Participation	5%
Final Examination*	25%

- A final exam grade of 60% is required to pass the class.
- Late assignments will receive a zero. Unexcused absences from quizzes or final exam will receive a zero.
- Class participation includes arriving on time for class, attendance in class, attentiveness in class, and asking questions/commenting during lectures about class material.

Numerical Grade	Grade	Grade Points
97-100 93-96.9 90-92.9	A+ A A-	4 1/3 4 3 2/3
87-89.9 83-86.9 80-82.9	B+ B B-	3 1/3 3 2 2/3
77-79.9 73-76.9 70-72.9	C+ C C-	2 1/3 2 1 2/3
68-69.9 66-67.9 65-65.9	D+ D D-	1 1/3 1 2/3
Below 62	F	0

"Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with Disability Services Office (http://www.ncsu.edu/dso/) located at 1900 Student Health Center, Campus Box 7509, 515-7653. For more information on NC State's policy on working with students with disabilities, please see the Academic Accommodations for Students with Disabilities Regulation at http://www.ncsu.edu/policies/academic_affairs/courses_undergrad/REG02.20.1.php"

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