CHBE/ME 4763 Pulping and Chemical Recovery (Elective)

Catalog Description: CHBE/ME 4763 Pulping and Chemical Recovery (3-0-3)
Prerequisites: Senior standing
Crosslisted with CHBE and ME.
Pulping and chemical recovery processes are studied on the reaction, delignification, energy, and liquor reuse. The process optimization, air and water pollution minimization are taught.

Textbook: Gary A. Smook, *Handbook for Pulp and Paper Technologists*, 3rd Edition, Angus Wilde Publication, 2003.

Topics Covered:

1. Characteristics of wood and wood pulp fibers
2. Wood and chip handling
3. Kraft pulping process
4. Pulping chemistry, reaction and extended delignification
5. Sulfite pulping
6. Mechanical pulping
7. Cooking equipment: batch and continuous digester
8. Pulp processing: brown stock washing
9. Chemical recovery: evaporator, recovery boiler, recausticizing and lime kiln
10. Secondary fiber
11. Water and air pollution
12. Emerging pulping technology

Course Outcomes:

Outcome 1: To familiarize students with major paper industry pulping and chemical recovery processes.

1.1 The student will demonstrate the ability to apply knowledge of mathematics, science, and engineering.

1.2 The student will demonstrate the ability to design and conduct experiments, as well as to analyze and interpret data.

Outcome 2: To teach students the fundamental mechanisms of pulping chemistry, pressure cooking processing, and chemical recovery from waste black liquor.

2.1 The student will demonstrate the 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.

2.2 The student will demonstrate the ability to function on multidisciplinary teams.

Outcome 3: To provide the student with some specific knowledge regarding reaction kinetics in mechanical engineering systems, such as diffusion and mass transfer rate, to minimize the economic and environmental impact on society globally.

3.1 The student will demonstrate the ability to identify, formulate, and solve engineering problems.

3.2 The student will demonstrate the ability to use the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.

Outcome 4: Improve the student's research and communication skills using a self-directed, group study of a specific problem related to pulping and chemical recovery with results that will be communicated in both oral and written form.

4.1 The student will demonstrate the ability to recognize the need for and to engage in lifelong learning and an understanding of professional and ethical responsibility.

4.2 The student will demonstrate the ability to function on multidisciplinary teams and to communicate effectively.

4.3 The student will demonstrate the ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Correlation between Course Outcomes and Student Outcomes:

ME 4763											
	Mechanical Engineering Student Outcomes										
Course Outcomes	a	b	c	d	e	f	g	h	i	j	k
Course Outcome 1.1	X										
Course Outcome 1.2		X									
Course Outcome 2.1			X								
Course Outcome 2.2				X							
Course Outcome 3.1					X						
Course Outcome 3.2								X			
Course Outcome 4.1						X			X		
Course Outcome 4.2							X			X	
Course Outcome 4.3											X

GWW School of Mechanical Engineering Student Outcomes:

(a) an ability to apply knowledge of mathematics, 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 multidisciplinary 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

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