**CHBE/MLDR 6701:** Foundational Topics in the Manufacturing of Forest Bioproducts

**Instructors:** Dr. Norman Marsolan and Dr. Yulin Deng, School of Chemical and Biomolecular Engineering

**Other Professors:** Dr Chris Luettgen (ChBE), Dr Sandra Pettit (ChBE), Dr Carsten Sievers (ChBE)

**Description:** The objective of this course is to enhance the technical skills of students related to the forest bioproducts manufacturing industry. The course covers a diverse set of topics that provide comprehensive foundational knowledge of the industry, enabling the student to understand the role of different manufacturing operations in the overall process and to strategically plan for process improvement. Mastery of the technical content is supported by several case studies that challenge the student to identify aspects of leadership that enable technology and/or product development.

**Learning Outcomes:**

By the end of this course, a student should:

1. Be knowledgeable of the technologies deployed in the Forest Bioproducts Industry.
2. Be well versed in the processes, equipment and unit operations for pulping, chemical recovery, bleaching, recycled fiber / deinking, paper, board and tissue manufacturing, and converting.
3. Acquire an understanding of Wood Chemistry and Tree and Fiber Morphology in order to comprehend the impact of factors on paper product properties and end use performance.
4. Obtain a fundamental knowledge of Surface Chemistry as it applies to wet-forming processes and the supply-side of chemical applications prevalent in the forest products industry.
5. Understand the environmental and issues and safety considerations involved in the operation of a forest bioproducts facility.
6. Be well versed in case studies of mill operation and the economics of the Forest Bioproducts Industry.

**Class Text:** Selected literature readings and case studies

**Grading:** 70% Case Studies, 30% Final Exam

**Academic**

**Integrity:** Students are encouraged to study together and collaborate on case studies, but each student must submit their own work unless the assignment is specifically structured as a group assignment/project.

Any reference sources (including online sources) used to prepare written assignments must be paraphrased in your own words and cited.

Students are to neither receive nor provide help to others during exams.

Any student suspected of behavior in violation of the Georgia Tech Honor Code will be referred to the Office of Student Integrity. The Georgia Tech Honor Code is available on the Office of Student Integrity website (<http://www.osi.gatech.edu>)

**Lectures:** Forests: Timberland, Products, Management, and Policy

Sustainability: Forest Certification and Non-wood Fibers

*Case Study: Wood Supply Logistics and Economics*

Chemistry of Lignocellulose and Fibers

Pulping Technologies

Bleaching Technologies

*Case Study: Market Pulp*

Paper Making: Processes

Paper Making: Chemistry

*Case Study: Paper Physics and Measurements*

Energy Systems and Optimization

Sensors, Measurements, and Process Control

Pulp and Paper Quality Systems

Continuous Improvement Systems

*Case Study: Plant Operations*

Competitive Product Performance: Performance and Cost

Paper Industry Competitiveness Analysis

*Case Study: Tissue and Packaging*

Environment, Health & Safety

Sustainability: Pulp and Paper Manufacturing Design Challenges

Sustainability: Product Design Challenges

*Case Study: Sustainable Package Design*