

Course Syllabus

ME 4730

Emerging Markets for Forest Bioproducts

Instructors: Dr. Chris Luetttgen, Dr. Sandra Pettit, School of Chemical and Biomolecular Engineering

Other Professors: Dr. Norman Marsolan (ChBE), Dr. Carsten Seivers (ChBE), Dr. Yulin Deng (ChBE)

Description: This course concerns the development and manufacturing of nontraditional products with forest bioproducts and other biomass. The course builds upon foundational knowledge in the manufacturing of forest bioproducts to analyze and assess emerging manufacturing markets. Topics include the processes needed to produce raw materials as well as materials construction and characterization. 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.

Class Text: Selected literature readings and case studies

Learning Outcomes:

By the end of this course a student should:

1. Be knowledgeable of the physical and chemical structure of lignin and cellulose and the beneficial uses being examined for the future bioeconomy.
2. Have an understanding of biomass and the processes of converting it into value-added products, both in commercial operation today and those in development and pilot.
3. Obtain an understanding of the diversity of products which cellulose can be deployed and why there is widespread belief that forms of cellulose, such as nano and micro fibrillary and crystalline, hold such promise for widespread application.
4. Be well versed in case studies of startup and venture capital operations and the economics of the Forest Bioeconomy.

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>)

Learning Accommodations:

If needed, we will make accommodations for students with documented disabilities. These accommodations must be arranged in advance and in accordance with the Office of Disability Services (<http://disabilityservices.gatech.edu>).

Lectures: Introduction to Lignocellulosic Materials – what is Biomass
Fluff Pulp and Dissolving Pulps
Specialty Papers
Packaging and Printed Electronics
Biorefining Technologies and Products
Case Study: Biochemical PLA for Cups
Case Study: Biocatalysis
Renewable Chemistry Industry Analysis
Case Study: Catchlight Energy, Inc.
Micro and Nanocellulose Characteristics and Manufacture
Case Study: Nanocellulose Market Analysis
Renewable Polymer and Composite Materials: Science and Characteristics
Case Study: Carbon Fiber from Lignin
Composite Materials: Manufacture and Performance
Biocomposite Industry Analysis
Case Study: Automotive Bio-Composite Panels
Future Forest and Corporate Strategic Planning and Project Management