**Date:** May 12, 2011  
**Course Number:** PSE438  
**Course Title:** Biorenewable fibrous and nonfibrous products

<table>
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<tr>
<th>New Course</th>
<th>OR</th>
<th>Changes in existing course (check all that apply):</th>
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*This course meets the General Education standards in the following knowledge and skills area (check all that apply):*

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<td>□ American History</td>
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<td>□ Other World Civilizations</td>
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<td>□ The Arts</td>
<td>□ Mathematics</td>
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<td>□ Basic Communication</td>
<td>□ Natural Sciences</td>
<td>□ Western Civilization</td>
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**Prerequisites or co-requisite requirements:**

☑ Prerequisites: PSE465 Fiber and Paper Properties and/or PSE223 Introduction to Lignocellulosics or consent of instructor

☐ Co-requisites:

**Institutional Impact:**

Anticipated Enrollment: per semester

| Technology and Classroom Resource Demands: | Black or white board, Computer, Projector |
| Computing Resources: | None |
| Library Resources: | Access to Library |
| Transportation Requirements: | None |
| Forest Properties or Field Practicum Facilities Required: | None |
Health and Safety Considerations:

Conditions or situations present in association with the course?

Yes / No

1. Will substances with any of the following properties be used during instruction: flammability, toxicity, corrosivity, reactivity, registered pesticide, legally controlled, or other characteristics with the potential to cause harm or injury?  
   Yes / No: No

2. Will any physical hazards be present during instruction? (e.g., machines that need safety guards; razor blades or syringes; compressed gases, etc.).  
   Yes / No: No

3. Will any biological hazards be present during instruction? (e.g., handling animals (rabies or hantavirus); cultures or stocks of infectious agents (fungal spores, viruses, bacteria, etc.).  
   Yes / No: No

4. Will any radiation hazards be present during instruction? (e.g., radioisotopes, X-rays, ultraviolet rays, lasers, etc.).  
   Yes / No: No

5. Will any electrical equipment that, due to its design, location, or method of use, pose any threat to safety during instruction? (Give considerable thought to electrical use outdoors, or any potentially wet location.).  
   Yes / No: No

6. Will there be any personal safety issues related to the class? (e.g., due to time of day or location, at the end of any organized class exercise, will students be in danger of physical assault, etc.).  
   Yes / No: No

7. Will any students be driving official state or research sponsored land or water vehicles during any class or instructional exercise?  
   Yes / No: No

8. Will any type of personal protective equipment be necessary during class exercises? (e.g., hard-hats, eye/face protection, hearing protection, hand/foot protection, lab coat, visibility clothing, etc.)  
   Yes / No: No

If the answer was “Yes” to any of the HEALTH AND SAFETY questions, please explain:

CATALOG DESCRIPTION (Please provide using the precise format currently used in the ESF catalog, please do not exceed 1000 characters):

Three credit-hour advanced science course on the production and properties of lignocellulosic products. Topics encompass fibrous products including different paper grades, nanocellulose and cellulose derivatives, and nonfibrous products including products of enzymatic and/or chemical conversion of biomass constituents. Spring. Prerequisite(s): PSE 465 Fiber and Paper Properties and/or PSE 223 Introduction to Lignocellulosics or consent of instructor
DETAILED COURSE DESCRIPTION

COURSE: PSE438 Biorenewable fibrous and nonfibrous products
3-credit hour course - Spring
3 hours lecture/discussion per week

SCOPE:

This is an advanced science course on the production and properties of biorenewable products. Topics encompass fibrous products including different paper grades (printing and writing paper, paper board, tissue, specialty papers), nanocellulose and cellulose derivatives, and nonfibrous products including hemicelluloses, lignin, and extractives and products of enzymatic and/or chemical conversion of biomass constituents.

STUDENT LEARNING OUTCOMES:

After completing this course the student should be able to:

1. Discuss the production and properties of biorenewable products including fibrous products: paper grades (printing and writing paper, paper board, tissue, and specialty papers), nanocellulose and cellulose derivatives, and nonfibrous products including hemicelluloses, lignin, pectins, extractives, and enzymatically and/or chemically derived products

2. Give a formal analysis of the potential products from different categories of plants including softwoods, hardwoods, grasses, and agriculture residues

3. Understand the effect of the chemical composition and structure of plants on the complexity of their treatment for the production of paper, materials, and chemicals

4. Understand current uses of biomass and conversion processes.

MAJOR CONCEPTS OR METHODOLOGIES:

This course is designed to help students understand a diverse application potential of biorenewable resources such as lignocellulosics. The course consists of lectures and discussion on the production, properties, and use of a wide range of fibrous and non-fibrous products of biorenewable resources. Students are expected to actively participate in the learning process by making group and/or individual reports and oral presentations on the selected topics in the area of the production, properties, and use of different biorenewable products. Fibrous products cellulose/paper, nanocellulose and cellulose derivatives and non-fibrous products including hemicelluloses, lignin, pectins, extractives are explained. By-products of mature technologies based on biorenewables (pulping) and current and potential value-added products from biorefineries are discussed.

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COURSE HISTORY:

This course has never been taught at ESF.
Last approved: never.
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