



## **Master of Science in Paper Science and Engineering**

Students in the master's program who are interested in a unique multidisciplinary program in biotechnology and (M.S.P.S.E.) engineering sciences of paper and tissue production can select their degree with a major or minor in Paper Science and Engineering (PSE). These multidisciplinary degrees are supported by four Schools (referred to as Home Schools), namely the Schools of Mechanical Engineering, Chemical and Biomolecular Engineering, Materials Science and Engineering, and Chemistry in conjunction with the Institute of Paper Science and Technology at Georgia Tech.

The Master and Ph.D. degree programs with a major or minor in PSE in the Woodruff School of Mechanical Engineering provide a multidisciplinary approach to biotechnology of natural fiber production, manufacturing of paper and tissue, and energy production through woody biomass. Students admitted to the Master of Science program in PSE in the School of Mechanical Engineering must have a B.S. degree in engineering, science, or mathematics, and satisfy the admission requirements of the Woodruff School.

The minimum PSE course requirements are the same for students who select their major in ME and minor in PSE or those who select their major in PSE. All PSE students must complete 12 credits of PSE coursework. These 12 credits constitute a PSE minor or, when combined with other courses determined by the student's advisor from the Home School, constitute the curriculum for a PSE degree. The Master of Science degree with major or minor in PSE has the following minimum course credit-hour requirements. Of the 33 total hours required, 27 hours must be at the 6000 level or above and six credit hours must be at the 4000 level or above.

	<b>With Thesis</b>	<b>Without Thesis</b>
Required PSE Core Courses (listed below)	6	6
Required PSE Elective courses (listed below)	6	6
Electives in a coherent ME or Multidisciplinary area as designed and approved by the student's advisor	9	18
Mathematics (from courses which satisfy the ME Math requirements, for example ME 6443 or ME 6758)	3	3
Thesis	9	0
<b>Total for Degree</b>	<b>33</b>	<b>33</b>

## **Courses**

### **PSE Core Courses (each course is 3 credit hours)**

(Required of all students in all Home Schools with a major or minor in PSE)

ChBE/ME 6741: Pulp and Paper Manufacture I

ChBE/ME 6742: Pulp and Paper Manufacture II

### **PSE Elective Courses (each course is 3 credit hours)**

Students in the Woodruff School with a major in ME and a minor in PSE or with a major in PSE are required to take

ME 6281: Mechanics of Paper Forming and Coating

and one course from the following list:

ChBE 6232: Chemical Engineering Processes in Pulp & Paper Manufacturing

MSE 8803L: Environmental Degradation of Materials

CHEM 8803: Pulping and Bleaching Chemistry

### **Suggested Electives**

Students in the Woodruff School with a major or minor in PSE are required to take 9 (18 without thesis) credits in a coherent group of courses in Mechanical Engineering or multidisciplinary areas supporting their thesis project as approved by their advisor. A list of suggested electives is provided below. Other electives approved by the student's advisor can be included.

ME 6601: Introduction to Fluid Mechanics

ME 6602: Viscous Flow

ME 6768: Polymer Structure, Physical Properties, and Characterization

ME 7301: Transport Phenomena in Multiphase Flow

ME 7751: Computational Fluid Dynamics

ME 7771: Mechanics of Polymer Solids and Fluids

CEE 6293: Hydrodynamics Instability and Turbulence

ME 6201: Principles of Continuum Mechanics

ME 6203: Inelastic Deformation of Solids

ME 6301: Conduction Heat Transfer

ME 6302: Convection Heat Transfer

ME 6304: Principles of Thermodynamics

### **PSE Course Requirements for PSE Fellows**

All students funded on a PSE Fellowship must complete 12 credits of PSE coursework. These 12 credits constitute a PSE minor or, when combined with other courses determined by the Home School, constitute the curriculum for a PSE degree. Students completing the PSE minor must file the Certificate of [Completion of PSE Coursework](#) form with the Home School as well as the IPST Director's office prior to graduation.

### **PSE Course Descriptions**

<b>Course</b>	<b>Description</b>	<b>Hours</b>
	<b>Pulp and Paper Manufacture I</b>	
ChBE/ME 6741:	The fundamentals of pulp and paper technology including unit operations involved in the sequence leading up to the headbox in a paper mill. Applications are explored and augmented by field trips and recent case studies.	3.000 Credit Hours 3.000 Lecture Hours

## **Pulp and Paper Manufacture II**

ChBE/ME 6742: Papermaking technology from a multidisciplinary engineering perspective with emphasis on relationships between transport and interaction of fiber suspensions on the final properties of the finished paper. 3.000 Credit Hours  
3.000 Lecture Hours

## **Chemical Engineering Processes in Pulp & Paper Manufacturing**

ChBE 6232: The science and engineering of processes in the pulp and paper industry, including advanced bleaching processes, and chemical recovery processes. Environmental modeling and papermaking chemistry will also be covered. 3.000 Credit Hours  
3.000 Lecture Hours

## **Mechanics of Paper Forming and Coating**

ME 6281: Fundamentals of multiphase flow in paper forming and coating processes, and their impact on the physical properties of composite fiber structures and surface characteristics. Flow characteristics of suspensions in process components are analyzed in depth. 3.000 Credit Hours  
3.000 Lecture Hours

## **Pulping and Bleaching Chemistry**

Chem 8833: Fundamental chemistry associated with pulping and bleaching of wood. Includes detailed analysis of the chemical structure of wood components, the reactions of pulping and bleaching reagents with typical carbohydrate and lignin functional groups, and the factors that govern the degree of lignin vs carbohydrate degradation. 3.000 Credit Hours  
3.000 Lecture Hours

## **Environmental Degradation of Materials**

MSE 8803L: Basic interactions of materials with their environment. Degradation of the properties of materials when exposed to different environments. Includes fundamentals of corrosion, with appropriate examples from bleach plants, boilers, paper machines, and water treatment plants. 3.000 Credit Hours  
3.000 Lecture Hours