

# CONTENTS

<b>COLLEGE OF FOREST SCIENCE .....</b>	<b>1</b>
DEPARTMENT OF FOREST RESOURCES .....	1
Courses .....	2
Faculty Members .....	7
DEPARTMENT OF FOREST PRODUCTS .....	8
Courses .....	8
Faculty Members .....	13

## COLLEGE OF FOREST SCIENCE

As society becomes rapidly industrialized, it is required to improve the economic, environmental, and social values of forests and to utilize for more highly value added uses. This college is to offer professional education to meet such societal demands. Especially, the college is designed to train forestry professionals to contribute in the fields of forest resource conservation, efficient and balanced utilization and development of the resources, and promotion of forestry activities and forest product industries.

- **Seminar in Special Topics (2)**

This seminar course is designed to stimulate students' intellectual interests and to activate their relationships with colleagues and professors through face-to-face personal contacts. This course is also aimed to encourage students to pursue their intellectual activities after graduation. This course is offered in a variety of settings such as seminar, research, workshop, field visits and field exercises. Depending upon professor, this course or each activities of the course could carry a theme.

### DEPARTMENT OF FOREST RESOURCES

Intangible values of forests have never been emphasized as today because of rapid growth of population and industrialization. Department of Forest Resources Department is designed to offer students a variety of program to acquire knowledge and to learn practical skills on sustainable and multiple use of life supporting environmental resources of forests. At the same time the department is to teach students of how to efficiently apply advanced technologies such as GIS (Geographic Information System) and GPS (Global Positioning System) for the conservation and management of natural resources including forests. The department also aims to train students with a skills and capacity for effective communication.

## Courses

- **Introduction to Forest Science (2)**

This course deals generally with forest science in order to provide basic information on the function of forests, domestic and foreign forest resources, tree species, forest protection, surveying, forest management, forest economics, forest policy forest recreation, GIS, and forest engineering.

- **Plant Taxonomy (3)**

Theories and field studies for the identification of vascular plant species in Korea. Lectures involve theories in plant classification based on nomenclature, morphology, distribution, habits and usages of plant species.

- **Cultural Forestry (2)**

Material and spiritual aspects of culture in forestry. The role of forests in the development of civilization and the historical evolution of human culture.

- **Micrometeorology and Practice (2)**

Physical basis for atmospheric small scale climate and bio-climatic aspects, model of weather pattern and effects of meteorological at force on the energy balance of vegetation canopy and land cover type. Training with programming in IDL provides meteorological satellites-based weather imagery.

- **Statistics (3)**

Statistical concepts with emphasis on experimental problems from biological fields. Summarizing statistical data probability concept the normal distribution estimation and test of hypothesis regression and correlation analysis simple analysis of variance basic concepts of experimental design are covered in this course.

- **Forest Tree Genetics and Breeding (2)**

Basic genetic principles as they apply to selection and breeding of forest trees. Variation and genetic systems in trees, selection techniques, as well as hybridization techniques.

- **Forest Mensuration and Practice (3)**

Principles underlying forest resource measurement tools and techniques. Application of sampling methods appropriate for inventorying of forest resources. Field surveying and inventory sampling. Practice in measuring forest land and products. Data collection, analysis and estimation.

- **Introduction to Forest Soil (2)**

Theories on the characteristics of forest soils in Korea. Lectures on formation, development, physiochemical properties, classification, productivity, and conservation of forest soil. Emphasis is placed upon the protection of the soil ecosystem in the era of destruction of soil resources.

- **Surveying and Practice (2)**

Surveying fundamentals with emphasis on forest survey. Familiarization with basic instrumentation. Field and office procedures for compass, plane table, leveling, traversing, and transit surveys. Survey computations and mapping, including theory of errors and computer applications.

- **Forest Landscape and Aesthetics (2)**

The targets are in understanding the ecological, environmental, and cultural values of the forest, especially with respect to aesthetics. The main contents are beauty and aesthetics, natural beauty, landscape description, forest landscape management and designing forest landscape, etc.

- **Tree Physiology (3)**

Application of physical and biological principles for the understanding of tree processes involved in assimilation, metabolism and regulation of growth and development.

- **Geographic Information Systems and Lab Exercises (2)**

Introduction to basic concepts and application of GIS. Lab exercises on GIS promote the understanding of the computer systems and spatial relationship.

- **Dendrology and Practice (3)**

Theories and field study for the identification and classification of woody plant species in Korea. Lectures on classification based on nomenclature, morphology, distribution, habits and usages of woody plants as natural resources. Emphasis is placed upon field trips to advance the ability to identify trees in natural conditions.

- **Forest Hydrology and Watershed Management (3)**

Students are required to understand the relationship between the forest and the hydrologic cycle and then apply hydrologic principles to forests and range land. As a special topic, it deals with regional land use in relation to watershed management.

- **Silviculture and Practice (3)**

Effects of genetics, in addition to physiological and environmental factors on the processes underlying tree and forest stand growth. Manipulation of forest vegetation based on silvicultural principles for the establishment of artificial stands.

- **Principles of remote sensing and Geographic Information Systems (3)**

Focusing on application of remotely sensed data for natural resources management and environmental monitoring, including photo interpretation, and introduction of soft copy-based photogrammetry.

- **Ecology and Practice (3)**

Theories and field study for the understanding of structure, function and the development of forest ecosystems. Lectures on biotic components, energy transfer and nutrient cycling in terms of biogeochemistry, environmental components, succession, and sustainable management of forest ecosystems. Emphasis is placed upon the sustainable management of forest resources in an ecologically sound manner.

- **Forest road and logging (3)**

This subject concentrates on the opening up of the forest and focuses on planning, designing, and constructing forest roads. Students are trained to design a road on a map with the divide step method, while surveying using the zero line

surveying method and calculating the data. As a special topic environmentally friendly development principles in the forest engineering field are prepared.

- **Practice at University Experimental Forest (2)**

One 15 day practical experience with tools and using skills at the University Experimental Forest. Use of instruments, forest resources inventory (practical in tree identification, silviculture, ecology log scaling, sampling, cruise design and implementation timber appraisal, regeneration, soil and range surveys), and practical application of forest management.

- **Forest Tree Biotechnology (3)**

Application of tissue culture and genetic engineering techniques for the understanding of tree processes in molecular biology, gene transformation and foreign gene expression.

- **Socioecological Forestry (2)**

Integrating human dimensions of forest resources used within the forest environment. Interdisciplinary knowledge for managing a sustainable forest ecosystem and the importance of landscape ecology in forest management.

- **Protection of Forests and Environment (2)**

Theories for the protection of forests and the environment in an era of environmental pollution and ecosystem destruction. Lectures on forest damages due to anthropogenic impacts or fluctuation of global environmental factors. Emphasis is placed upon the application of ecological theories to protect the forest and the environment.

- **Forest Management (3)**

Principles of organizing, regulating, and administering forest land in conjunction with commercial harvest and multiple-use goals for both public and private ownership. Integrated forest management is emphasized. Methodologies of both stand-level forest-level management planning are discussed.

- **Forest Policy and Forest Economics (3)**

Review of the forest economics and policies in Korea and other nations. Analysis of current forest conditions and policies, the basis of forest organization and environmental characteristics of the forest world. And economic interactions, legislation and policies affecting forestry. The role of economic forces in forest resource analysis, and macro-forestry management.

- **Wildlife Ecology (2)**

Application of the principles of ecology for the conservation and management of wildlife in natural and altered habitats. Regulating the density of wild birds and mammals and management of the wildlife population.

- **Forest Growth and Yield (2)**

Principles of growth and yield by species and locality. Relationship between tree growth and yield. Methodology of developing growth and yield models. Estimation of current stand volume and growth. Selection of variables for volume and yield tables. Applications of sampling methods to forest resource surveys.

- **Environmental Planning and Design (3)**

This course is offered for understanding methods to enhance the quality of life by applying anthropological and ecological principles. The main subjects are classification of environment, historic review, the decision-making process, analysis and synthesis of the environment, planning theory and application monitoring. It deals with CAD and GIS S/W.

- **Nature Interpretation Exercise (1)**

This course is designed to help students to know and understand the techniques for Nature interpretation. During the semester, students will develop and practice the programs and presentation for the nature interpreters.

- **Current Issues on International Forest Resources (2)**

Recent issues and advances in various aspects of international forest resources. Lectures and seminars on various aspects of the current status, demand and

supply, developmental trends, and the protection and destruction issues on international forest resources. Emphasis is placed upon the application of computer communication systems to wisely approach the issues.

- **Forest recreational planning and Design (2)**

For coping with increasing forest recreational demand, it introduces general theories about outdoor recreation, and gives lecture on recreational planning and design methods in forest site. Additionally it also deals with a desirable recreational forest management practice.

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## DEPARTMENT OF FOREST PRODUCTS

The study in the Department of Forest Products is offered to students, who are preparing for professional occupations in the field of wood-based materials science and engineering, pulp and paper science, natural products science and total wood utilization in general. Most courses offered in the Department require knowledge in basic natural sciences such as chemistry, physics, and biology.

### Courses

- **Introduction to Forest Products (3)**

General understanding of characteristics and manufacturing or converting processes in forest products.

- **Wood Anatomy and Laboratory (3)**

Plant origin of wood, formation of tree, development of woody cells, cell wall ultrastructure, gross and microscopic structures of wood, growth-related defects in wood, and variability of wood are treated as a compulsory subject for the study of forest products and wood science. Laboratory work is essential.

- **Introduction to Wood Mechanics (3)**

Fundamental studies on static and mathematics for wood engineering. This course also includes the analysis of trusses and beams made from wood products.

- **Organic Chemistry and Laboratory (3)**

A basic course in which both the theoretical and practical aspects of a variety of organic reactions are emphasized. Modern chromatographic, instrumental, and spectroscopic techniques are also introduced.

- **Wood Physics and Laboratory (3)**

Physical properties of wood, hygroscopic nature of wood fiber and solid wood, wood-fluid relationships, steady-state flow processes, electrical, thermal, and sonic properties of wood and wood-based composite materials. Measurement of basic wood physical properties.

- **Wood Machining (3)**

Characteristics of wood machining, basic wood properties, analysis of cutting processes in orthogonal cutting and peripheral milling, and the processes of joint, planing, moulding, shaping, turning, boring, routing, mortising and tenoning, sanding, sawing, etc. are treated as mechanical processing principles applicable to the conversion of logs to various wood products.

- **Statistics for Forest Products (2)**

Understanding the basics of statistics. Theories and practices of information represented by statistical methods for the data obtained from experiments and wood industries.

- **Environmental Applied Chemistry (2)**

This course gives the general understanding for the structures and properties of various organic or inorganic environmental materials, and the basic treatment technology and analysis methods of environmental toxic substances.

- **Wood Chemistry (3)**

Introduction to primary and secondary metabolites such as cellulose, hemicellulose, lignin, and extractives with emphasis on formation, isolation, and their usefulness.

- **Wood Adhesion · Finishing and Laboratory (3)**

Theories of wood adhesion, and kinds, manufacture, properties, and performance of wood adhesives are presented in wood adhesives. In wood finishing, function of coating, properties and kinds of wood finishes, finishing processes and techniques, coat faults, and finishing methods are presented. Laboratory work is essential.

- **Mechanical Properties of Wood and Laboratory (3)**

General comments on the determination of the mechanical properties of wood and on the relationship of certain wood characteristics to wood mechanical properties. Studies on the development of theories for analyzing the effects of various kinds of forces within wooden members.

- **Fibrous Material Chemistry and Laboratory (3)**

This course deals with the fundamental technology of various pulping methods, chemical & mechanical properties of cellulosic fibers and recycled fibers, characteristics of pulping and bleaching processes.

- **Experiments in Advanced Organic Chemistry & Laboratory (3)**

Advanced organic synthesis will be introduced in this lecture. Studies of important synthetic methods with the emphasis on asymmetric synthesis will mainly be handed in the class. Also, analysis of modern synthetic strategies with illustrative examples will be discussed.

- **Bio-Energy (2)**

Recently developed technology on alternative energy sources, especially energy from biomass from forests.

- **Wood Deterioration and Preservation (3)**

Basic theory and technique in the field of preservative treatment chemicals to protect the various wood materials and wood structures against wood decaying-fungi, sapstain and wood attacking insects.

- **Papermaking Chemistry and Laboratory (3)**

This course gives the understanding for basic principle of papermaking, various interactive mechanism of furnish between water and fibers, and the wet-end chemistry of papermaking additives in wet-end and dry-end processes.

- **Spectroscopic Analysis and Laboratory (3)**

Cellulose, hemicellulose, lignin, and minor, in quantitative manner, wood components will be introduced. Chemical and biological characteristics for the components, chromatographic separation and identification principles as well as basic concepts of spectroscopic methods will be studied.

- **Plant Biochemistry (2)**

Structure, dynamics, and the function of biological molecules in cells and organisms will be focused in this class. Metabolisms, formation, and properties of cells,

membranes, organelles, and whole living bodies will be also covered.

- **Wood Furniture (3)**

Roles of furniture. Quality control for furniture-making. Types of materials and durability of wood materials in furniture manufacturing.

- **Wood Drying and Laboratory (2)**

Roles of water and transport passages of water in wood. Drying methods, theories, and skills to improve the end use of wood.

- **Wood-based Composites and Laboratory (3)**

Definitions, raw materials, the relationship of wood properties to composite formation, manufacture principles and processing systems, adhesives and other additives, and properties and uses of particleboard and fiberboard are treated through lecture and laboratory work. Also, newer developments of wood-based composites such as wood-plastic composites is introduced.

- **Introduction to World Forest Resources and Utilization (3)**

Evaluation of timber production from global forests and its supply for wood based manufacturing, and the prospect of world forest resources and their potential.

- **Environmental Process & Quality Control and Laboratory (3)**

This course gives the basic understanding for the environmental treatment process of papermaking process water, the analysis methods of waste water, unit operations related to environmental process, and the evaluation of physical and chemical quality properties of end-products and quality control.

- **Chemical Wood Conversion (2)**

The treatment of wood with some polymer such as WPC to improve its properties, chemical modification of wood for new uses, and the conversion of wood constituents into energy.

- **Structural Wood Design (3)**

Concepts on wood strengths in structural construction. Design concepts and the structural calculation of beams, walls, trusses and joints.

- **Natural Products Chemistry and Laboratory (3)**

Structures, properties, natural sources, and synthesis with emphasis on biological activities of important natural products such as terpenoids, alkaloids, flavonoids, steroids, lignans, and other phenolic compounds as well as various essential oils will be introduced.

- **Veneer-construction Products and Laboratory (2)**

Definition and classification, raw materials, manufacture principles and processing systems, adhesives, properties, uses, and testing and evaluation of plywood, laminated veneer lumber (LVL), parallel strand lumber (PSL, parallel), etc. are introduced through lecture and laboratory work.

- **Papermaking Process Modeling (2)**

This course gives the basic understanding for the structure of overall papermaking machinery, principle of unit processes, and the design modeling of papermaking process.

- **Utilization of Forest by-Products (2)**

Utilization and development of forest by-product seeds, and extractives from trees and herbaceous plants with some active ingredients for medicine and mushrooms. Natural resources and utilization provides methods for the utilization and development of plants and microbial resources. Special emphasis on new material making, energy production and wood preservation.

- **Glulam and Laboratory (2)**

Definition, raw materials, design, manufacture principles and processing systems, adhesives, properties, uses, and testing and evaluation of glued laminated lumber (Glulam) are introduced through lecture and laboratory work.

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