



Republic of the Philippines
OFFICE OF THE PRESIDENT
COMMISSION ON HIGHER EDUCATION

CHED MEMORANDUM ORDER (CMO)

No. 44
Series 2006

SUBJECT: POLICIES, STANDARDS AND GUIDELINES FOR BACHELOR OF SCIENCE IN FORESTRY (BSF)

In accordance with the pertinent provisions of Republic Act (RA) No. 7722, otherwise known as the "Higher Education Act of 1994," and by virtue of Resolution No. 602 of the Commission en banc dated 11 September 2006 and for the purpose of rationalizing the Bachelor of Science in Forestry program in the country with the end view of keeping pace with the demands of global competitiveness, the following Policies, Standards and Guidelines (PSG) are hereby promulgated and adopted by the Commission.

**ARTICLE 1
INTRODUCTION**

Section 1. Rationale and Background

The "Guiding Principles and Minimum Standards for the Bachelor of Science in Forestry Program" currently being implemented was adopted and promulgated about eight years ago. Many developments and concerns have emerged in forestry and forest products requiring a review and revision of said principles and standards.

The new developments and concerns include among others the following:

1. Promulgation of Executive Order No. 318 (Promoting Sustainable Forest Management in the Philippines), providing policy direction for Philippine Forestry,
2. Recognition of the role of forests and forestry in poverty alleviation and support of sustainable livelihood,
3. Forestry and land-use implications including climate change,
4. Adoption of the criteria and indicators for sustainable forest management,
5. Emerging trends in local and international forestry, and multi-lateral agreements
6. CHED Special Order No. 42, Series of 2003 (Guidelines for the formulation of Policies and Standards of Academic Programs)

In order for the new forestry professionals to be relevant and competent in the discharge of their functions, it is necessary that such new developments and concerns be addressed.

ARTICLE II AUTHORITY TO OPERATE

The BS Forestry program shall be operated only by institutions of higher learning with proper authority granted by the Commission on Higher Education (CHED and by the respective Boards in case of chartered State Universities and Colleges (SUCs)

ARTICLE III PROGRAM SPECIFICATIONS

Section 2 – Degree: Bachelor of Science in Forestry (BSF)

Section 3 – Program description –

a) Objectives

The BSF Program aims to educate, develop and train students to become:

1. Professional foresters equipped with the social, economic and environmental dimensions of forestry resources;
2. Competent researchers and academicians in order to advance the growth of forestry science; and
3. Leaders in proper conservation and development of forest resources.

b) Specific professions/careers/occupations or trades that the graduates of these programs may go into are varied and these include among others the following:

- | | |
|---|--|
| 1. Forest Resource Inventory | 10. Professional Administration |
| 2. Tree and Agroforestry Farming | 11. Environmental Impact Assessment |
| 3. Range and Pasture Development and Management | 12. Environmental Protection |
| 4. Protected Areas Management | 13. Forest Products Production and Utilization |
| 5. Land-Use planning | 14. Plant Systematics |
| 6. Research and Development | 15. Consultancy |
| 7. Administration | 16. Urban Landscaping |
| 8. Educational Management | 17. Teaching |
| 9. Livelihood and enterprise Development | |

Section 4 – Allied programs

Related programs to BSF are as follows:

1. BS in Environmental Science,
2. BS in Biological Science,
3. BS in Agroforestry,
4. BS in Agriculture, and
5. BS in Agricultural Engineering

ARTICLE IV COMPETENCY STANDARDS (Attachment A)

ARTICLE V CURRICULUM

Section 5- Curriculum Description

This curriculum is designed to prepare well-rounded forester with knowledge, skills and values in the art, business and science of forestry. The curriculum is divided into four major parts. The first part is composed of General Education courses (77 units) which is geared toward providing basic knowledge in the arts and sciences. The second part is the core courses (78 units) which will develop competence in the scientific field of forestry science and management needed by all foresters. The third and fourth parts are Thesis/Practicum 12 units and Electives six units.

Section 6 - Curriculum outline

A. General Education Courses - General Education and legislated courses shall follow the existing requirements of CHED in accordance with CHED Memorandum Order Number 59, series 1996 (GEC-B; 51 units).

	77 Units
1. Language and Humanities	21 Units
a. English	
1. English 1 – Study and Thinking Skills in English	3
2. English 2 – Writing in the Discipline	3
b. Filipino	
1. Filipino 1 – Sining Pakikipagtalastasan	3
2. Filipino 2 – Pagbasa at Pagsulat sa Iba't-Ibang Disiplina	3
c. Humanities	
1. Introduction to Humanities	3
2. Philosophy and Ethics	3
3. The Literatures of the Philippines	3

2. Mathematics and Natural Science	27 Units
a. Mathematics	
1. Math 1 - College Algebra	3
2. Math 2 - Plane Trigonometry	3
3. Math 3- Analytical Geometry and Calculus 1	3
4. Statistics 1	3
b. Natural Sciences	
1. Nat. Sci. 1 – Botany	3
2. Nat. Sci. 2 - Zoology	3
3. Nat. Sci. 3 - General Chemistry	3
4. Nat. Sci. 4 - Physics I	3
c. Fundamentals of Computer Science	3
3. Social Sciences*	12 Units
a. Soc. Sci. 1 -	3
b. Soc. Sci. 2 -	3
c. Soc. Sci. 3 -	3
d. Soc. Sci.4 -	3

* (consist of subjects such as Political Science, Psychology, Anthropology, Economics, History and the like provided that the following topics are taken up in appropriate subjects: Taxation and Agrarian Reform, Philippine Constitution and Population Education)

4. Life and Works of Rizal	3 Units
5. Physical Education (PE)	(8)
6. National Service and Training Program (NSTP)	(6)

B. Core courses **78 Units**

1. Forest Biological Sciences	22 Units
a. Forest Ecology	3
b. Morphology, Taxonomy and Dendrology	4
c. Forest Wildlife and Biodiversity	3
d. Forest Genetics and Tree Improvement	3
e. Geology and Forest Soils	3
f. Forest Health	3
g. Tree Physiology	3

2. Forest Resources Management	32 Units
a. Introduction to Forestry	3
b. Forest Surveying and Engineering	4
c. Silviculture I – Forest Nurseries Plantation	3
d. Silviculture II – Silvicultural Systems	3
e. Forest Resource Economics and Valuation	3
f. Forestry Statistics and Measurements	4
g. Forest Management	3
h. Forest Business Management	3
i. Watershed Management	3
j. Geology and Forest Soils	3
3. Social Forestry and Forest Governance	15 Units
a. Principles and Concepts of Social Forestry	3
b. Forest Governance and Policy	3
c. Forest Laws and Regulations	3
d. Forestry Extension	3
e. Agroforestry Systems	3
4. Forest Products Utilization	12 Units
a. Wood Structure and Identification	3
b. Properties and Utilization of Forest Products	3
c. Chemistry of Forest Products	3
d. Production Management in Forest-Based Industries	3
C. Thesis/Practicum	12 Units
a. Technical Report Writing	3
b. Problem Analysis and Research Method	3
c. Thesis/Practicum	6
D. Electives	6 Units
a. Multiple-Use Management	3
b. Range Management	3
c. Ecotourism	3
d. Environmental Impact Assessment	3
e. Geo-spatial Method in Forestry	3
f. Forest Resource Policy and Advocacy	3
E. Sum total of units of the Curriculum	
GE	77
Core	81
Thesis/Practicum	12
Elective	6
TOTAL	176

Section 7 Sample Program of Study

The program study herein is only an example. HEIs may use this sample and modify it according to its needs. They may also add other preferred courses.

First Year

First Semester	Units	Lect. Hrs.	Lab. Hrs.	Second Semester	Units	Lect. Hrs.	Lab. Hrs.
Nat. Sci. 1 - Botany	3	2	3	Nat. Sci. 2 -Zoology	3	2	3
Introduction to Forestry	3	3	0	Philosophy and Ethics	3	3	0
Math 1 - College Algebra	3	3	0	Math 2 - Plane Trigonometry	3	3	0
Introduction to Humanities	3	3	0	Nat. Sci. 3 – Gen. Chemistry	3	2	3
English 1 – Study and Thinking Skills in English	3	3	0	English 2 – Writing in the Discipline	3	3	0
Filipino I - Sining Pakikipagtalastasan	3	3	0	Forest Ecology	3	2	3
PE 1	(2)			PE 2	(2)		
NSTP	(3)			NSTP	(3)		
Total	23			Total	23		

Second Year

First Semester	Units	Lect. Hrs.	Lab. Hrs.	Second Semester	Units	Lect. Hrs.	Lab. Hrs.
Filipino 2 – Pagbasa at Pagsulat sa Iba’t-Ibang Disiplina	3	3	0	Technical Report Writing	3	1	6
Morphology, Taxonomy and Dendrology	4	2	6	Forest Wildlife and Biodiversity	3	2	3
Math 3 - Analytical Geometry and Calculus 1	3	3	0	Geology and Forest Soils	3	2	3
Nat. Sci. 4 - Physics I	3	2	3	Soc. Sci. 2	3	3	0
Soc. Sci. I	3	3	0	Fundamentals of Computer Science	3	2	3
The Literatures of the Philippines	3	3	0	Soc. Sci. 3	3	3	0
PE 3	(2)			PE 4	(2)		
Total	21			Total	20		

Summer Class - Forest Surveying and Engineering – 4 Units

Third Year

First Semester	Units	Lect. Hrs.	Lab. Hrs.	Second Semester	Units	Lect. Hrs.	Lab. Hrs.
Forest Health	3	2	3	Silviculture II – Silvicultural Systems	3	2	3
Silviculture I – Forest Nurseries Plantation	3	2	3	Forest Resource Economics and Valuation	3	3	0
Principles and Concepts of Social Forestry	3	3	0	Forestry Statistics and Measurements	3	2	3
Problem Analysis and Research Methods	3	3	0	Forest Surveying and Engineering	3	3	0
Wood Structure and Identification	3	2	3	Introduction to Forest Governance	4	2	6
Soc. Sci. 4	3	3	0	Forest Management	3	3	0
Statistics 1	3	3	0	Tree Physiology	3	2	3
Total	21			Total	22		

Summer Class - Thesis/Practicum – 6 Units

Fourth Year

First Semester	Units	Lect. Hrs.	Lab. Hrs.	Second Semester	Units	Lect. Hrs.	Lab. Hrs.
Forest Business Management	3	3	0	Forest Genetics and Tree Improvement	3	2	3
Forest Policy, Laws and Administration	3	3	0	Chemistry of Forest Products	3	2	3
Properties and Utilization of Forest Products	3	2	3	Forestry Extension	3	2	3
Watershed Management	3	2	3	Production Management in Forest-Based Industries	3	3	0
Life and Works of Rizal	3	3	0	Agroforestry Systems	3	2	3
Elective	3			Elective	3		
Total	18			Total	18		

ARTICLE VII COURSE SPECIFICATIONS

The specification for each of the course is indicated in Attachment B

ARTICLE VII GENERAL REQUIREMENTS

Section 8 - Program Administration Requirements

Dean

1. A Doctorate degree holder in forestry or MS in Forestry with at least five (5) years administrative experience provided that his/her bachelors degree is in forestry or in related programs specified in section 4;
2. Appointed/designated as Chairman of the Department/Division, Director of an Institute or other related administrative position;
3. At least assistant professor or equivalent rank;
4. With at least three (3) years teaching experience and two (2) years on research and/or extension: and
5. Must be a registered professional

Unit/department chair

1. At least M.S. Degree holder on Forestry or provided his/her Bachelor's degree is on Forestry; and
2. With at least three (3) years teaching experience and two (2) years in research and/or extension work

Duties and responsibilities

Dean

1. Acts as the over-all administrator of the college;
2. Provides direction and leadership to education, research and extension;
3. Establishes linkages and collaborates with other forestry organization (Department of Environment and Natural Resources, Non-Government Organizations, etc.) on the various issues and concerns concerning forestry education;
4. Formulates and implements plans and programs on resource generation;
5. Prepares and submit an annual report and plan for the coming year to the President/Chancellor of the University; and
6. Carry-out the implementation of the PSG for BSF as prescribed by CHED

Unit/department chair

1. Acts as administrator of his department
2. Carry-out the implementation of the Policies and Standards for his particular department;
3. Formulates and implements research and extension projects for the department;
4. Oversees the welfare of the students to achieve academic excellence and ensure that they shall benefit on the courses offered by the department;
5. Implements plans and programs on resource generation; and

Section 9 Faculty

A. Qualification of Faculty

1. At least a BS degree in Forestry or any of the allied programs as identified in Section 4. However, for the major courses at least a master's degree is required.
2. A minimum of 50% of the faculty must have a Master's degree in forestry or or any of the allied programs as identified in Section 4.

B. Employment Status - The institution shall maintain a minimum of 12 regular faculty teaching the BSF program of which 75% is full-time.

C. Teaching Load

Teaching load requirements for the BSF program of a full time faculty shall be as follows:

1. The minimum teaching load should be 12 units per semester,
2. A faculty may be assigned an overload,
3. In no instance should the aggregate teaching load of the faculty exceed 24 units (inclusive of overload and teaching loads in other schools), and
4. Teaching hours per day should not exceed 6 lecture hours.

D. Faculty Development.

The institution must have a system of faculty development. It should institute a program for faculty to:

1. Pursue graduate studies,
2. Attend seminars, symposia and conferences for continuing education,
3. Undertake research activities and to publish their research output,
4. Give lectures and present papers in national/international conferences, symposia and seminars, and
5. Attend training and workshop on teaching methods under the area of specialization.

The institution must provide opportunities and incentives such as:

1. Tuition subsidy for graduate studies
2. Study leave with pay
3. Deloading to finish a thesis or carry out research activities
4. Travel grants for academic development activities such as special skills training and attendance in national/ international conferences, symposia and seminars.
5. Awards & recognition

Section 10 Library

A. Policy

Libraries service the instructional and research needs of the staff and students making it one of the most important service units within an HEI. It is for this reason that libraries should be given special attention by HEI administrators by maintaining it with a wide and up-to-date collection, qualified staff, and communications and connectivity portals.

B. Library Staff

The Head Librarian should: 1) have an appropriate professional training; 2) be a registered librarian; and 3) have a Master's degree in Library Science.

The library should be: 1) staff with one full time professional librarian for every 1,000 students and 2) a ratio of 1 librarian to 2 staff/clerks should be observed.

C. Library Holdings

Library holdings should conform to existing requirements for libraries. For the BSF program, the libraries must provide 5 book titles per professional course found in the curriculum at a ration of 1 volume per 15 students enrolled in the program. These titles must have been published within the last 10 years.

The HEI is likewise encouraged to maintain periodicals and other non-print materials relevant to forestry and environment to aid the faculty and students in their academic work. CD-ROMs and internet access could complement a library's book collection but should otherwise not be considered as replacement for the same.

D. Space Requirements

At least 126 m². or approximately 2 classrooms shall be required for the library. It should include space for collections, shelving areas, stockroom, office space for staff and reading area. The library must be able to accommodate 5% of the total enrollment at any one time.

E. Finance.

All library fees should be used exclusively for library operations and development for collections, furnitures and fixtures, equipment and facilities, maintenance and staff development.

F. Networking

Libraries shall participate in inter-institutional activities and cooperative programs whereby resource sharing is encouraged.

G. Accessibility

The library should be readily accessible to all.

H. Library Hours

The library should be open to serve the needs of the users.

Section 11 Facilities and Equipment

A. Laboratory requirements

Forest Laboratory. At least 50 hectares should be available for instruction and research purposes. Higher Education Institutions which cannot meet the minimum requirement are given five (5) years from the implementation of this PSG to enter into Memorandum of Agreement (MOA) or other agreement with forest-related agencies.

Laboratories should conform to existing requirements as specified by law (RA 6541, "The National Building Code of the Philippines" and Presidential Decree 856, "Code of Sanitation of the Philippines"). List of required and recommended equipment are listed in the course specifications found in Attachment B.

B. Class Size.

1. For lecture classes - Ideal size is 35 students per class, maximum is 50.
2. For laboratory and research classes - Maximum of 30 students per class
3. Special lectures with class size more than 50 may be allowed as long as the attendant facilities are provided.

C. Educational Technology Centers

The institution should provide facilities to allow preparation, presentation and viewing of audio-visual materials to support instruction.

Section 12 Admission and Retention

The basic requirement for eligibility for admission of a student to any tertiary level degree program shall be graduation from the secondary level recognized by the Department of Education. Higher education institutions must specify admission, retention and residency requirements. They should ensure that all students are aware of this PSG.

ARTICLE VIII
TRANSITORY, REPEALING CLAUSE AND EFFECTIVITY CLAUSE

Section 13. Transitory Clause

HEIs that have been granted permit or recognition for BSF program are hereby given three (3) years from the date of effectivity hereof to fully comply with all the requirements as stipulated in this CMO. Compliance to these requirements shall also be required to State Universities and Colleges (SUCs) and Local Colleges and Universities (LCUs). In the event that the HEI fails to comply, it is given a non-extendable period of two (2) years to comply.

Currently enrolled students in the BSF program shall be allowed to graduate under the old curriculum. However, students enrolling for the above-mentioned program beginning school year 2007-2008 shall be covered by this CMO.

Section 14. Repealing Clause

All pertinent rules and regulations or parts thereof that are inconsistent with the provisions of these policies and standards are hereby repealed or modified accordingly.

Section 15. Effectively Clause

This CMO shall be effective beginning SY 2007-2008 after publication in the Official Gazette or in a newspaper of general circulation.

Pasig City, Philippines October 16, 2006.


CARLITO S. PUNO, DPA
Chairman 

ATTACHMENT A

PROFILE OF DUTIES AND COMPETENCIES OF A FORESTER

Duties	Competencies			
A. Establish and manage forest resources using appropriate technologies	1. Know the nature and dynamics of various types of ecosystems in the forest.	2. Know the dynamics of forest ecosystems-human/society interactions	3. Know the sustainable management of natural, coastal, protection and plantation forest.	4. Know how to rehabilitate and restore degraded or denuded forest lands
	5. Manage forests to meet global standards (ie. Iso certification)	6. Able to apply techniques on financial and economic aspects of forestry		
B. Visualize, interpret and apply geospatial methods in forest and other natural resources	1. Able to encode, identify, analyze, interpret and validate thematic data and information	2. Able to propose decision options for land use (LU) planning, resource allocation, policy decisions, etc.		
C. Formulate and implement forest policies, laws, rules and regulations	1. Know forest laws and regulations and its documentation procedures	2. Know the legal procedures in the apprehension and prosecution of violators of forest laws and regulations	3. Know the procedures in the formulation of forest policies, laws, rules and regulations	
D. Develop and implement integrated forest management plans and programs	1. Able to relate the forestry sub system with the other components of socio-bio-physical system	2. Able to use the strength, weakness, opportunities and threat (swot) analysis and other forms of systems analyses	3. Able to identify and implement solutions to problems using systems frameworks	4. Demonstrate integrative and collaborative skills in problem solving
	5. Prepare integrated resource plans and programs			
E. Maintain socio-cultural-ecological balance through conservation and preservation of resources	1. Able to identify and assess the socio-bio-ecological status of existing resources	2. Demonstrate knowledge on policies, regulations and standards	3. Able to design and implement appropriate conservation and preservation [techniques] approaches/strategies	

Duties	Competencies			
F. Conduct research	1. Identify research problems, prepare corresponding proposal and identify funding sources for research	2. Apply research methodologies	3. Able to process, analyze, prepare and interpret data/results	4. Able to write and present progress and final reports
G. Demonstrate awareness of the importance of the living and preserved collections	1. Able to identify, name and classify the flora and fauna	2. Able to advocate biodiversity conservation	3. Know the anthropological values of living and preserved collection	4. Able to establish and manage botanical gardens, wildlife sanctuaries and natural museums
H. Source and process information through information and communication technology (ICT) and other means	1. Able to use a computer and application software	2. Able to identify and use other sources of information	3. Able to synthesize information for its appropriate use	4. Demonstrate ability to network
	5. Able to organize and use databases	6. Able to apply traditional and advanced communication technology		
I. Teach forestry principles and applications	1. Demonstrate mastery of subject matter	2. Know how to teach effectively	3. Able to use the strength, weakness, opportunities and threat (swot) analysis and other forms of systems analyses	4. Develop teaching materials
J. Design, mobilize, and implement information, education and communication projects/programs	1. Familiarization with project management cycle and basic iec processes	2. Able to assess the iec needs of the clientele and stake holders	3. Able to design and implement iec programs using multi-media and other technologies	4. Able to monitor, evaluate and redesign iec programs
K. Adapt, transfer and promote appropriate forestry technologies	1. Knowledgeable of technology transfer method	2. Able to explain the technical aspects and uses of forestry appropriate technologies	3. Able to design and implement appropriate technology transfer programs	4. Able to apply appropriate technology and assessment methods involving social, technical, economic, environmental and political aspects

Duties	Competencies			
	5. Able to monitor and evaluate impacts of forestry technology programs			
L. Develop forest-based enterprise	1. Knowledgeable of forest-based enterprises	2. Able to undertake feasibility studies and write proposals and business plans	3. Able to identify sources of funding for enterprises	4. Able to integrate product development and marketing
M. Supervise forest-based processing operations	1. Knowledgeable on materials, property and processing technologies	2. Able to integrate non-forest-based to forest-based enterprise	3. Able to apply ergonomics to forest-based operations	4. Knowledgeable in environmental standards and mitigating measures
	5. Able to monitor and evaluate processes and products			
N. Supervise forest personnel/activities	1. Knowledge on human behavior	2. Know and understand the principles of personnel management	3. Able to apply supervisory manpower skills	4. Know how to enhance personnel productivity and performance
	5. Able to prepare accomplishment reports of the various activities		6. Know labor laws	
O. Practice professional ethics	1. Know ethical standards of the forestry profession		2. Observe/apply forestry ethical standards	
P. Establish interpersonal, institutional relationships	1. Know and understand individual and organizational behavior	2. Able to demonstrate empathy	3. Able to effectively work with others	4. Able to recognize and acknowledge where credit is due
	5. Able to demonstrate skills in managing and resolving conflict			
Q. Communicate effectively	1. Able to demonstrate good level of confidence	2. Able to express oneself effectively both orally and in writing	3. Proficient in subject matter	4. Know and able to use appropriate communication strategies in any situation
	5. Must have a good sense of humor	6. Must be a good listener and observer	7. Able to wear appropriate attire and practice appropriate grooming	

ATTACHMENT B – COURSE SPECIFICATIONS

FOREST BIOLOGICAL SCIENCE

Course Name	FOREST ECOLOGY
Course Description	Biological interaction of forest components, energy flow and trophic levels, principles of limiting factors and succession, principles and methods of forest dynamics and vegetational development with emphasis on tropical rain forest; the ecological impact of man
Course Objectives	1. Describe the nature and dynamics of various types of ecosystems in the forest 2. Describe the interaction between and among biological and physical components in relation to forest productivity and sustainability 3. Discuss the ecological impacts of anthropogenic activity in forest ecosystems 4. Identify methods of studying the dynamics of forest ecosystem
Number of units for Lecture and Laboratory	3 units (2 units lect., and 1 unit lab.)
Number of Contact Hours per Week	5 hrs a week (2 hrs lec, 3 hrs lab)
Prerequisites	General Botany and Zoology
Course Outline	1. Introduction A. Definition of Terms ▪ Ecology ▪ Ecosystem ▪ Etc B. Importance and Relevance of Forest Ecology 2. Forest as an Ecosystem A. Types of Ecosystem B. Biological and Physical Interaction C. Energy Flow and Tropic Levels 3. Principles and Methods of Forest Dynamics A. Succession B. Ecosystem Development 4. Ecological Impacts of Anthropogenic Activities 5. Forest Influences
Laboratory Equipment	Steel tape
Texts and References	Odum, E.P. 1971 Fundamentals of Ecology. Puri, G.S. et al. 1982 Forest Ecology, Vol, 1, 2 nd Ed. Oxford

Course Name	MORPHOLOGY, TAXONOMY AND DENDROLOGY
Course Description	Structure, classification and identification of woody and non-woody plants
Course Objectives	1. Describe the methods of classifying, naming and identifying woody and non-woody plants 2. Discuss the past and current plant classification system in particular woody and non-woody plants 3. Identify commonly known woody and non-woody plants in natural stands and plantations
Number of units for Lecture and Laboratory	4 units (2 units lect and 6 units Lab)
Number of Contact Hours per Week	8 hrs a week (2 hrs lec, and 6 hrs lab)
Prerequisites	General Botany
Course Outline	1. Introduction A. Definition of Terms B. Importance, Relevance and Roles of Morphology, Taxonomy, and Dendrology in Forestry 2. Past and Current System of Plant Classification 3. Components of Plant Taxonomy A. Classification B. Nomenclature/Identification C. Description 4. Methods of Classifying, Naming and Identifying Woody and Non-Woody Plants
Laboratory Equipment	Ladder - 2 Pruning saw - 2 Pruning shear with long handle – 2

	Oven - 1 Herbarium cabinets - 2 Pressers - 4 sets
Texts and References	New Classification System of the Angiosperm Phylogeny Group 1998, Annals of the Missouri Botanical Gardens: 85: 531-553 Brummit, R.K. 1992 Vascular Plant Families and Genera Fernando E.S. 2000 Checklist of Species in FBS 21 (taxonomy of Forest Plants, 8 th Ed., Dept of Forest Biological Sciences, UPLB-CFNR, College, Laguna Hutchinson, J. 1959. Families of Flowering Plants. Vol I Dicotyledons 2 nd ed Oxford Hutchinson, J. 1959. Families of Flowering Plants. Vol II, Monocotyledons, Oxford Rojo, J.P. 1999. Revised Lexicon of Philippine Trees. FPRDI

Course Name	FOREST WILDLIFE AND BIODIVERSITY
Course Description	Survey of Philippine flora and fauna, biology and ecology of selected species, with emphasis on indigenous species; Principles concepts and practise of biodiversity conservation in forest ecosystems
Course Objectives	1. Identify Philippine flora and fauna (endangered, extinct, rare, threatened species etc.) 2. Describe the biology and ecology of selected Philippine flora and fauna 3. Discuss or describe methods, procedures of assessment and survey of Philippine flora and fauna 4. Basic feeding and breeding of selected Philippine flora and fauna 5. Enumerate and discuss the principles and strategies of biodiversity conservation 6. Design, implement and monitor appropriate conservation and preservation for biodiversity 7. Discuss the current policy and regulation on wildlife conservation and management
Number of units for Lecture and Laboratory	3 units (2 units lect., and 1 unit lab.)
Number of Contact Hours per Week	5 hrs a week (2 hrs lec, 3 hrs lab)
Prerequisites	General Botany, Zoology, Forest Ecology,
Course Outline	1. Introduction A. Relevance of Wildlife to Forestry B. Different Wildlife Indigenous, Endangered, Extinct, Commercially used species, etc. 2. Ecology, Biology, Breeding and Feeding Habits of Selected Wildlife Species with Commercial Values 3. Methods/Procedures in Determination of Wildlife Population, Distribution and Composition Including Habitat Assessment and Establishment of Wildlife Sanctuaries 4. Principles and concepts of biodiversity 5. Approaches/strategies in biodiversity 6. Planning and management of biodiversity 7. Current Trends and Practices on Biodiversity Conservation 8. Treatises, Agreements, Laws on Wildlife Management and Conservation
Laboratory Equipment	Clippers - 4 Dissection kit - 2 Hatchet - 4 Mesh net - 4 Traps -10 Binoculars - 5
Texts and References	Survey of Philippine Flora and Fauna Ecology of Selected Wildlife Species Philippine Biodiversity. 1997. An assessment and plan of action

Course Name	FOREST HEALTH
Course Description	The common and important destructive agents of forest plants and forest products, their characteristics and management. Emphasis on integrated pest management
Course Objectives	1. Describe destructive agents of forest plants and forest products 2. Discuss tree management (monitoring, prevention and control) of destructive agents 3. Describe current trends in predicting pests and diseases incidence
Number of units for Lecture and	3 units (2 units lect., and 1 unit lab.)

Laboratory	
Number of Contact Hours per Week	5 hrs a week (2 hrs lec, 3 hrs lab)
Prerequisites	None
Course Outline	<ol style="list-style-type: none"> 1. Morphology and Biology of Common Forest Pests and Diseases 2. Principles of Pests and Disease Control and Management <ol style="list-style-type: none"> A. Biological B. Cultural C. Chemical 3. Methods of Diagnosing Pests and Diseases in Forests 4. Methods of Predicting Incidence of Pests and Diseases in Natural Nurseries, Forest and Plantation and Forest Product in Service
Laboratory Equipment	Compound Microscope -10 units/class Insect box (pins, etc.) – 5 sets/class Stereo microscope - 5 units/class Autoclave/pressure cooker – 1 Dissecting Kit - 5 sets/class Incubator - 1 Isolation room - 1 Oven/hot air sterilizer - 1
Texts and References	Eusebio, Plant Pathology Elzinga, R.J.. 1981. Fundamentals of Entomology. 2 nd Ed. Prentice Hall

Course Name	TREE PHYSIOLOGY
Course Description	Nutrition, metabolism, growth and reproduction of trees
Course Objectives	<ol style="list-style-type: none"> 1. Discuss how trees grow and reproduce 2. Identify physiological processes contributing to growth and development of trees 3. Discuss recent developments in tree nutrition and reproduction
Number of units for Lecture and Laboratory	3 units (2 units lect., and 1 unit lab.)
Number of Contact Hours per Week	5 hrs a week (2 hrs lec, 3 hrs lab)
Prerequisites	General Botany and General Chemistry
Course Outline	<ol style="list-style-type: none"> 1. Introduction 2. Importance, Relevance and Roles of Tree to Forestry 3. Physiological Processes <ol style="list-style-type: none"> A. Absorption B. Translocation C. Photosynthesis D. Respiration E. Other Metabolic Processes 4. Growth and Development of Trees <ol style="list-style-type: none"> A. Germination B. Maturation C. Reproduction 5. Tree Nutrition 6. Recent Developments <ol style="list-style-type: none"> A. Biofertilizers B. Sioculture C. Secondary Metabolite Production
Laboratory Equipment	Analytical balance - 1 Bunsen burner - 7 Hydrometer - 1 pH meter - 1 Screen house - 1 Tool and equipment shed -1
Texts and References	Kramer, P.J. 1960. Physiology of Trees. McGraw-Hill Bidwel, R.G.S. 1979. Plant Physiology. 2 nd ed. Macmillan Publishing Co. Inc New York.

Course Name	FOREST GENETICS AND TREE IMPROVEMENT
Course Description	Mechanism of tree heredity and variation, cytogenetics, mutation, nature of genes, population genetics and evolution genetics, and biometrical procedures.
Number of units for Lecture and Laboratory	3 units (2 units lect., and 1 unit lab.)
Number of Contact Hours per Week	5 hrs a week (2 hrs lec, 3 hrs lab)
Prerequisites	General Botany
Course Outline	<ol style="list-style-type: none"> 1. Importance and relevance of forest genetics and tree improvement 2. Gene and gene expressions 3. Principles of tree heredity 4. Evolution and sources of variation in trees 5. Principles of population genetics 6. Tree improvement methods and development
Texts and References	Wright, J.W. 1976. Introduction to Forest Genetics. Academy Press, Inc Zobel, B.J. and J.T. Talbert. Applied Forest Tree Improvement, John Wiley and Sons

FOREST RESOURCES MANAGEMENT

Course Name	INTRODUCTION TO FORESTRY
Course Description	A survey of the whole field of forestry, including the nature of forest resources and their importance to man and his needs; uses of forest and its place in local, national and world economy; the place of forestry among the professions; the nature of education in forestry and discussion of principal subject matter fields.
No of Units Lec/Lab	3 units (3 units lect.)
No. of Contact Hrs Per Wk	3 hrs lect.
Course Outline (Major Topics)	<ol style="list-style-type: none"> 1. Forestry and the socio-biophysical system 2. Basic forestry concepts 3. General introduction to Philippine Forestry 4. The role of forestry in environmental protection and national development 5. Introduction to sustainable forest management

Course Name	SILVICULTURE I – FOREST NURSERIES AND PLANTATION
Course Description	Establishment and management of tree and non-tree nurseries, plantation and agroforestry farms, and timber stand improvement
Course Objectives	<ol style="list-style-type: none"> 1. Discuss how to establish tree and non-tree nurseries, plantations and agroforestry farms 2. Discuss management strategies and approaches applicable to tree and non-tree nurseries 3. Effectively apply the principles of establishing tree and non-tree nurseries, plantation and agroforestry farm 4. Identify current trends and international standards in plantation establishment and management e.g. Forest Certification, ISO, etc.
Number of units for Lecture and Laboratory	3 units (2 units lect. and 1 Unit lab)
Number of Contact Hours per Week	5 hrs (2 hrs lect. and 3 hrs lab)
Prerequisites	Forest Ecology, Forest Soil
Course Outline	<ol style="list-style-type: none"> 1. Introduction <ol style="list-style-type: none"> A. Definition of Terms B. Basic Concept and Principles of Artificial Regeneration 2. Basics of Nursery Establishment and Management 3. Plantation Establishment and Management 4. Cultural Practices in Tree Plantation <ol style="list-style-type: none"> A. Pruning B. Cutting 5. Establishment and Management of Agroforestry Farm 6. Current Trends and International Standards
Laboratory Equipment	Pruning saw - 2 Bow saw - 2 Analytical balance - 1 Budding knife - 5 Light meter - 1 pH meter - 1 Pruning tools - 5 Set of sieves - 1 Shovel, spade, hoe - 5 Soil analysis kit - 1 Spring balance - 1 Water sprinkler - 2 Weighing scale - 1
Texts and References	Agpaoa, A. 1975. Introduction to Reforestation and Erosion Control for the Philippines Daniel, T. W. et al. 1979. Principles of Silviculture. McGraw Hill, Inc MacDicker, K.G. and N.T. Vergara. Agroforestry: Classification and Management. John Wiley and Sons Delizo, T.C. 1978. Forest Nurseries and Plantations for the Philippines. CF,UPLB

Course Name	SILVICULTURE II –SILVICULTURAL SYSTEM
Course Description	Silvicultural and regeneration methods and their application in tropical forest units with emphasis on the forests of the Philippines
Course Objectives	1. Discuss the relationship between forest, forest stand and their dynamics 2. Understand and discuss silvicultural methods 3. Describe principles and methods in the improvement of natural residual stand
Number of units for Lecture and Laboratory	3 units (2 units lect. and 1 Unit lab)
Number of Contact Hours per Week	5 hrs (2 hrs lect. and 3 hrs lab)
Prerequisites	Silviculture I
Course Outline	1. Introduction A. Definition of Terms B. The Forest and Stand as Basic Units of Silviculture 2. Basic Principles and Concepts of Silviculture A. Silvics as foundation of Silviculture 3. Silvicultural System/Regeneration Method A. Clear Cutting B. Seed Tree C. Shelter Wood D. Selection and Support E. etc. 4. Improvement of Residual Stand
Laboratory Equipment	Analytical balance - 1 Budding knife - 5 Light meter - 1 pH meter - 1 Pruning tools - 5 Set of sieves - 1 Shovel, spade, hoe - 5 Soil analysis kit - 1 Spring balance - 1 Water sprinkler - 2 Weighing scale - 1
Texts and References	Agpaoa, A. 1975. Introduction to Reforestation and Erosion Control for the Philippines Smith, D.M. 1962. The Practice of Silviculture. 7 th ed. John Wiley and Sons

Course Name	GEOLOGY AND FOREST SOILS
Course Description	Geology, formation and development of land forms; physical, chemical and biological characteristics of forest soils;
No of Units Lec/Lab	3 units (2 units lect., and 1 unit lab.)
No. of Contact Hrs Per Wk	5 hrs a week (2 hrs lec, 3 hrs lab)
Prerequisites	General Chemistry
Course Outline (Major Topics)	1. Physical Geology A. Types and origin of different rocks 2. Formation and Development of Land forms A. Weathering process B. Erosion and sedimentation C. Other formation and development process of land form 3. Soil Formation and Development 4. Types of Forest Soil 5. Soil Characteristics A. Physical B. Chemical C. Biological 6. Introduction to soil Classification and Taxonomy 7. Soil deterioration and control; maintenance and improvement of soil fertility and production 8. Soil Conservation and Rehabilitation
References	Wilde, S.A. 1958. Forest Soils: Their Properties and Relation to Silviculture. The Ronald Press Company. New York

Course Name	FORESTRY RESOURCE ECONOMICS AND VALUATION
Course Description	Economics of production, distribution and consumption of forest products and services, economic analysis of forestry projects
No of Units Lec/Lab	3 units (2 units lect. and 1 Unit lab)
No. of Contact Hrs Per Wk	5 hrs (2 hrs lect. and 3 hrs lab)
Prerequisites	General Economics
Course Outline (Major Topics)	<ol style="list-style-type: none"> 1. Introduction to forest economics 2. Approaches and techniques in economic measurements and valuation of natural resources 3. Forest products/ production economics 4. Economics of non-timber products in forestry 5. Marketing of forest products and services 6. Economic and financial analyses of forestry projects 7. Environmental Valuation and MBI
Lab Equipment	Douglas, J. 1983.A Re-Appraisal of Forestry Development in Developing Countries Sharma, L.C. 1980. Forest Economics, Planning and Management Gregory, G. 1972.Forest Resource Economics
References	

Course Name	FORESTRY STATISTICS AND MEASUREMENTS
Course Description	Elements of forest mensuration; forest and forest products measurements; tree measurements and volume determination; forest inventory; and basic computer applications; forest sampling; timber inventory planning
Course Objectives	<ol style="list-style-type: none"> 1. Understand the basic concepts and methods involved in the measurement of tree variables 2. Familiarization with different instruments used in forest and forest products measurements 3. Overview of biodiversity assessment techniques 4. Overview of forest sampling and inventory 5. Know basic computer applications
No of Units Lec/Lab	4 units (2 units lect. and 2 units lab)
No. of Contact Hrs Per Wk	8 hrs 2 hrs lect. and 6 hrs lab)
Prerequisites	Elementary Statistics
Course Outline (Major Topics)	<ol style="list-style-type: none"> 1. Fundamental Concepts of Measurements 2. Elements of Sampling and Descriptive Statistics 3. Measurement of Tree Variables 4. Growth, Yield And Age Measurements 5. Area Measurements 6. Forest Sampling and Inventory 7. Experimental Design; Regression and Correlation
References	Harnet D.L. 1982. Statistical Methods. Addison-Wesley Publishing Company FORI, 1978 Seminar-Workshop on Basic Statistics in Forestry Research Spurr, S.H. 1952. Forest Inventory. The Ronald Press Company Husch, B. 1972. Forest Mensuration. The Ronald Press Company

Course Name	FOREST MANAGEMENT
Course Description	Environmental management systems; Principles and concepts of environmental management and planning; methodologies, indicators and operational issues on environmental planning and management; monitoring and evaluation of environmental projects
No of Units Lec/Lab	3 units (2 units lect. and 1 units lab)
No. of Contact Hrs Per Wk	5 hrs (2 hrs lect. and 3 hrs lab)
Course Outline (Major Topics)	<ol style="list-style-type: none"> 1. Principles in forest research management 2. Decision tools and their applications 3. Forest resource management systems and strategies 4. Concepts of sustainable forest management 5. Environmental problem and analysis 6. Designing and planning SD/forestry schemes 7. Carrying capacity and other SD concepts

	8. Analysis and validation of sustainability in natural resource management projects in forestry
References	Duerr, W. et al. 1975. Forest Resource Management: Decision-Making Principles and cases. Dorney, L. 1989. The Professional Practice of Environmental Management. Springer-Verlag, Inc. IEMSD-SEI. 1998. A Source book of Sustainable Development Indicators

Course Name	FOREST BUSINESS MANAGEMENT
Course Description	Economic and business management concepts and principles and their application to forestry including small-scale forest-based enterprise with focus on management, planning, directing and control of enterprise
Course Objectives	Describe the concepts, principles and application and application of economic and business management.
No of Units Lec/Lab	3 units (3 units lect.)
No. of Contact Hrs Per Wk	3 hrs (3 hrs lect.)
Prerequisites	
Course Outline (Major Topics)	1. Economic and business concepts and principles 2. Entrepreneurship 3. Management Study 4. Marketing management 5. Technical/production and taxation studies 6. Financial management 7. Small-scale forest-based enterprise
Lab Equipment	
References	Rich. 1970. Marketing of Forest Products: Texts and Cases PIDS, 1983. Studies on the Wood-Based Furniture, Leather Products and Foot Wear Manufacturing Industries of the Philippines, PIDS Working Paper 83-01

Course Name	WATERSHED MANAGEMENT
Course Description	Regulation, use, conservation practices and treatment of the aggregate resources of a drainage basin for the production of water and control of erosion, stream flow and floods. Rehabilitation and land-use planning
No of Units Lec/Lab	3 units (2 units lect. and 1 Unit lab)
No. of Contact Hrs Per Wk	5 hrs (2 hrs lect. and 3 hrs lab)
Prerequisites	Geology and Forest Soils
Course Outline (Major Topics)	1. General Introduction 2. Watershed characteristics 3. Watershed meteorology and hydrology 4. Water Augmentation 5. Soil Erosion 6. Water Quality Management and Monitoring 7. Watershed Management /land-use planning Planning 8. Watershed protection (including fire protection) 9. Special Topics
References	FAO, 1986. Watershed Management in Asia and the Pacific Reidl, O. and D. Zacher. 1984. Forest Amelioration. Elsevier David, W.P. 1984. Environmental Effects of Watershed Modifications. PIDS Makati Lee, R. 1980. Forest Hydrology. Columbia University Press. New York

SOCIAL FORESTRY AND FOREST GOVERNANCE

Course Name	PRINCIPLES AND CONCEPTS OF SOCIAL FORESTRY
Course Description	Dynamics of human-forest ecosystems interaction; principles, concepts and approaches of community organizing and development, forestry extension, social impact assessment, and other participatory approaches to forest and natural resources management (BASIC)
Number of units for Lecture and Laboratory	3 units; 3 hrs lec
Number of Contact Hours per Week	3 hrs a week.
Course Outline	<ol style="list-style-type: none"> 1. Dynamics of human – forest ecosystems interaction 2. Principles, concepts and approaches of community organizing, forest extension, social impact, assessment & other participatory approaches to forest & natural resources management 3. Community forestry and agroforestry programs
Texts and References	UNDP-FAD-EPI, 1984. Community Forestry: Some Aspects Upland Development Program-DENR.1991. Handbook on Community Training Programs Vergara, N.T. and R.A. Fernandez. 1989. Social Forestry in Asia: Factors that influence Program Implementation Gregersen, H. et al. 1989. The Role of Social forestry in Sustainable Development

Course Name	FOREST GOVERNANCE AND POLICY
Course Description	
Number of units for Lecture and Laboratory	3 units lecture
Number of Contact Hours per Week	3 hrs a week
Course Outline	Importance of forest governance Knowledge, skills and attitude in forest governance Professional ethics and values Forest organization Link with LGUs and civic action groups
Texts and References	DENR, 1995 and 1997 Compilation of Environmental and Natural Resources Policy

Course Name	FOREST LAWS AND REGULATION
Course Description	Laws, rules and regulation, legal procedures and forestry administrative orders relative to the conservation and utilization of forest and natural resources, including international protocols, treaties, convention and commitments; Analysis of Philippine and other laws and policies; and administration of forest institution
Course Objectives	To identify and analyze/review Philippine forestry policies, and laws, and administration of the forestry institutions
Number of units for Lecture and Laboratory	3 units; 3 hrs lect.
Number of Contact Hours per Week	3 hrs a week.
Course Outline	<ol style="list-style-type: none"> 1. History of forestry in the Philippines 2. Constitutional provisions 3. Importance of forest governance 4. Forestry Legislation <ol style="list-style-type: none"> A. Presidential Proclamation B. DAOs C. LOIs D. Decrees E. Executive Orders 5. Forest Protection 6. Enforcement Forest Laws
Texts and References	FDC, 1982. Integrated Forestry System of the Philippines. CF, UPLB Cruz, C.A. 1984. Policy Issues on Commercial Forest Management DENR, 1997, Compilation of Environmental and Natural Resources Policy Issuance Code of Ethics for Foresters

Course Name	FORESTRY EXTENSION
Course Description	Theories, principles and methods of IEC/extension as applied to forestry and natural resources management; analysis of IEC/extension programs in forestry and natural resources management (BASIC)
Number of units for Lecture and Laboratory	3 units; 3 hrs lec
Number of Contact Hours per Week	3 hrs a week.
Course Outline	<ol style="list-style-type: none"> 1. Theories, principles & methods of IEC/extension 2. Analysis of IEC/extension programs in forestry & natural resources 3. Planning, design, mobilizing for implementation/action and evaluation of IEC 4. programs in forestry & natural resources
Texts and References	DENR, 1996. Basic Community Organizing Hand Book for Community-Based Forest Management programs

FOREST PRODUCT UTILIZATION

Course Name	WOOD STRUCTURE AND IDENTIFICATION
Course Description	Gross and microscopic structure of wood; wood identification and natural defects.
Course Objective	<ol style="list-style-type: none"> 1. Explain the formation of wood and its structure in a living tree. 2. Recognize and describe the appearances and functions of the major cell types that comprise the wood. 3. Describe cell wall structures; growth related defects and their significance. 4. Identify various wood species based on their physical and structural characteristics. 5. Relate wood structure to wood properties and utilization.
No. of Units for Lec and Lab	3 units (1 unit lect., and 2 units lab.)
No. of Contact Hrs Per Week	7 hrs per week (1 hr lect and 6 hrs lab)
Course Outline	<ol style="list-style-type: none"> 1. Introduction <ol style="list-style-type: none"> a. The importance of the course b. Basis of wood identification c. Properties common to all wood 2. Plant Origin Of Wood <ol style="list-style-type: none"> a. Types of plants producing wood b. Plant classification c. The role of Timber-producing trees in plant classification 3. Tree Growth <ol style="list-style-type: none"> a. The Stem b. Tree-Trunk Development 4. The Woody Plant Cell <ol style="list-style-type: none"> a. Chemical components of the plant cell-wall b. Structural units of the cell wall c. The cell-wall layers d. Modification or Sculpturing of the cell-wall 5. The Minute Structure Of Softwoods (Coniferous Wood) <ol style="list-style-type: none"> a. Longitudinal Prosenchymatous Elements b. Longitudinal Parenchymatous Elements c. Transverse Prosenchymatous Elements d. Transverse Parenchymatous Elements e. Rays of Coniferous Woods f. Resin Canals in Conifers g. Crystalliferous Woods Elements in Conifers 6. The Minute Structure Of Hardwoods (Porous Woods) <ol style="list-style-type: none"> a. Elements of porous woods b. Longitudinal Prosenchymatous Elements (Porous Wood) c. Longitudinal Parenchymatous Elements (Porous Wood) d. Transverse Parenchymatous Elements (Porous Wood) e. Gum Canals in Porous Wood 7. Natural Defects In Wood <ol style="list-style-type: none"> a. Knots b. Cross-grain c. Reaction wood d. Growth Stresses e. Brashness f. Pitch Defects g. Bark Pockets
Laboratory Equipment	<ol style="list-style-type: none"> 1. Microscopes 2. Hand Lens 3. Knife 4. Wood Samples
Text and References	<ol style="list-style-type: none"> 1. Asian Development Bank. 1994. The Forestry Sector in the Philippines. 2. Brown, Panshin and Forsaith. 1949. Textbook of Wood Tech. Vol. 1

	<ol style="list-style-type: none"> 3. Cote, W.A. (editor). 1965 Cellular Ultrastructure of Woody Plants. Syracuse University Press, New York. 4. Dech, H. Timber, Its Structure and Properties. 5. De Vela, America, Meniado and Lopez. Guide to Wood Identification. 6. Findly, Walter Philip Kennedy. 1975. Tomber Properties and Uses. 7. Haygreen, J. 1989. Forest Products and Wood Science. Iowa University Press; Ames, Iowa 8. Haygreen, J. 1989. Forest Products and Wood Science. 2nd ed. 9. Jane, F.W. 1955. The Structure of Wood. 10. Kollman and Cote. 1975. Principles of Wood Science and Technology 11. Kribs, D.A. 1959. Commercial Foreign Woods in the American Market. 12. Lantican, C.B and C. B. Madamba .1979 Laboratory Manual in Wood Structure and Identification. 13. Mediado, et al.1975. wood Identification Handbook for Philippine Timbers. Vol. 2 FORPRIDECOM 14. Panshin and de Zeeuw. 1970. Textbook of Wood Tech. Vol. 1 15. Reyes, L. 1938. Philippine Woods. 16. Wangaard, F.F. (editor). 1979. Wood: Its Structure and Properties.
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Course Name	PROPERTIES AND UTILIZATION OF FOREST PRODUCTS
Course Description	Physical, mechanical and chemical properties of wood and non-wood products; manufacturing processes and utilization technologies for forest products.
Course Objective	At the end of the course, the students should be able to: <ol style="list-style-type: none"> 1. Discuss the physical, mechanical and chemical properties of wood and selected non-timber forest products; and 2. Discuss the different processes in the conversion of these materials into commercial important consumer goods.
No. of Units for Lec and Lab	3 units, (3 lec., 3 lab)
No. of Contact Hrs Per Week	6 hours a week
Course Outline	<ol style="list-style-type: none"> 1. Introduction <ol style="list-style-type: none"> a. Review of wood structure (softwoods and hardwood) b. Comparison between normal abnormal wood, mature and juvenile wood c. Classification of forest products d. Significance of sustenance forest products utilization 2. Properties Of Wood And Fibrous Non-Wood Forest Products <ol style="list-style-type: none"> a. Chemical compositions and properties b. Physical properties c. Mechanical properties 3. Silvicultural/Forest Management Practices And Their Influence On the properties of Forest 4. Processing Operations In Forest Based-Industries <ol style="list-style-type: none"> a. Transforming logs into lumber, veneer and plywood b. Seasoning of wood, bamboo and rattan <ol style="list-style-type: none"> i) wood chemistry ii) wood seasoning iii) Wood preservation c. Preservative treatment of wood, bamboo and rattan d. Manufacture of wood composition boards e. Technology of making pulp and paper f. Manufacture of furniture and secondary wood products g. Community level processing 5. Other Non-Wood Forest Products <ol style="list-style-type: none"> a. Exudates and extractives b. Palms, grasses and vines c. Food and medicinal forest plants 6. Woodfuel And Biomass Energy <ol style="list-style-type: none"> a. Biomass energy, their sources and utilization b. Fuelwood and charcoal production c. Dendro-energy and other industrial wood energy generation 7. government policies affecting consumption and utilization of forest products
Laboratory	1. Oven

Equipment	<ol style="list-style-type: none"> 2. Vernier Caliper 3. Weighing balance 4. Sawmill 5. Dry kiln 6. Treating Cylinder
Text and References	<ol style="list-style-type: none"> 1. Razal, R.A. Mga Produktong Gubat at Agham Kahoy. Sentro ng Wikang Filipino. 2. Haygreen and Bowyer. 1989 (2nd ed.) Forest Products and Wood Science. Iowa State University Press. 3. Tesoro, Bello and Pollisco. 1977. Forest Products and Industries of the Philippines.

Course Name	CHEMISTRY OF FOREST PRODUCTS
Course Description	Chemistry of wood; pulping and paper-making principles; cellulose derived products
Course Objective	<p>At the end of the course, students should be able to:</p> <ol style="list-style-type: none"> 1. identify and characterize the different chemical components of wood; 2. discuss the formation and distribution of the chemical components in the cell wall; 3. describe the structure of the chemical components of the cell wall; 4. discuss the reactivities of the cell wall components toward pulping and paper-making chemicals; and 5. isolate the individual cell components.
No. of Units for Lec and Lab	3 units (2 class 3 lab)
No. of Contact Hrs Per Week	5 hours a week
Course Outline	<ol style="list-style-type: none"> I. Introduction – General Consideration; Importance of Wood Chemistry. II. Chemical Composition and Analysis of Wood <ol style="list-style-type: none"> 1. Classes of compounds present in wood 2. Separation of wood components 3. Analysis of wood III. Brief Review of Organic and Carbohydrate Chemistry. IV. Chemistry of Wood Components <ol style="list-style-type: none"> A. CELLULOSES <ol style="list-style-type: none"> 1. Formation and location in the cell wall 2. Isolation 3. Structure <ol style="list-style-type: none"> a. Macromolecular structure of cellulose b. Physical structure c. Molecular structure 4. Solubility of Cellulose 5. Cellulose reactions 6. Cellulose derivatives B. HEMICELLULOSES <ol style="list-style-type: none"> 1. Classification and location 2. Isolation 3. Structure <ol style="list-style-type: none"> a. Hardwood hemicelluloses b. Softwood hemicelluloses 4. Reactivity C. OTHER WOOD POLYSACCHARIDE <ol style="list-style-type: none"> 1. Pectin 2. Starch D. LIGNIN <ol style="list-style-type: none"> 1. Formation and distribution in the cell wall 2. Isolation <ol style="list-style-type: none"> a. Preparation of the plant material b. Native lignins c. Insoluble lignin 3. Lignin Determination Methods <ol style="list-style-type: none"> a. Direct Methods b. Indirect Methods 4. Structure 5. Reactivity

	<ul style="list-style-type: none"> a. Oxydation b. Hydrolysis 6. Wood Extractives <ul style="list-style-type: none"> b. Formation and location in the wood structure c. Influence of extractives on wood properties d. Structure e. Chemical classification f. Reactivity towards pulping chemicals
Laboratory Equipment	<ul style="list-style-type: none"> 1. Analytical Balance 2. Correction Oven 3. Muffle Furnace 4. Grinder (Wiley Mill) 5. Soxhlet Extraction Apparatus 6. Porcelain Crucible 7. Fritted glass crucible
Text and References	<ul style="list-style-type: none"> 1. Browning, B.L. 1963. The Chemistry of Wood. 2. Browning, B. L 1967. Methods of Wood Chemistry.

Course Name	PRODUCTION MANAGEMENT IN FOREST-BASED INDUSTRIES
Course Description	Planning of production requirements, routing, scheduling, dispatching and inspection; control of materials, methods, machines, tooling and operation times
No. of Units for Lec and Lab	3 units, (2 lec 3 lab)
No. of Contact Hrs Per Week	5 hours a week
Course Outline	<ul style="list-style-type: none"> I. INTRODUCTION <ul style="list-style-type: none"> a. The Product and operation function II. ORGANIZATION <ul style="list-style-type: none"> a. Philosophy of organization b. Organization Structure III. FACILITIES LAYOUT AND MATERIALS HANDLING <ul style="list-style-type: none"> a. The departmental arrangement b. The detailed layout and materials handling IV. PRODUCTION FORECAST <ul style="list-style-type: none"> a. General observations on sales forecast b. Sales forecast methods V. PRODUCTION PLANNING <ul style="list-style-type: none"> a. The basis of production Planning b. Production Planning, a basis for financial planning c. Determination of factor-of-production requirements VI. PRODUCTION SCHEDULING <ul style="list-style-type: none"> a. Factors governing scheduling of production VII. PRODUCTION REPORTING <ul style="list-style-type: none"> a. Recording requirement b. Types of records necessary in production c. Reporting VIII. PRODUCTION CONTROL <ul style="list-style-type: none"> a. Production control in intermittent manufacturing b. Production control in continuous manufacturing c. Linear programming d. Critical path scheduling IX. INVENTORY CONTROL <ul style="list-style-type: none"> a. Relevant factors in inventory control b. Inventory under certainty c. Inventory control under risk and uncertainty
Text and References	<ul style="list-style-type: none"> 1. Baldwin, R.F. Operations Management in the Forest Products Industry. Miller Freeman Publication. 1984. 2. Bowman, D.M. and F. M. Fillerup. Organization and Planning. McGraw-Hill Book Company, Inc. 1963. 3. Macniece, E.H. Production Forecasting, Planning, and Control. 3rd edition. John Wiley

	and Sons, Inc. 1966. 4. Mayer, R.R. Production and Operations management. 3 rd edition. McGraw-Hill Book Company. 1975.
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