



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

CHED MEMORANDUM ORDER

No. 48
Series of 1998

**SUBJECT: GUIDING PRINCIPLES AND MINIMUM STANDARDS FOR
THE BACHELOR OF SCIENCE IN FORESTRY PROGRAM**

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In accordance with the pertinent provisions of Republic Act No. 7722, otherwise known as the "Higher Education Act of 1994," and by virtue of Resolution No. 332-98 series of 1998, the Commission *en banc* approves the Guiding Principles and Minimum Standards for the Bachelor of Science in Forestry program for information, guidance and compliance of all concerned.

Pasig City, Philippines August 25, 1998


ANGEL C. ALCALA
Chairman

REVISED GUIDING PRINCIPLES AND MINIMUM STANDARDS FOR BACHELOR OF SCIENCE IN FORESTRY

I. GUIDING PRINCIPLES

A. Mission Orientation

The BS Forestry 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 in order to advance the growth forestry science ; and
4. Leaders in proper conservation and development of forest resources through public education and extension activities.

B. Programs

1. Instruction

The curriculum shall have a well-rounded general education and technical courses aimed at developing students mentally, physically, socially and morally.

2. Research and Extension

A forestry institution shall have a viable and workable research and extension programs including facilities therefor to support instruction.

C. Resources

1. Faculty

There shall be a minimum number of qualified instructors to handle courses in the Bachelor of Science in Forestry program.

2. Physical Facilities and Equipment

There shall be adequate facilities and equipment to ensure the offering of a quality undergraduate program in forestry.

D. Organization

The staff shall be organized such that the institution's triple functions namely: instruction, research and extension can be carried out effectively.

E. Quality of Output

There shall be a number of graduates as specified who shall pass the board for Foresters Licensure Examination.

II. MINIMUM STANDARDS

A. Programs

1. Instruction

a. Curriculum

The minimum units required for the graduation in the Bachelor of Science in Forestry program is 160 units including electives and practicum/thesis but excluding ROTC (See for Minimum requirements for BS Forestry curriculum)

b. Student recruitment and admission

Completion of high school and passing the required admission test if applicable, shall be prerequisites for admission.

2. Research and extension

A minimum of 15 percent of the operating expenses for the institution shall be allocated for each research and extension program apportioned more or less to 75 percent for personal services and 25 percent for maintenance and operating expenses.

B. Resources

1. Faculty

There shall be a minimum faculty of 12 full-time instructors in forestry and related technical courses, four of whom must have an advanced degrees from accredited institutions in any of the following fields of specialization provided each shall have different specialization.

Fields of specialization:

Forest Biology (Physiology, Botany, Dendrology, Ecology)
Forest Pathology
Forest Entomology
Forest Wildlife
Forest Soils
Silviculture/ Forest Biometry,
Forest Management Economics
Forest Policy, Laws Administration
Forest Engineering/Timber Harvesting
Forest Extension
Wood Science and Technology
Social Forestry
Watershed Management

Faculty-Student ratio of 1:20 using the full-time equivalent for teaching as basis should be the maximum.

2. Physical facilities and equipment

An institution should have physical facilities and equipment for instruction and research as follows:

a. Building requirements

1. School Building

The school building of forestry schools should conform to appropriate zoning and building regulations.

2. Laboratories

Laboratory units. Forestry institution should have the following laboratory units:

Physiology, Botany and Ecology
Soils/Silviculture
Wildlife
Pathology Fungal Collection
Entomology
Drafting room
Wood collection/Herbarium and wood testing machine
Wood physics and mechanics/ Forest Products Utilization
Multi-purpose teaching room
Meteorology
Computer

The laboratory space requirement are as follows:

- a) Floor space of 2.3 sq. m. per student
- b) A maximum of 30 students per laboratory class
- c) Minimum of the 30% of the total area of the room for circulation and walls

3. Classroom

The classroom requirement for forestry schools are as follows:

- a) Floor space of 1.5 sq.m. per student
- b) A maximum of 70 students per class
- c) Minimum of the 30% of the total area of the room for circulation and walls

b. Minimum laboratory equipment and facilities

1. Botany
2. Dendrology
3. Tree Physiology
4. Forest Entomology
5. Forest Pathology
6. Forest Wildlife
7. Silviculture
8. Watershed Management
9. Wood Science and Technology
10. Forest Resource management/Surveying Aerial Photo and GIS

11. Computers

c. Water and Power

An institution should have its own electric power especially if the source of electricity is far. A good source of water supply for a school is very essential.

d. School Forest

An institution should have at least 100 hectares of well-manage forest reserve for its own use for instruction and research and an access to a public forest, preferably representing various forest types. In addition, It should have its own forest nursery. It should also have access to a nearby sawmill

e. Library

An institution should have a well-maintained and well-stocked library (reference books, journals, magazines, school publications, bulletins, external publications, such as FAO, IUFRO, ITTO publication, monographs, etc.) with the latest information in forestry. It should have at least five copies each of standards reference in forestry.

f. Support services

1. Health services. There should be adequate health services (medical and dental) for student staff and their dependents.
2. Student Services There should be sufficient dormitory space, food services and recreational facilities whenever outside housing facilities are not available.

C. Organization

An educational institution offering a baccalaureate program in forestry must have the minimum number of faculty who specialized in different fields, physical facilities and equipment for instruction research and extension. Resources as well as sufficient funding for personal services and operating expenses must be provided in order for the school to carry out functions on instruction, research and extension effectively

D. Quality of Output

At least Sixty (60) percent of the school's yearly graduates must take the Board for Foresters License Examination, of which forty (40) percent must pass the examination.

BACHELOR OF SCIENCE IN FORESTRY
(Listing of Courses)

	Units
I. GENERAL EDUCATION	15
A. Language	9
1. English	
English I - Communication Skills	3
English II - Fundamentals of Speech	3
English III - Writing of Scientific Paper	3
2. Pilipino	6
Pilipino 1 - Sining Pakikipagtalastasan	3
Pilipino 2 - Pooklorikong Pilipino	3
B. Humanities	6
1. Humanities 1 - Introduction to Humanities	3
2. Humanities 2 - Philosophy and Ethics	3
C. Literature	3
1. Literature 1 - The Philippine Literature	3
D. Mathematics	9
1. Math 1 - College Algebra	3
2. Math 2 - Plane Trigonometry	3
3. Math 3 - Analytic Geometry and Calculus I	3
E. Natural Sciences	17
General Chemistry	5
Physics	3
General Botany	3
General Zoology	3
Computer Science (Introduction to Computer)	3
F. Social Science	12
Social Science I - General Psychology	3
Social Science II - Society and Culture	3
Social Science III - General Economics (with Taxation and Economic Reform)	3
Social Science IV - Principles of Government Politics and Constitution	3
G. Mandated Subjects	3
Life and Works of Rizal	3
H. Physical Education	8
TOTAL	73

II. FORESTRY TECHNICAL COURSES

BASIC BIOLOGICAL COURSES		15
Tree Morphology and Taxonomy	3	
Tree Physiology	3	
Forest (Protection) Pathology and Entomology	3	
Forest Ecology	3	
Forest Tree Genetics	3	
APPLIED BIOLOGICAL COURSES		12
Dendrology	3	
Silviculture I	3	
Silviculture II	3	
Forest Wildlife	3	
BASIC PHYSICAL COURSES		18
Forest Geology and Meteorology	3	
Forest Survey	3	
Structure and Identification of Vascular Plants	3	
Physics and Mechanics of Vascular Plants	3	
Chemistry of Forest Products	3	
Forest Statistics	3	
APPLIED PHYSICAL COURSES		9
Forest Biometry and Measurement	3	
Processing and Utilization of Forest Products	3	
Forest Infrastructure	3	
BASIC SOCIAL COURSES		6
Principles and Concepts of Social Forestry	3	
Forest Economics	3	
APPLIED SOCIAL COURSES		9
Forest Policy, Laws and Administration	3	
Rural Upland Community Development	3	
Forestry Business and Entrepreneurship	3	
FORESTST PRACTICUM/THESIS		6
INTEGRATIVE (Introduction to Forestry)	3	
ELECTIVES (Any of the following Center of Excellence areas)		9
1. Environment		
2. Forest Resource Management		
3. Agro Forestry/Social Forestry		
4. Forest Products Utilization, Processing and Marketing		
5. Forest Resource Policy and Advocacy		
	TOTAL	87
	TOTAL NUMBER OF UNITS	160
SUMMARY:		
General education Courses -	73	
Forestry Technical Courses -	87	
	<u>160</u>	

BACHELOR OF SCIENCE IN FORESTRY
(Sample Curriculum)

FIRST YEAR

First Semester

	<u>Lecture Hrs.</u>	<u>Lab. Hrs.</u>	<u>Units</u>
General Botany	2	3	3
English I, Communication Skills	3	0	3
Math I, College Algebra	3	0	3
Soc Sci I, General Psychology	3	0	3
Filipino I, Sining ng Pakikipagtalastasan	3	0	3
Introduction to Forestry	3	0	3
ROTC 11			(1.5)
P.E. 1			2
			<hr style="width: 10%; margin: 0 auto;"/> 20

Second Semester

	<u>Lecture Hrs.</u>	<u>Lab. Hrs.</u>	<u>Units</u>
General Zoology	2	3	3
English II, Fundamentals of Speech	3	0	3
Math II, Plane Trigonometry	3	0	3
General Chemistry	3	6	5
Forest Ecology	2	3	3
ROTC 12			(1.5)
P.E. 1			2
			<hr style="width: 10%; margin: 0 auto;"/> 19

SECOND YEAR

First Semester

	<u>Lecture Hrs.</u>	<u>Lab. Hrs.</u>	<u>Units</u>
Filipino II - Puklonkong Pilipino	3	0	3
Physics	2	3	3
Math III, Analytic Geometry and Calculus I	3	0	3
Philippine History	3	0	3
Tree Morphology and Taxonomy	2	3	3
Forest Geology and Meteorology	2	3	3
ROTC 21			(1.5)
P.E. I			2

			20

Second Semester

	<u>Lecture Hrs.</u>	<u>Lab. Hrs.</u>	<u>Units</u>
Social Science 2 - Sociology (Society and Culture)	3	0	3
Literature 1 - The Philippine Literature	3	0	3
Dendrology	4	6	3
Tree Physiology	2	3	3
Forest Survey	1	6	3
Forest Wildlife	2	3	3
ROTC 21			(1.5)
P.E. I			2

			20

THIRD YEAR

First Semester

	<u>Lecture Hrs.</u>	<u>Lab. Hrs.</u>	<u>Units</u>
Humanities 1 - Introduction to Humanities	3	0	3
Pilipino 3 - Mga piling Katha ng mga Mammulat na Pilipino	3	0	3
Structure and Identification of Vascular Plants	1	6	3
Forest Economics	3	0	3
Silviculture I	2	3	3
Forest Biometry and Mensuration	2	3	3
Forest Infrastructure	2	3	3

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Second Semester

	<u>Lecture Hrs.</u>	<u>Lab. Hrs.</u>	<u>Units</u>
English 3 - Writing of Scientific Paper	3	0	3
Literature 2 - Literature of the World	3	0	3
Computer Science (Introduction to Computer)	3	0	3
Forest Pathology and Entomology	2	3	3
Silviculture II	2	3	3
Physics and Mechanics of Vascular Plants	2	3	3
Forest Statistics	2	3	3

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Summer

Forestry Practicum/Thesis - 6 units

FOURTH YEAR

First Semester

	<u>Lecture Hrs.</u>	<u>Lab. Hrs.</u>	<u>Units</u>
Social Science 3 - General Economics (with Taxation and Economic Reform)	3	0	3
PI 100 - Life and Works of Rizal	3	0	3
Principles and Concepts of Social Forestry	2	3	3
Forest Policy, Laws and Administration	3	0	3
Forest Tree Genetics	2	3	3
Processing and Utilization of Forest Products	2	3	3
Elective			3
			<hr/> 21

Second Semester

	<u>Lecture Hrs.</u>	<u>Lab. Hrs.</u>	<u>Units</u>
Social Science 4 - Principles of Government Politics and Constitution	3	0	3
Humanities 2 - Philosophy and Ethics	3	0	3
Rural Upland Community Development	3	0	3
Forestry Business and Entrepreneurship	3	0	3
Chemistry of Forest Products			3
Elective			3
Elective			3
			<hr/> 21

unifying principles. Primarily for students who are not in the natural and engineering sciences

BOTANY I - INTRODUCTION TO PLANT SCIENCE. 3 units (2 lec., 3 lab.). 5 hours a week. Structure, functions, adaptation and phylogenetic relationships of plants.

GENERAL ZOOLOGY - 3 units (2 lec., 3 lab.). 5 hours a week. Biological principles as related to zoology; general life history; morphological characteristics; and relationship or representative of the more important animal phyla.

COMPUTER SCIENCE I - INTRODUCTION TO COMPUTER SCIENCE - 3 units, 3 hours a week (lec.). EDP fundamentals, word processing, spread sheets and data base reinforced by hands-on sessions.

F. Social Science - 12 units

SOCIAL SCIENCE I - GENERAL PSYCHOLOGY - 3 units, 3 hours a week (lec.) Contemporary approaches to analyses and treatment of complex human behavior. Focuses on man as he acts and interacts with his environment. Includes topics as nature and perception; learning, memory, intelligence, motivation, personality and social psychology in the Philippine setting.

SOCIAL SCIENCE II - SOCIOLOGY (SOCIETY AND CULTURE) - 3 units, 3 hours a week (lec.). An Introduction to the basic concepts of Sociology and Anthropology stressing man's inter-relationship with other men and also his environment; study of culture and social change.

SOCIAL SCIENCE III - GENERAL ECONOMICS (WITH TAXATION AND ECONOMIC REFORM) - 3 units, 3 hours a week (lec.). An Introduction to economic analysis with special application to the Philippines, including taxation and land reform.

SOCIAL SCIENCE IV - PRINCIPLES OF GOVERNMENT, POLITICS AND CONSTITUTION - 3 units, 3 hours a week (lec.). The principles and concepts of political science especially as they apply to the Philippines, the historical development of political institutions from pre-Spanish times to the present, special emphasis on the new constitution.

G. Mandated Subjects - 6 units

PHILIPPINE HISTORY AND INSTITUTION - 3 units, 3 hours a week (lec.). A comprehensive cultural, socio-economic and political history of the Philippines from the pre-Hispanic Period to present

DESCRIPTION OF FORESTRY TECHNICAL COURSES

A. Basic Biological Courses - 15 units

- TREE MORPHOLOGY AND TAXONOMY - 3 units, 5 hours a week (2lec., 3 lab). Structure and classification of woody and non-woody plants.
- TREE PHYSIOLOGY - 3 units, (2 lec., 3 lab). 5 hours a week. Nutrition, metabolism, growth and reproduction of trees.
- FOREST PATHOLOGY AND ENTOMOLOGY - 3 units, (2 lec., 3 lab). 5 hours a week. The common and important destructive agents of forest plants and forest products, their characteristics and management. Emphasis on integrated pest management.
- FOREST ECOLOGY - 3 units, (2 lec., 3 lab). 5 hours a week. Biological interaction of forest components, energy flow and trophic levels, principles of limiting factors and succession, forest dynamics and vegetational development with emphasis on tropical rain forests; the ecological impact of man.
- FOREST TREE GENETICS - 3 units, (2 lec., 3 lab) 5 hours a week. Mechanism of tree heredity and variation, cytogenetics, mutation, nature of genes, population genetics and evolution genetics, and biometrical procedures.

B. Applied Biological Courses - 12 units

- DENDROLOGY - 3 units, (1 lec., 6 field). 7 hours a week. Field study and identification of woody and non-woody plants.
- SILVICULTURE I - SILVICULTURAL SYSTEM (NATURAL) - 3 units, (2 lec., 3 lab). 5 hours a week. Silvicultural methods and their application in tropical forest units with emphasis on the forests of the Philippines
- SILVICULTURE II - FOREST NURSERIES AND PLANTATION - 3 units, (2 lec., 3 lab). 5 hours a week. Establishment and management of forest nurseries, plantation and agroforestry systems, tree establishment and tree improvement.
- FOREST WILDLIFE - 3 units, (2 lec., 3 lab). 5 hours a week. Survey of Philippine flora and fauna, biology and ecology of selected species.

C. Basic Physical Courses - 18 units

- FOREST GEOLOGY AND METEOROLOGY - 3 units, (2 lec., 3 lab). 5 hours a week. Geology; formation and development of land forms; physical, chemical and biological characteristics of forest soils, and climatic elements.
- FOREST SURVEY - 3 units, (1 lec., 6 lab). 7 hours a week. Techniques, instruments, procedures in planning and implementing forest surveys: analysis and presentation of data.
- STRUCTURE AND IDENTIFICATION OF VASCULAR PLANTS - 3 units, (1 lec., 6 lab). 7 hours a week. Identification of wood based on gross and microscopic structure.
- PHYSICS AND MECHANICS OF VASCULAR PLANTS - 3 units, (2 lec., 3 lab). 5 hours a week. Physical structure and properties of wood in relation to moisture, heat, sound, light, and electricity; mechanical properties of wood.

CHEMISTRY OF FOREST PRODUCTS - 3 units (2 class 3 lab) Chemistry of wood, pulping and paper-making principles; cellulose derived products

FOREST STATISTICS - Basic statistical concepts; frequency tables and distributions; sampling; average; test of significance; regression and correlation; introduction to analysis of variance and experimental designs.

D. Applied Physical Courses - 9 units

FOREST BIOMETRY AND MENSURATION - 3 units, (2 lec., 3 lab). 5 hours a week. Measurement of standing and felled timber and tree growth, forest sampling and timber inventory planning.

FOREST INFRASTRUCTURE - 3 units, (2 lec., 3 lab). 5 hours a week. Analysis of forest situation. Basic principles of forest infrastructures, design, planning, construction and improvement.

PROCESSING AND UTILIZATION OF FOREST PRODUCTS - 3 units, (2 lec., 3 lab). 5 hours a week. Veneer and plywood; pulp and paper; wood composition board and wood derivatives. Log and lumber manufacture and grading; utilization of non-timber plant products; seasoning and preservation. Poles and piling, railroad ties and mine timbers.

E. Basic Social Courses - 6 units

PRINCIPLES AND CONCEPTS OF SOCIAL FORESTRY - 3 units, (2 lec., 3 lab). 5 hours a week. Principles and concepts of social forestry, forestry extension and community organizing strategies, social impact assessment, participatory approach to research management.

FOREST ECONOMICS - 3 units, 3 hours a week. (lec). Economics of production, distribution and consumption of forest products and services.

F. Applied Social Courses - 9 units

FOREST POLICY, LAWS AND ADMINISTRATION - 3 units, 3 hours a week. (lec). Analysis of Philippine forest policies and laws, and administration of forestry institution.

RURAL UPLAND COMMUNITY DEVELOPMENT - 3 units, 3 hours a week. (lec). Theories, concepts, strategies and tools for the development of forest communities.

FORESTRY BUSINESS AND ENTREPRENEURSHIP - 3 units, 3 hours a week. (lec) An introduction to the field of forestry business and entrepreneurship with focus on management planning, directing and control of the enterprise.

G. Practicum/Thesis - 6 units

Forestry Practicum - 6 units. Supervised forestry field work.

H. Integrative - 3 units

INTRODUCTION TO FORESTRY - 3 units, 3 hours a week. (lec). 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.

1. Electives (Any of the following Center of Excellence areas) - 9 units

1. Environment

ENVIRONMENTAL IMPACT ASSESSMENT - 3 units, 5 hours a week. (2 lec 3 lab). Concepts of environmental impact assessment (EIA). Application of EIA in natural resource management projects with emphasis in forestry and upland development projects.

SUSTAINABLE DEVELOPMENT CONCEPTS - 3 units, 5 hours a week. (2 lec 3 lab). Concepts of sustainable development, Types and measurements, analysis and valuation of sustainability in natural resource management projects with emphasis in forestry, and upland and control over development project.

ENVIRONMENTAL PLANNING AND MANAGEMENT SYSTEMS - 3 units, 5 hours a week. (2 lec. 3 lab.) Principles and concepts of environmental planning and management; methodologies, indicators and operational issues on environmental planning and management.

NATURAL RESOURCES ACCOUNTING AND VALUATION - 3 units. Approaches and techniques for economic measurements and valuation of natural resources and environmental impacts and development.

2. Forest Resource Management

SOIL MANAGEMENT - 3 units. Soil deterioration and its control; maintenance and improvement of soil fertility and productivity.

WATERSHED MANAGEMENT - 3 units, 5 hours a week. (2 lec 3 lab). Regulation, use, conservation practices and treatment of the aggregate resources of a drainage basin for the production of water and the control of erosion, stream flow, and floods.

RANGE MANAGEMENT - 3 units, 5 hours a week. (2 lec 3 lab). Principles of range management range condition, classification and analysis, range ecology, improvement and management planning; identification of range pasture and forage plants.

TIMBER MANAGEMENT - 3 units, 5 hours a week. (2 lec 3 lab). Growth and yield analysis; regulatory methods; timber management planning.

WILDLIFE MANAGEMENT- 3 units, 5 hours a week. (2 lec 3 lab). Interrelationship of wildlife biology, habitat ecology, and population dynamics as they affect management problems.

MULTIPLE-USE SYSTEM - 3 units, 3 hours a week. (lec). The multiple use forestry principles; its technical and economic aspects

RESOURCE ECONOMICS - 3 units. Survey and analysis of the theory, methods and problems in resource economics.

3. Social Forestry

AGROFORESTRY SYSTEMS OF THE PHILIPPINES - 3 units, 4 hours a week. (2 lec 3 lab). Description and analysis of agroforestry systems in the Philippines.

TECHNIQUES OF SOCIAL SURVEYS - Methods and techniques in conducting social survey with emphasis on current challenges in social forestry.

TECHNOLOGY TRANSFER - 3 units, 3 hours a week. (lec). Theories and practices in extension education as applied to forestry; analysis of forestry extension programs in the Philippines.

TECHNIQUES OF COMMUNITY ORGANIZING - 3 units, 3 hours a week. (lec). Techniques, strategies and tools in organizing forest communities.

4. Forest Products Utilization

FOREST-BASED INDUSTRIES IN THE PHILIPPINES - 3 units, 3 hours a week. (lec). Nature, types, characteristics of forest-based industries in the Philippines; strategies to promote their development.

FURNITURE MANUFACTURE AND MANAGEMENT - 3 units. An introduction to the production/operation management function with emphasis on planning and controlling of resources in manufacture of furniture.

PRODUCTION PLANNING AND CONTROL - 3 units, 5 hours a week. (2 lec 3 lab). Planning of production requirements, routing, scheduling, dispatching and inspection; control of materials, methods, machines, tooling and operation times.

QUALITY CONTROL - 3 units, 5 hours a week. (2 lec 3 lab). Principles of statistical quality control and organization of quality control programs in the manufacture of wood products.

POLLUTION AND POLLUTION CONTROL - 3 units, 3 hours a week. (lec). Causes and control of pollution associated with the primary wood processing industries.

5. Forest Resource Policy and Advocacy

POLICY ISSUES - 3 units, 3 hours a week. (lec). Study of policies and institution involve in forest management and development in the Philippines

FOREST LAWS AND IMPLEMENTING RULES AND REGULATIONS - 3 units, 3 hours a week. (lec). Laws, rules and regulation, legal procedures and forestry administrative orders relative to the conservation and utilization of natural resources, especially forests.

FOREST ORGANIZATION AND ADMINISTRATION - 3 units, 3 hours a week. (lec). Principles and analysis of forest policy; introduction to management principles and managerial functions; analysis of public forestry administration with focus on Philippine condition.

MODELS IN FOREST ADMINISTRATION - 3 units. Survey and analysis of current forest administration systems; comparison of principles of operation, social condition and objectives

ECONOMICS OF FOREST POLICIES - 3 units. Economic aspects and significance of major forest policies with particular emphasis on Philippine forestry.

J. Forest Business

FORESTRY BUSINESS AND ENTERPRISE - 3 units, 3 hours a week. (lec). Economic and business concepts as applied to the establishment of small scale forest based enterprise

ECONOMIC AND FINANCIAL ANALYSIS - 3 units. Application of economic tools of analysis to the management of business enterprises.

FOREST PRODUCTS MARKETING - 3 units, 5 hours a week. (2 lec 3 lab). Forest products marketing, the structure of forest products' market, output and pricing policies and strategic trends

ESTABLISHING AND MANAGING OF FOREST BUSINESS - 3 units, 3 hours a week. (3 lec). Business management principles and their application to forestry.

FINANCIAL MANAGEMENT - 3 units. Introduction to the field of business finance with focus on principles and techniques of financial planning and decision-making.

MANAGERIAL ACCOUNTING - 3 units. Use and analysis of accounting and financial data for purpose of management planning; directing and control of the enterprise. Emphasis on cost analysis and control.

ADVANCE BUSINESS MANAGEMENT - 3 units. Principles and techniques of managing organizations; analysis of actual management problems and situation.

CASE STUDIES - 3 units. Case study of forestry business firms and enterprises.

BASIC LABORATORY AND FIELD EQUIPMENT AND FACILITIES
 Bachelor of Science in Forestry

HARD REQUIREMENTS:

<u>Equipment/Facilities</u>	<u>Quantity</u>
I. Botany	
1. Compound microscope	5 units/ class
II. Dendrology	
1. Herbarium cabinets	2
2. Pressers	4 sets
III. Tree Physiology	
1. Analytical balance	1
2. Bunsen burner	7
3. Hydrometer	1
4. pH meter	1
5. Screen house	1
6. Tool and equipment shed	1
IV. Forest Entomology	
1. Compound microscope	5 units/class
2. Insect box (pins, etc.)	5 sets/class
3. Stereo microscope	1
V. Forest Pathology	
1. Autoclave/pressure cooker	1
2. Compound microscope	5 units/ class
3. Dissecting Kit	5 sets/ class
4. Incubator	1
5. Isolation room	1
6. Oven / hot air sterilizer	1
7. Stereo microscope	5 units/ class
VI. Forest Wildlife	
1. Clippers	2
2. Dissection kit	1
3. Hatchet	2
4. Mesh net	2
VII. Silviculture	
1. Analytical balance	1
2. Budding knife	5
3. Light meter	1
4. pH meter	1
5. Pruning tools	5
6. Set of sieves	1
7. Shovel, spade, hoe	5
8. Soil analysis kit	1
9. Spring balance	1
10. Water sprinkler	2
11. Weighing scale	1

<u>Equipment/Facilities</u>	<u>Quantity</u>
VIII. Watershed Management	
A. Hydrometeorological instruments	
1. Cup anemometer	1
2. Evaporation pan	1
3. Psychrometer	1
4. Rain gauge	1
5. Sunshine recorder	1
6. Wind vane	1
B. Soil Analysis	
1. pH	1
2. Set of shovel, spade	5
3. Soil auger	1
4. Soil thermometer	1
IX. Wood Science	
1. Adjustable wrench	1
2. Buck saw	1
3. Drill press	1
4. Grinder	1
5. Hand lens	10
6. Hatchet brace	1
7. Hot plate	1
8. Hot press, 12' x 12"	1
9. Jack plane	1
10. Marking gauge	1
11. Microscope	1
12. Microtome	1
13. Paraffin oven	1
14. Power saw	1
15. Saw clump	2
16. Saw set	3
17. Set of complete carpenter's tool	3
18. Smooth plane	1
19. Spoke shave	1
20. Steel rule	4
21. Steel tape	4
22. Tension balance	1
23. Turning saw	1
24. Vernier calliper	2
25. Vises rapid-acting	1
26. Wood file	1
27. Wood lathe with complete accessories	1
28. Wood surfacer	1
29. Wood working equipment(hand saw, jointer, radial arm, saw, table saw)	1 set
30. Work bench 3' x 6'	3

Equipment/Facilities	Quantity
X. Forest Resources Management/ Surveying	
1. Abney hand level	5
2. Axe	2
3. Box compass	5
4. Cabinets	2
5. Cross-cut saw	1
6. Desk calculators/ pocket calculators	5
7. Diameter tapes	10
8. Drafting tables	2
9. Forestry transit	3
10. Hypsometer	1
11. Increment borer	5
12. Pantograph	1
13. Planimeter	2
14. Staff head compass	5
15. Steel tapes	5
16. Stereoscope (for arial photo interpretation)	2
17. Tree calipers	5

SOFT REQUIREMENTS:

I. Tree Physiology

1. BOD Cabinets	1
2. Experimental forest waste	1
3. Moisture chamber	1
4. Refrigerator	1
5. Set of glassware	1
6. Torsion balance	1

II. Forest Pathology

1. Air conditioner	1
2. hemacytometer	1
3. Set of glassware (i.e., petri dish)	1
4. Slaker	1

III. Forest Wildlife

1. Animal traps	2
2. Display and storage cabinets	2
3. Sleeping bag	2
4. Tent	1

IV. Silviculture

1. Air conditioner	1
2. Refrigerator	1
3. Seed blower	1
4. Seed dryer	1
5. Seed germinator	1
6. Seed moisture meter	1

V. Watershed Management

Hydrometeorological instruments

1. Current meter	1
2. Hygro Thermograph	1
3. Maximum thermometer	1

4. Pyranometer	1
5. Pyrheliometer	1
6. Rectangular weir	1
7. Staff gauge	1
8. Trapezoidal weir	1
9. Triangular (90) Weir	1
B. Soil Analysis	
1. Instrument shelter	1
2. Mercurial barometer	1
3. Permeometer	1
4. Tensiometer	1
VI. Wood Science	
1. Bomb calorimeter	1
2. Compressor	1
3. Distilling apparatus	2
4. Extraction apparatus	2
5. Finishing equipment (spray)	1
6. Hygrometer	1
7. Moisture meter	1
8. pH meter	1
9. Sander	1
10. Sling Psychrometer	1
11. Vacuum pump	1
VI. Forest Resources Management/ Surveying	
1. Air conditioner (for sensitive instruments)	1
2. Bow, saw	1
3. Camera	1
4. Cant hooks	5
5. Ladder	1
6. Miniature logging equipment	1
7. Over head projector	1
8. Planimeter	2
9. Power chain saw	1
10. Samples of assorted cable strands	1
11. Slide projectors	1
12. Stereoscope	1