

First Year (2nd semester)/Semester II

FMS 251: Forest Ecology and Tree Physiology

Course Number	Course Title	Credit (Th + Pr)
FMS 251	Forest Ecology and Tree Physiology	3 (3 + 0)

SCOPE

This course will cover fundamentals of forest ecology (interactions of organisms with each other and with their physical environment) and tree physiology (underlying mechanistic processes that determine how trees function). The course will enable students to enhance their knowledge to analyze its importance in the field of forestry and natural resources management.

OBJECTIVES

- Knowledge on fundamental ecological and physiological processes and their roles in regulating growth and development of forests.
- Exposure to methods to study ecological and physiological processes.
- Skills to apply their forest ecology and tree physiology knowledge to address contemporary issues in the fields of forestry and natural resources management.
- Acquire skills to apply knowledge to address climatic stress on forests

EXPECTED OUTCOMES

After completion of the course, students will be able to describe ecological and physiological process of forest quantitatively and demonstrate their roles in regulating growth and development of forests.

COURSE DESCRIPTION

UNIT 1. INTRODUCTION TO FOREST ECOLOGY (6)

- 1.1 Concept of forest ecology and forest ecosystem
- 1.2 Attributes of forest ecosystem (biodiversity, functions, and structure)
- 1.3 Documenting attributes of forest ecosystem

UNIT 2. AUTECOLOGY (POPULATION ECOLOGY) (7)

- 2.1 Concept of population
- 2.2 Characteristics of population
- 2.3 Major determinants of population size
- 2.4 Theories about the natural regulation of population size
- 2.5 Importance and application of autecology in forest management

UNIT 3. SYNECOLOGY (COMMUNITY ECOLOGY) (9)

- 3.1 Concept of community and its characteristics
- 3.2 Community diversity
- 3.3 Interactions between species in a community (both positive and negative interactions)
- 3.4 Importance and application of synecology in forest management
- 3.5 Quantitative analysis of tree diversity using plot survey

UNIT 4. INTRODUCTION TO TREE PHYSIOLOGY (6)

- 4.1 Concept of tree physiology

- 4.2 Principles of tree physiology
- 4.3 Structure of tree
- 4.4 External structure (vegetative structure: leaves, stems and roots and reproductive: flowers, fruits/cones and seeds)
- 4.5 Internal structure (cell)

UNIT 5. TREE GROWTH AND DEVELOPMENT (10)

- 5.1 Concept of tree growth and development
- 5.2 Vegetative growth and reproductive growth
- 5.3 Major physiological processes related tree growth and development
- 5.4 Photosynthesis (definition, significance, mechanism of respiration, factors affecting respiration)
- 5.5 Respiration (definition, significance, mechanism of respiration, factors affecting respiration)
- 5.6 Transpiration (definition, significance, mechanism of transpiration, factors affecting transpiration)
- 5.7 Anatomical study of radial tree growth

UNIT 6. ROLE OF TREE PHYSIOLOGY IN FORESTRY (7)

- 6.1 Mineral nutrition (forest fertilization and soil treatment)
- 6.2 Seed physiology (seed viability and dormancy)
- 6.3 Plant growth regulators (growth promotion, weed control and vegetative propagation)
- 6.4 Cell physiology (tissue culture)
- 6.5 Photoperiodism and vernalization (off season flowering)
- 6.6 Stress physiology (resistance to stress such as drought, cold, heat, acidity and basicity)
- 6.7 Measurement of rate transpiration
- 6.8 Factors affecting photosynthesis

REFERENCES

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2. Bell, F. W., Kershaw, M., Aubin, I., Thiffault, N., Dacosta, J., & Wiensczyk, A. (2011). Ecology and traits of plant species that compete with boreal and temperate forest conifers: An overview of available information and its use in forest management in Canada. *Forestry Chronicle*, 87(2), 161–174.
3. Bhatta, S. P., & Devkota, A. (2020). Community structure and regeneration status of Sal (*Shorea robusta* Gaertn.) forests of Dadeldhura district, Western Nepal. *Community Ecology*, 21(2), 191–201.
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11. Osakabe, Y., Osakabe, K., Shinozaki, K., & Tran, L. P. (2014). Response of plant to water stress. *Frontiers in Plant Science*, 5(Mar), 1-8.
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FPU 252: Forest Surveying and Engineering

Course Number	Course Title	Credit (Th + Pr.)
FPU 252	Forest Surveying and Engineering	3 (2 + 1)

SCOPE

This course covers basic surveying principles, methods, and error associated with measurements and makes students to produce a plan/map of the forest land and other land uses. It ensures knowledge on basic engineering of forest road design and construction and associated soil stabilization/erosion control / drainage measures. The teaching style of the course will include a combination of classroom learning, lab class and field.

OBJECTIVES

- Understand principle/methods/types of surveying
- Able to decide appropriate surveying methods to suit the requirement.
- Prepare the map and derive the forest and land use area information from it.
- Know basic elements of building construction and forest road & associated roadside erosion measures and drainage measures.
- Calculate estimate cost of small-scale conservation structures and building elements.

EXPECTED OUTCOMES

Upon the completion of the course, students will be able to prepare different maps for forest and NRM planning and management, demarcate and/or check boundary, identify & rectify encroachment area, and compute estimate cost of engineering works.

COURSE DESCRIPTION

UNIT 1. FUNDAMENTAL ON SURVEYING AND MEASUREMENT ERRORS (6)

- 1.1 Definition of surveying, historical background, objectives of surveying, principles of surveying, classification of surveying, methods of surveying, measurements units, map scales, methods of presenting the scales in different ways and shrunk scale, map reading, work of a surveyor, Sources of errors, kinds of errors, propagation of errors, precision and accuracy, permissible error
- 1.2 Linear measurement and associated error & corrections: methods of linear measurement, equipment for chaining, ranging - direct, indirect, chaining/taping on plain ground and sloping ground, numerical based on slope distance, linear measurement through obstacles, corrections for distance measurement with numerical (standardization, slope, temperature, sag, pull), common mistakes& errors in chaining, suggestions for good chaining/taping, degree of accuracy in chaining, basic principles of linear surveying, survey stations, base line, tie line, check line , importance of survey stations and stations marking, ranging, chain survey field book; offsets, plotting of details and preparing plan, error in chain survey and their effects

UNIT 2. ANGULAR MEASUREMENTS (6)

- 2.1. Compass Surveying: meridians and bearings, magnetic bearing, magnetic variation and magnetic declination, numerical related with bearings and declination, types of compass–prismatic

compass and surveyor's compass, compass error, error due to local attraction and adjustments, compass traverse, computation and adjustment, compass surveying field procedures, plotting of compass survey, field work and preparing map

2.2. Angular measurements: theodolite surveying (horizontal, zenithal/vertical angle, angular units of measurement, angular measurements by theodolite, check on the angles of closed geometrical figures, calculations of bearings from included angles with numerical, sources of errors in theodolite work, introduction of total station and its advantages over the theodolite)

UNIT 3. LEVELING (6)

3.1. Basic terms in leveling - horizontal plane, horizontal line, level surface, level line, vertical plane, vertical line, reference points- bench marks (BM), HI, BS, FS, IS, TP, elevation, datum, MSL, RL etc., level machine and staff and their types, principle of direct leveling (spirit leveling), differential levelling, booking and reducing levels, balancing back sights and foresights, effect of curvature and refraction, profile and cross section leveling, errors and degree of precision in leveling.

3.2. Tacheometry surveying and contouring: definition, introduction to stadia, principles of stadia method, distance and elevation formula derivation for staff vertical and related numerical, the anallatic lens, contour, contour interval, factors affecting contour interval, horizontal equivalent and characteristics of the contour, methods of locating the contours, uses of the contour maps

UNIT 4. TRAVERSING AND COMPUTATION (4)

4.1 Traversing (definition & types), methods of traversing (compass, theodolite), computation and plotting a traverse, co-ordinate method in detail (latitude and departure method)

4.2. Area and volume estimation: Methods of area estimation (subdividing in triangles, coordinate method, trapezoidal and Simpsons' rule, planimeter), methods of volume estimation (spot leveling formula)

UNIT 5. BUILDING ELEMENTS AND CONSTRUCTION MATERIALS (6)

5.1 Building components: definition and types (walls, doors, windows, lintels, roofs, beam, column, foundation, water supply & sanitation systems and electrical system), site selection criteria and orientation of a building, introduction to construction materials (masonry, mortar, PCC, RCC, pointing, plastering, scaffolding, shuttering)

5.2. Forest roads and allied works: Introduction and necessity of forest roads, types of forest road pavement (earthen, graveled, WBM road), forest road alignment and survey, geometric design of road, factors of the geometric design, cross-section of road in cutting and filling, camber, super elevation (Cant), extra widening, sight distance, gradient, curves (types- horizontal, vertical and transition), road sub grade soil and its significance, soil compaction, moisture content, dry density and soil strength at OMC, special consideration of hill roads (a typical cross section of hill road showing all components of the road), failure and maintenance of road, stabilization of road pavement, bridges, culvert and causeway: definition, importance, types, selection of bridge sites, road drainage, types and its importance, retaining walls and breast walls

UNIT 6. QUANTITY AND COST ESTIMATION (2)

6.1 Estimating & costing: types, norms, specification, district rate, rate analysis, understanding engineering drawing (plan, elevation, section, isometric view) and its importance in estimating, estimating and costing for two roomed forest guard houses, estimating earthwork for forest roads/trails and side drains

PRACTICAL/EXERSION (15)

1. Familiarization of surveying equipment and map reading
2. Leaner measurement
3. Handling of theodolite (horizontal/vertical angle measurement)
4. Leveling (differential, profile and cross sectioning)
5. GPS surveying
6. Estimating and costing

REFERENCES

1. B.C. Punmia and Jain A.K. 2016. Surveying – Vol. 1, Laxmi Publications, India
2. Jack C. McCormack, 2003: Surveying/ Edition 5 – USA
3. S. Kumar, 2010. Building construction –, India
4. Khanna, S.K. & Justo, C.E.G. 2018. Highway Engineering –, India
5. N.J. Masani, 2006. Forest Engineering without tears –, India
6. Dutta, B. N. 2017. Estimating and Costing in Civil Engineering, 25th Edition,

Details of practical

S.N.	Topics and learning objective	Tools/equipment	Methods	Lecture hours	Link to the course unit
1	<p>Familiarization with practical work and map reading:</p> <p>The learning objectives are;</p> <ul style="list-style-type: none"> • Make realize the link between theory and practical class. • Aware on rules and regulation of the lab and their roles and responsivity. • Familiarize with the equipment to be used throughout the practical classes • Train on basic (size, scale, legend, orientation, lettering, etc.) of a map. • Make realize on importance of graphical scale and shrunk scale 	Lab rules/ surveying equipment/ drawing tools/ maps/ practical reports and plan/map produced by former students	Lecture, demonstration and tutorial class for practice on numerical related to shrunk scale	3	Unit 1 to 6
2	Linear measurement in plain and sloping	Chaining	Field work	3	Unit 1.2

	<p>ground: The learning objectives are;</p> <ul style="list-style-type: none"> • Provide the concept of direct ranging/indirect ranging • Perform chaining on plain and sloping ground • Learn to drop and erect perpendicular in the ground • Determine distance across obstacle • Compute corrections related to distance measurement 	<p>equipment, line ranger, cross staff, abney level etc.</p>	<p>and tutorial class for practice on numerical related to linear measurement</p>		
3	<p>Measurement of bearing by compass and angles by theodolite: The learning objectives are;</p> <ul style="list-style-type: none"> • Familiarize with different parts of the compass and theodolite. • Measure horizontal and vertical angles by a theodolite • Use compass to read both WCB and RB • Convert bearing to angle and vice versa through numerical examples • Eliminate local attraction through numerical examples • Perform compass traversing • Plot compass traverse by angle and distance method and traverse adjustment 	<p>Compass, theodolite, tripod, ranging rod, chaining equipment, field notes on bearing measurements, calculator</p>	<p>Demonstration, field work and tutorial</p>	3	2.1, 2.2 and 4.2
4	<p>Measurement of elevation: The learning objectives are;</p> <ul style="list-style-type: none"> • Familiarize with level machine and staffs reading • Perform differential leveling • Determine the leveling error • Learn strategy for simultaneous profile and cross section leveling • Plot profile and cross section leveling 	<p>Level machine, staff, field note, calculator, graph paper</p>	<p>Field works and tutorial class for office work.</p>	3	3.1
5	<p>Field measurements and plotting of small area contour map: The learning objectives are;</p> <ul style="list-style-type: none"> • Determine horizontal distance and elevation of points through tacheometry observation. • Establish traverse for horizontal control for contour locating • Measure horizontal and vertical control 	<p>Theodolite, tripod, ranging rods, tape, field book, calculator, drawing paper etc.</p>	<p>Field work, tutorial class for office work</p>	3	3.2, 4.1 and 4.2

	<p>of the guide points for contour map.</p> <ul style="list-style-type: none"> • Understand coordinate method of plotting • Learn interpolation of contour • Draw contour lines. 				
6	<p>Practice engineering drawing and cost estimation: The learning objectives are;</p> <ul style="list-style-type: none"> • Understand basics (isometric view, plan, elevation, sections) of engineering drawings and relate it with actual element • Draw plan, elevation and sections required for estimating purpose of simple buildings • Understand types of cost estimation and processes • Identify requirements for accurate cost estimation 	<p>Drawings, photos, specification, district rate, norms, calculator, set of project assignments</p>	<p>Lab work</p>	<p>3</p>	<p>5.1, 5.2 and 6.1</p>

Total 18

FMS 253: Introductory Silviculture and Dendrology

Course Number	Course Title	Credit (Th + Pr.)
FMS 253	Introductory Silviculture and Dendrology	3 (3 + 0)

SCOPE

The course introduces principles of general silviculture, silviculture system and dendrology. It further develops knowledge of locality factors, regeneration method, silvicultural treatments and silviculture characteristics of some important tree species of Nepal. After the completion of this course student will be able to advice appropriate silviculture techniques required for ecosystem based forest management in Nepal.

OBJECTIVES

- Learn about basic concept and terminology of silviculture
- Understand locality factors, site productivity, succession and deadwood in relation to climate change
- Understand the basic concept of dendrology.
- Learn about regeneration and appropriate silvicultural treatment for different forest types.
- Gain a basic silvicultural and ecological understanding of some important forest species of Nepal.

EXPECTED OUTCOMES

On completion of the course, the students will be able to understand the silviculture as an applied science and an art of caring of a forest *stand*; be able to apply the principle and practices of silvicultural knowledge on regeneration, succession, productivity and recommend the silvicultural techniques in improving the forest management practices.

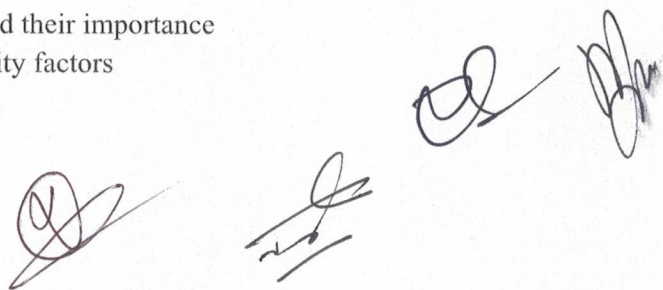
COURSE DESCRIPTION

UNIT 1: CONCEPT OF SILVICULTURE (6)

- 1.1 Introduction to silviculture and silvics (definition, objective and importance)
- 1.2 Relation of silviculture with forestry and its branches
- 1.3 Natural forests (Primary, Secondary), Forest plantation/Planted forests, and Forest nursery techniques.
- 1.4 Deadwood and its role in forest ecosystem
- 1.5 Climate change impact on forests

UNIT 2: LOCALITY FACTORS AND PLANT SUCCESSION (10)

- 2.1 Locality factors
 - 2.1.1 Definition of locality factors and their importance
 - 2.1.2 Classification of different locality factors
 - Climatic factors
 - Topographical factors
 - Edaphic factors
 - Biotic factors
- 2.2 Plant succession
 - 2.2.1 Concept of plant succession



2.2.2 Kinds of succession (Primary, Secondary)

2.2.3 Causes of succession

2.2.4 Concept of climax

UNIT 3: DENDROLOGY (9)

3.1 Introduction (scope and important)

3.2 Relationship of dendrology with Plant Taxonomy and Silviculture

3.3 Principles and systems of plant classification systems

• Bentham and Hooker natural system, its advantages and disadvantages.

3.4 Plant Nomenclature—objectives, principles and International Code of Botanical Nomenclature.

3.5 Wood anatomy and dendrology, basic tools to identify tree species with wood structure (conifers, broadleaved trees, and lianas)

UNIT 4: REGENERATION AND SILVICULTURAL TREATMENT (10)

4.1 Natural Regeneration

4.1.1 Natural regeneration from seed

4.1.2 Natural regeneration from root suckers and coppice

4.2 Artificial regeneration

4.2.1 Regeneration from seed

4.2.2 Regeneration from vegetative parts

4.3 Release operations (weeding & cleaning, liberation cutting, use of herbicides)

4.4 Pruning and lopping (type and effects)

4.5 Thinning (basis, types, effects of thinning, regulation of thinning)

4.6 Improvement cuttings (T.S.I.)

4.7 Salvage and sanitation cutting

4.8 Effects of prescribed burning and fire on regeneration

UNIT 5 : SILVICULTURE OF SOME MAJOR TREE SPECIES (10)

5.1 Terai and Inner Terai: Sal, Asna, Karma, Khair, Sissoo, Poplar, Teak, Eucalyptus

5.2 Mid hill and mid mountain: Katus, Chilaune, Utis, Chir Pine, Oak,

5.3 High mountain and trans Himalaya: Blue pine, Hemlock, Spruce Fir, Deodar, Yew, Birch

5.4 Silviculture of selected native tree species (timber), selected non- native tree species (timber, fiber, pulp), and selected fodder tree species

REFERENCES

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3. DOF 2004. A handbook of Silviculture Management of Community Forestry. NARMSAP Project, Dept. of Forest, Kathmandu.
4. Dwivedi, A.P. 2002. A text book of Silviculture. International Book Distributors, India.
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6. Jackson, J.K., 1994. Manual of Afforestation in Nepal, Volume 2. Forest Research and Survey Centre, Ministry of Forests and Soil Conservation, Kathmandu, Nepal
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10. Mishra, S.R. 2011. Textbook of Dendrology. Discovery publishing house.
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12. Prakash R., and Khanna, L.S. 2013. Theory and Practice of Indian Silvicultural system. International Book Distributors, Dehradun, India.
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WEM 254 Agroforestry

Course Number	Course Title	Credit (Th + Pr.)
WEM 254	Agroforestry	3 (3 + 0)

SCOPE

This course will cover concept, principle and classification of agroforestry and its systems. It will enable students to enhance their understanding in the concept of intercropping and tree crop interface and its management practices. The teaching style of this course will include combination of classroom learning and field excursion.

OBJECTIVES

- Understand the concept and principle of agroforestry and its classification
- Understand the concept of intercropping and tree crop interface
- Design agroforestry system based on location and site condition
- Develop skill in agroforestry management and practices
- Know about the soil productivity aspects of agroforestry
- Make economic assessment of agroforestry system and develop plan for enterprise development

EXPECTED OUTCOMES

Upon the completion of this course, students will be able to develop skills of agroforestry land use including diagnosis and methodologies and enterprise development.

COURSE DESCRIPTION

UNIT 1. INTRODUCTION TO AGROFOREST (7)

- 1.1 Concept, definition and principle of agroforestry
- 1.2 Origin of agroforestry
- 1.3 Benefits from agroforestry (environmental/biological, social and economic)
- 1.4 Components of agroforestry and their interaction
- 1.5 Limitations of agroforestry (environmental and socio-economic aspects)

UNIT 2. DESCRIPTIONS & CLASSIFICATIONS OF AGROFORESTRY SYSTEMS (9)

- 2.1 Purpose and Criteria for Classification
- 2.2 Structural basis for Classification
 - 2.2.1 Nature of Components, Agri-Silviculture, Horti-Silviculture, Silvi-Pasture, Agri-Horti-Silviculture and Aqua Silviculture
 - 2.2.2 Arrangement of Components Spatial and Temporal Arrangements
- 2.3 Functional classification of Agroforestry Systems
 - 2.3.1 Productive Function
 - 2.3.2 Protective Function
- 2.4 Socioeconomic Classification of Agroforestry Systems
- 2.5 Ecological Classification of Agroforestry Systems

UNIT. 3. SOIL PRODUCTIVITY ASPECTS OF AGROFORESTRY (10)

- 3.1 Systems for improving Soil Productivity and Land Suitability
 - 3.1.1 Trees for Soil Conservation

- 3.1.2 Cropping Systems, Rain fed based Agriculture
- 3.2 Soil stabilization with the use of Multistory Cropping
 - 3.2.1 Suitable Agroforestry species (herb, shrub and trees) for multistory cropping
 - 3.2.2 Applied Multistory Cropping technology
- 3.3 Soil fertility improvement with green manuring tree crops
 - 3.3.1 Suitable tree species for use of green manure
 - 3.3.2 Permanent intercropping with N-Fixing trees
 - 3.3.2 Green manuring with N-Fixing Agroforestry Species
- 3.4 Tree Crop Interaction and Interface relationship
 - 3.4.1 Symbiotic relationship
 - 3.4.2 Allopathic relationship
 - 3.4.3 Aboveground relationship
 - 3.4.4 Underground relationship

UNIT 4. AGROFORESTRY MANAGEMENT AND PRACTICES (9)

- 4.1 Farming system in Nepal and inter-linkage with Forestry
- 4.2 Plantation Crops under Shade of Trees Tea, Coffee, Cardamom and others
- 4.3 Shifting Cultivation
- 4.4 Hedgerow Cultivation
- 4.5 Alley Cropping
- 4.6 Taungya System
- 4.7 Agroforestry Program Options
 - 4.7.1 Farm Forestry
 - 4.7.2 Agroforestry within Community Forestry
 - 4.7.3 Agroforestry in Leasehold Forestry
 - 4.7.4 Woodlots in block plantation
 - 4.7.5 Biochar production from invasive tree and shrub species

UNIT 5. AGROFORESTRY DIAGNOSIS AND DESIGN (D & D) (6)

- 5.1 Criteria of good Agroforestry Design
 - 5.1.1 Productivity
 - 5.1.2 Sustainability
 - 5.1.3 Adoptability
- 5.2 A diagnostic Approach to Agroforestry Design
- 5.3 Basic D & D procedures for project planning and implementation

UNIT 6. ECONOMIC ASPECTS OF AGROFORESTRY (4)

- 6.1 Enterprise development through agroforestry
- 6.2 Cost Benefits Analysis of Agroforestry system
- 6.3 Improvement of Farm Income through agroforestry gardening

FIELD EXCURSION

At least one excursion visits to three nearby agroforestry farm, agro-based enterprise and research trial plots. Students are required to prepare and submit field tour report.

REFERENCES

1. Amatya S.M., Cedamon E., Nuberg I. 2018. AGROFORESTRY SYSTEMS AND PRACTICES IN NEPAL-Revised Edition, Agriculture and Forestry University, Rampur, Nepal, 108pp + xviii

2. Chundawat, B.S., and Gautam, S.K.(2010). Text book of Agroforestry. Oxford and IBH Publishing Company Pvt. Ltd. New Delhi.
3. Dwivedi, AP. 2019. Agroforestry Principle and Practices. Oxford & IBH Publishing.
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FOU 255 Introduction to NTFPs and Herbal Sciences

Course Number	Course Title	Credit (Th + Pr.)
FPU 255	Introduction to NTFPs and Herbal Sciences	3 (2 + 1)

SCOPE

This course will cover introduction, methods of collection, management, and utilization of major Non-Timber Forest Products (NTFP) and Medicinal and Aromatic Plants (MAPs) in the region in general and in Nepal in particular. It will also cover plant protection, harvesting, processing and economics of major MAPs. The teaching style of the course will include combination of classroom learning and field.

OBJECTIVES

- Understand the importance and scope of NTFPs and MAPs.
- Understand the economic and livelihood-oriented collection, cultivation, harvesting and processing of NTFPs.
- Understand the particular livelihood and economic importance of medicinal and aromatic plants.
- Criteria for selection and uses of NTFPs and MAPs.
- Understand the science and importance of sustainable harvesting and value adding processing and marketing.

EXPECTED OUTCOMES

After completion of course, students will be able to identify, assess and estimate the importance NTFPs and MAPs. In addition, they will be able to demonstrate processing and value addition.

COURSE DESCRIPTION

UNIT 1. INTRODUCTION OF NTFPs/MAPs AND LIVELIHOOD (6)

- 1.1 Introduction of major NTFPs and MAPs in Nepal
- 1.2 Livelihood, health and economic importance and scope of NTFPs and MAPs in Nepal's development
- 1.3 Major categories and types of NTFPs and MAPs (Classification of NTFPs)
- 1.4 Employment generation and income earning practices and opportunities
- 1.5 cultural, religious and spiritual values of NTFPs and MAPs

UNIT 2. NTFPS, MAPS AND THEIR COMMERICAL VALUE (7)

- 2.1 Importance and scope
- 2.2 Classification of MAPs
- 2.3 Nursery raising and cultivation methods of important MAPs
- 2.4 Collection, extraction and processing of MAPs
- 2.5 Commercially traded MAPs, NTFPs (bamboo, cardamom, Lokta, argheli, and katha, Wild honey, silk, mushroom, Tans and natural dyes)
- 2.6 Leaf, fiber, flosses, oil seed and aromatic oil

UNIT 3. ASSESSMENT AND HARVESTING OF NTFPS (6)

- 3.1 Methods of assessing the volume and production of NTFPs and MAPs
- 3.2 Sampling and measurement techniques

- 3.3 Estimation of production and assessment of sustainable harvesting NTFPs and MAPs
- 3.4 Traditional harvesting practices of major NTFPs and MAPs
- 3.5 Sustainable harvesting methods and challenges
- 3.6 Post harvesting management techniques

UNIT 4. NTFP/MAP CULTIVATION AND PROCESSING (5)

- 4.1 Importance of cultivation of NTFPs and MAPs
- 4.2 Cultivation, production, harvesting and processing techniques
- 4.3 Manufacturing process of NTFP/MAP products for marketing
- 4.4 Quality Control of NTFP/MAP products
- 4.5 Household and industrial Uses of NTFP/MAP product
- 4.6 Good Manufacturing Practices (GMP) for NTFPs/MAPs

UNIT 5. NTFP/MAP BASED /VALUE CHAIN AND ENTERPRISES DEVELOPMENT (3)

- 5.1 Definition of supply/value chain
- 5.2 Types of supply and value chains
- 5.3 Introduction to NTFP/MAP enterprise development

UNIT 6 MARKETING OF NTFPs/MAPs (3)

- 6.1 Importance of Marketing in NTFP/MAPs
- 6.2 Marketing of raw materials and processed products
- 6.3 Marketing channels (local, regional and international)
- 6.4 Problem and prospect of NTFP/MAP marketing in Nepal

PRACTICALS (8)

1. Collection and Identification of economically important NTFP/MAP species
2. Assessment and biomass estimation of NTFPs
3. Interaction with local traditional healers and traders (guruwa, kabiraj/Baidya and amchi)
4. Market survey of NTFPs
5. Value addition processing exercise (Drying, cleaning, storing etc.)
6. Concept of business plan and its preparation

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10. Shiva, M.P. and Mathur R.B. 1996. Management of Minor Forest Produce for Sustainability; Centre of Minor Forest Products, Dehradun, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

FMS 256: Field Study: Forest Management Models

Course Number	Course Title	Credit (Th + Pr.)
FMS 256	Field Study II: Forest Management Models	1 (0 + 1)

SCOPE

This field study course is designed to expose students with the opportunity to observe and interact with the real field situation. The field covers different forest managements practices such as community managed forests, and government managed forests and examines the local institutions and forest condition and their impacts on the daily life of forest dependent people. The class exercise is limited to critical observations, de-briefing, and field report.

OBJECTIVES

- Understand the concept of forest management
- Familiarizations with the working environment
- Gain knowledge and skills to interact with people
- Familiarizations of different forest management practices
- Develop skills in differentiating the needs of forest resources of different stakeholders

EXPECTED OUTCOMES

Upon completion of the field work, students will be able to understand the social context and suggest an appropriate management practice for a particular forest considering the demand supply situations.

COURSE DESCRIPTION

Students will be planned for one-week in the real work field situation. They are allowed to observe different forest management practices such as community managed forests, and government managed forests in different parts of Nepal selecting the area either from one-province or more, depending on the accessibility. Students are encouraged to interact with local people and forestry professionals to identify issues and challenges they are facing while managing forest resources. At the same time, they will be asked to estimate the demand of forest resources and their supply from the managed forests.

Note: Field schedule should be arranged as per convenience.

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1. FAO, 2013. Multiple Use Forest Management in the Humid Tropics, FAO Forestry Paper 173, Rome
2. DFRS, 2015. State of Nepal's Forests. Forest Resource Assessment (FRA) Nepal, Department of Forest Research and Survey (DFRS). Kathmandu, Nepal.
3. MFSC 2017. Scientific Forest Management Guideline 2071, Ministry of Forest and Soil Conservation, Government of Nepal.
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