

PROPOSED CURRICULLA

For

MASTER LEVEL

In

Tribhuvan University

INSTITUTE OF FORESTRY

(Conducting on March 3-5, 2010 at Kathmandu)

M.Sc. Forestry

S.No.	Course Code	Course Title		Credit hrs.
1st yr 1st Sem				
1.	SFB 701	Silviculture		2
2.	SFM 702	Sustainable Forest Management and Certification		3
3.	PWM 703	Biodiversity Conservation and Protected Area Management		2
4.	SFB 704	Advance Silviculture		2
5.	SFM 705	Forest Mensuration (Proposed 'Forest Biometrics' with growth modeling)		2
6.	SFM 707	Natural Resource Economics		2
1st yr 2nd sem				
7.	WME 706	Watershed Management		3
8.	SFM 708	Community Forestry and Governance		2
9.	WME 806	GIS and Remote Sensing		3
10.	FPE 710	Non-timber Forest Products (NTFPs)		3
2nd yr 1st Sem				
11.	WME 801	Global Environmental Change	Any two	2
12.	FPE 802	Bio-energy		2
13.	PWM 715	Eco-tourism		2
14.	SFM 805	Research Methodology and Participatory Action Research		3
15.	SFB 709	Agroforestry		3
16.	R&T 849	Research Proposal Seminar		2
2nd yr 2nd sem.				
17.	R&T 850	Research and Thesis		10
18.	R&T 851	Thesis Seminar		1

M.Sc. Watershed

S.No.	Course Code	Course Title	Credit hrs.
1st yr 1st Sem			
1.	SFB 701	Silviculture	2
2.	SFM 702	Sustainable Forest Management and Certification	3
3.	SFM 707	Natural Resource Economics	2
4.	SFM 712	Micro-finance and Enterprises Development	1
5.	SFM 713	Social and Cultural Issues	2
6.	SFB 704	Advance Silviculture	3
1st yr 2nd sem			
7.	WME 706	Watershed Management	3
8.	WME 909	Soil Genesis and Geomorphology	2
9.	WME 710	Watershed Hydrology/Hydrological issues in Watershed	2
10.	FPE 710	Non-Timber Forest Product	3
2nd yr 1st Sem			
11.	WME 711	Land Evaluation and Land Use Planning	2
12.	SFM 805	Research Methodology and Participatory Action Research	3
13.	SFB 709	Agroforestry	3
14.	WME 707	Soil Conservation Engineering & Rehabilitation	2
15.	WME 708	Global Environmental Change	2
16.	R&T 849	Research Proposal Seminar	2
2nd yr 2nd sem.			
17.	R&T 850	Research and Thesis	10
18.	R&T 851	Thesis Seminar	1

Policy, Governance and Conflict Mgmt.

M.Sc. NRMRD

S.No.	Course Code	Course Title		Credit hrs.
1st yr 1st Sem				
1.	SFB 701	Silviculture		2
2.	SFB 702	Sustainable Forest Management and Certification		3
3.	SFM 704	Advance Silviculture		2
4.	SFM 707	Natural Resource Economics		2
5.	SFM 712	Micro-finance and Enterprises Development		1
6.	SFM 713	Social and Cultural Issues		2
1st yr 2nd sem				
7.	WME 806	GIS and Remote Sensing		3
8.	FPE 710	Non-Timber Forest Product		3
9.	SFM 720	Rural Development		3
10.	SFM 721	Conservation and Rural Development		2
11.	SFM	Policy, Governance and Conflict Management	Not developed	2
2nd yr 1st Sem				
12.	SFM 805	Research Methodology and Participatory Action Research		3
13.	SFM 722	Project Management		2
14.	WME 708	Global Environmental Change		2
15.	SFB 709	Agroforestry		3
16.	R&T 849	Research Proposal Seminar		2
2nd yr 2nd sem.				
17.	R&T 850	Research and Thesis		10
18.	R&T 851	Thesis Seminar		1

Course Code : SFM 705

Course Title : **Forest Mensuration**

Credit hour : 2

Lecture hours: Theory 40

Practical 10

UNIT 1. VOLUME AND BIOMASS OF TREES AND PRODUCTS

- 1.1 Measuring Single Tree and Stand
- 1.2 Preparation of local and general volume tables (Regression technique)
- 1.3 Preparation of merchantable volume table
- 1.4 Biomass table and equations

UNIT 2. GROWTH PREDICTION

- 2.1 Diameter, Basal area and volume growth
- 2.2 Stand growth
- 2.3 CAI, MAI
- 2.4 Stand structure, site quality, and yield
- 2.5 Stem and stump analysis

UNIT 3. GROWTH AND YIELD

- 3.1 Growth and yield of even-aged forest
- 3.2 Growth and yield of uneven-aged forest
- 3.3 Different growth and yield modelling approaches (Distance independent Growth Models, Single tree distance Dependent Growth Models)
 - 3.3.1 Stand table projection
 - 3.3.2 Whole stand modelling
 - 3.3.3 Individual tree modelling
- 3.4 Application of growth and yield models
- 3.5 Yield table

UNIT 4. FOREST SAMPLING

- 4.1 Principles and theory of sampling
 - 4.1.1 Sampling techniques
 - 4.1.2 Selection of sampling units
 - 4.1.3 The theory and application of sampling
- 4.2 Types of Sampling
 - 4.2.1 Simple random designs
 - 4.2.2 One stage sampling
 - 4.2.3 Unrestricted sampling design
 - 4.2.4 The direct estimation and Stratified Random and Systematic Designs
 - 4.2.5 Cluster sampling design
 - 4.2.6 Double or low phase sampling
 - 4.2.7 Systematic Sampling design

UNIT 5. INVENTORY

- 5.1.1 Inventory and scope

- 5.1.2 Strip system of cruising
- 5.1.3 Line plot system of cruising
- 5.1.4 Pont sampling and relascope survey
- 5.2 Use of aerial photographs and satellite data in forest inventory
 - 5.2.1 Introduction and scope
 - 5.2.2 Interpretation of aerial photographs & satellite imageries
 - 5.2.3 Forest type classification
 - 5.2.4 Area and volume estimation
- 5.3 Forest inventory [Planning and execution, objectives of inventory, source of information, field measurement, statistical consideration, calculation, analysis and data capture, the execution of field work and control for accuracy, Security of inventory, records and events, results, recurrent forest inventory field work for recurrent inventory, types of plots (permanent plots, temporary plots, both permanent and temporary plots, in plantation and natural forest)]

UNIT 6. GROWING STOCK [Included in Statistical methods....]

- 6.1. Introduction and definition of growing stock.
- 6.2 Determination of growing stock by various methods

PRACTICALS

- Regression models development (Volume Table)
- Inventory with Point Sampling
- Various Plot Sampling techniques (Circular, Square, Rectangular)

COURSE CODE: SFM 702
COURSE TITLE: SUSTAINABLE FOREST MANAGEMENT AND CERTIFICATION
CREDIT HOUR: 3 Lecture Hours: 75

OBJECTIVES : The student will be able to .

- Explain the definition, identify the scope, logic and principles of forest management.
- Know forests of Nepal and its relation with the Nepalese people and economy.
- Understand and explain the interactions, interrelationship and interdependence between human, forest resources, and the environment.
- 4. Understand Forest management practices in the tropics, sub - tropics and mountain, and global forestry Practices.
- Measure trees and Forests
- Estimate the (biological and under various management conditions) growth of trees and forests.
- Importance of growth modeling forest management.
- Prepare operational plan as demanded by the managers of a given forest area.
- Understand and explain the concept and importance of Multiple use forest management
- Evaluate later active management strategies and their constraints while preparing forest management plans.
- Appraise alternatives and techniques for arriving at decision options.
- Employ techniques for stumpage valuation.
- Apply tools of regulating different types of forest production systems.
- Employ methods of optimal rotation determination and apply concepts of allowable cut.
- Demonstrate ability to write forest management plans at micro and macro level and identify and practice need for district level forest management planning.
- Identify the implications of economics and social aspects of forest management.
- To enable student to proposed sudation associated with common property resources

UNIT 1. INTRODUCTYION

- 1.1 Definition & scope of forest management.
- 1.2 Goal and objectives of forest management.
- 1.3 History of forest management in Nepal.
 - 1.4 Comparing forest management of developed countries / India to Nepal;
what should be the approach to promote forest management in Nepal .
 - Community Forestry Concept and practices
 - Private Forestry Concept and Practices
 - Leasehold forestry Concept and Practices
 - National Forest Concept and Practices

UNIT 2. INTERACTION OF MAN AND FOREST

- 2.1 Human dependence on forest resources in Nepal (historical) ; food , fuel - wood and fodder.

- 2.2 Human impact on the forests
 - 2.2.1 Wood / fuel - wood collection.
 - 2.2.2 Grazing systems
 - 2.2.3 Agriculture cultivation
- 2.3 Scarcity of forest products and its impact and human response.

UNIT 3. CLASSIFICATION OF FORESTS

- 3.1 Purpose and Classification of forest on the basis of
 - 3.1.1 What is it and why is classification done; implication of classification to forest management?
 - 3.1.2 Geographical and climatic factors,
 - 3.1.3 Functional factors (Protective and Productive)
 - 3.1.4 Legal factors.
 - 3.1.5 Ecological factor (Role of Biological expedition)

UNIT 4 NORMAL FOREST

- Protective & Productive
 - 4.1 Definition and concepts.
 - 4.2 Implication of the concepts to forest management
 - 4.3 Applied aspects of Normal Forest Concept to Forest Management in Nepal.

UNIT 5. GROWING STOCK, INCREMENT AND ROTATION

- 5.1 Growing stock and Increment
 - 5.1.1 Introduction and definition of growing stock determination of growing stock by various methods
 - 5.1.2 Importance and determination of site quality
 - 5.1.3 Understanding and utilising growth factors in determining and using growing stock for forest management
- 5.2 Rotation
 - 5.2.1 Definition and concept of rotation.
 - 5.2.2 Rotation in regular and irregular forest.
 - 5.2.3 Types of rotation
 - 5.2.3.1 Physical and silvicultural
 - 5.2.3.2 Rotation of max volume production
 - 5.2.3.3 Rotation of high income
 - 5.2.4 Choice of rotation
 - 5.2.5 Rotation and conversion period (8)

UNIT 6: FOREST RESOURCE PLANNING FOR MANAGEMENT

- 6.1 Working/management plan-introduction
 - 6.1.1 Definitions, objectives and limitations
 - 6.1.2 Small scale forest management plan
 - 6.1.3 Organization of working plans
- 6.2 Preparation of working plans

- 6.2.1 Data collection
 - bio-physical
 - Socio-economical
- 6.2.2 Maps and sketches
- 6.2.3 General format
- 6.2.4 Contents
- 6.2.5 Write up of management plan
- 6.2.6 Methods of updating

UNIT 7. FOREST PLANNING / WORKING PLAN

- 7.1 Definition, objectives, need and scope of operational plan
- 7.2 Steps in preparation of Operational Plan.
- 7.3 Write up of operational plans for macro and micro level
- 7.4 Practical exercise in district level planning for national and community forest management planning activities

UNIT 8: ROTATION MANAGEMENT

- 8.1 Concept and types of rotation
 - 8.1.1 Concepts definitions
 - 8.1.2 Types of rotations
 - 8.1.3 Choice and length of rotation
- 8.2 Rotation determination methods
 - 8.2.1 Biological criteria
 - 8.2.2 Financial / economic criteria
 - 8.2.3 Social / environmental criteria

UNIT 9. CONCEPT AND PRACTICE OF SUSTAINED YIELD

- 9.1. Concepts and principles of sustained yield
 - 9.1.1 Concepts and definitions
 - 9.1.2 Prerequisites for sustained yield
 - 9.1.3 Limitations in Nepal's conditions
 - 9.1.4 Steps for achieving sustained yield
 - 1. Yield types
 - 2. Management steps for sustained yield
- 9.2 Site assessment for potential production of a site
 - 9.2.1 Reasons for assessment (Land allocation and development planning, Choice of species, Growth of Species, Forecasting of growth and yield)
 - 9.2.2 Methods of Site Assessment
 - 9.2.3 Dominant height on age relationship
 - 9.2.4 Method of defining dominant height on age relationship
 - 9.2.5 Maximum mean annual increment class

UNIT 10: YIELD REGULATION

- 10.1 Introduction to yield regulation
- 10.2 Concept of yield regulation (by volume and area)

- 10.3 Definition, objective, need and scope of operationalization yield
- 10.4 Concepts and approaches
 - 10.4.1 The normal forest concept
 - 10.4.2 Yield tables and yield regulations
- 10.5 Regulating plantation forest
 - 10.5.1 Concepts
 - 10.5.2 Applications
- 10.3 Regulating natural forests
 - 10.3.1 Concepts
 - 10.3.2 Applications
- 10.4 Allowable cut methods
 - 10.4.1 Area control
 - 10.4.2 Volume control
 - 10.4.3 Combined area and volume control

UNIT 11. FIELD VISIT AND EXERCISE:

- 11.1 Study of traditional and C.f. (Indicator, effectiveness practicality analysis & Reporting) management.
- Study of human response to FR scarcity
- Observation and classification of forests and forest land
- Normal forest analysis
- Preparation of operational plan (including steps and method)

UNIT 12. POLICY DEVELOPMENT

- 12.1 History of Natural Resources Policy
- 12.2 History of Nepalese Natural resources Policy formulation.
- 12.3 Current issues in Natural resources Policy in Nepal.
- 12.4. Analysis of selected countries NR Policy.
- 12.5 Natural Resources Policy Development process in Developed and developing countries.
- 12.6. Nepalese Natural Resources Policy Formulation Process.

UNIT 13. EVALUATION OF POLICY

- 13.1. Policy Evaluation Skills and Tools
- 13.2. Application of Economics, social and Biological criteria for Policy Evaluation
- 13.3. Case studies of Natural Resources Related Policies in Nepal, Forest Policy, Biodiversity conservation Policies, Environmental Policies, development Policies and Decentralization Policy and their

Interrelationship with other Policies inflowing Natural resources use and management.

UNIT 14. FUTURE DIRECTION OF NR POLICIES

- 14.1. Natural Resources Policy for supporting livelihoods of Rural People.
- 14.2 NR policy for Human Capital and social capital formation.
- 14.3 NR policy Compatible to the Concept of Development in 21 centuries.

UNIT 15. FOREST CERTIFICATION

- 15.1 Origin and Importance of Forest Certification
- 15.2 Methods of Certification
- 15.3 Policy and Regulations of Certification
- 15.4 Regulations
- 15.5 Status of Forest certification in Nepal

UNIT 16. THEORY AND PRACTICE OF COMMON PROPERTY RESOURCE (CPR)

UNIT 17. POSSIBLE SOLUTION FOR COMMON PROPERTY RESOURCES PROBLEM.

- a. **Community Based Resource Management (CBRM)**
- b. Community Forestry Resource Management
- c. Bio-diversity Conservation and Buffer zone Mgmt.
- d. Integrated Watershed Management
- e. Leasehold Forest Management

Institutions working with cpr

EXERCISE:

- 1. Practice in forest inventory and assessment
- 2. Preparation & write up of working plans

COURSE CODE: WME 706
COURSE TITLE: WATERSHED MANAGEMENT
CREDIT HOUR: 3 Lecture Hours: 7 5

GENERAL OBJECTIVE:

- The course is designed to provide students with a holistic and integrated outlook in the management of watersheds. Students will gain a mountain ecosystems perspective on the numerous aspects of watershed management for sustainable and environmentally compatible development, including fertility and watershed degradation, soil erosion processes/modeling, watershed analysis, project planning and research.

SPECIFIC OBJECTIVES:

More specifically, upon completion of the course students will:

- Gain knowledge on Soil fertility Evaluation
- Understand soil erosion processes and mechanisms
- Gain insight into land use effects on various types of watershed degradation and apply the knowledge for rehabilitation of degraded land and resources
- Be able to conduct monitoring of watershed parameters and initiate research to study key processes and issues
- Be capable of analyzing watershed conditions, status and processes and plan projects

UNIT 1: INTRODUCTION TO INTEGRATED WATERSHED MANAGEMENT (2)

- 1.1. Concept of integrated watershed management from a mountain ecosystems perspective
- 1.2. Present status of soil conservation and watershed management in Nepal
- 1.3. World Overview of Conservation approach and technology (WOCAT) in Watershed.
- 1.4. Role of GOs and NGOs in on-going programs and research

UNIT 2 LAND DEGRADATION (4)

- 3.1 Land Degradation
- 3.2 Definition, problem faced in the country,
- 3.3 Methods used in the degradation assessment,

UNIT 4. FACTORS OF SOIL DEGRADATION (10)

- 4.1 Land degradation processes
- 4.2 Deforestation
- 4.3 Land use/cover change
- 4.4 Erosion and sedimentation,
- 4.5 Overgrazing,
- 4.6 Intensive cultivation,
- 4.7 Farm power and machinery,

- 4.8 Slash and burn and its effect on soil fertility,
- 4.9 Nutrient/metals leaching and depletion
- 4.10 Degradation of Soil physical condition
- 4.11 Effective soil depth,
- 4.12 Permeability,
- 4.13 Texture,
- 4.14 Bulk density,
- 4.15 Available water,
- 4.16 Drainage,
- 4.17 Parent materials
- 4.18 Organic matter
- 4.19 Degradation of Soil Chemical properties
- 4.20 CEC,
- 4.21 Soil reaction
- 4.22 Base saturation,
- 4.23 Nutrients availability
- 4.24 Toxicity

UNIT 5: SOIL FERTILITY EVALUATION (10)

- 5.1 Approach employed
- 5.2 Nutrient deficiency symptoms,
- 5.3 Hidden hunger,
- 5.4 Plant analysis,
- 5.5 Biological tests,
- 5.6 Soil testing and soil testing facilities in Nepal,
- 5.7 Interpretation of soil test results

UNIT 6: LAND USE IMPACTS ON WATERSHED DEGRADATION (4)

- 6.1. Land use types and features
- 6.2. Agricultural impacts (farming practices, systems and cropping patterns)
- 6.3. Grazing impacts (vegetation, erosion, hydrological)
- 6.4. Forest degradation
- 6.5. Soil degradation
- 6.6. Land use changes (cause/effect relationships)
- 6.7. Road/trail construction and slope instability
(Field trip to examine land use types and their impacts on watershed degradation)

UNIT 7: SOIL EROSION AND WATERSHED MODELLING (5)

- 7.1. Spatial and temporal considerations in modeling
- 7.2. Model types (empirical/process-based; continuous/event-based; lumped/distributed)
- 7.3. Scale issues in modelling processes
- 7.4. Examples of major model types (RUSLE, WEPP, EPIC, SWAT)

- 7.5. Advantages/disadvantages of model types
- 7.6. Comparative modelling and field experimentation
(Exercise on model development and application)

UNIT 8: WATERSHED MONITORING AND RESEARCH (5)

- 8.1. Spatial and temporal scale of watershed monitoring and research
(plot, sub-watershed, catchment; event: daily, monthly, annual, etc.)
- 8.4. Soil fertility and nutrient status and management
- 8.5. Research approach, needs & priorities assessment
- 8.6. Field experimental design and implementation (plot, paired catchments, etc.)
(Field visit to project and experimental sites)

UNIT 9: WATERSHED ANALYSIS AND PROJECT PLANNING (12)

- 9.1. Watershed analysis methods
- 9.2. Watershed resources interactions (biological, physical, human)
- 9.3. The project cycle
- 9.4. Socio-economic aspects of watershed projects (analysis tools & methods; case studies)
- 9.5. Institutional consideration in design
- 9.6. Project Design
- 9.7. Appraisal of Alternatives
- 9.8. Design of Implementation Plan
- 9.9. Monitoring & Evaluation
- 9.10. Plan Preparation

UNIT 10

EIA in Watershed management

UNIT 11

Gender issues in watershed management

UNIT 12 Ecosystem services and compensation

UNIT 13 Best Management Practices (BMP)

EXERCISE AND TERM PAPER:

Field oriented exercise and group works will be conducted and a term paper will be prepared dealing with watershed analyses and conditions assessment; sub-watershed planning; watershed project development; etc.

COURSE CODE: SFM 707
COURSE TITLE: NATURAL RESOURCE ECONOMICS
CREDIT HOUR: 2 Lecture Hours: 50

GENERAL OBJECTIVE:

The course will provide the students with knowledge of resource economics to enable them to utilise the theory and tools of economics for the management of natural resources.

UNIT 1: NATURAL RESOURCES

- 1.1 Renewable and non-renewable resources;
- 1.2 property and common property resources;
- 1.3 Exclusion and level of extraction.
- 1.4 Stock and flow effects;
- 1.5 concept of maximum sustained yield;
- 1.6 Role of extraction and their threshold level.
- 1.7 External cost and benefits of natural resource Management.

UNIT 2: PRODUCTION, USE AND EXTERNALITY.

- 2.1 Production function, various types of use (consumption, non-consumption)
- 2.2 Definition of externality (Production and consumption externality);
- 2.3 Soil Conservation forest management, externality.
- 2.4 Control and command versus market as instrument of externality management.
- 2.5 Fiscal policy (taxes, subsidies, market theory and practice of transaction and corporation in managing externalities

UNIT 3: ECONOMIC VALUATION.

- 3.1 Valuation methods: Direct and indirect valuation methods; configuration valuation dose response methods; Hedonic price approaches; Travel cost method; applications of valuation methods (forest management, bio-diversity conservation, Soil and water conservation
- 3.2 Component valuation: Willingness to pay to willingness to accept; use versus exchange value; use versus non-use value; consumptive and non-consumption value; option value; existence value; Bequest value; cost benefit analysis ; cost effective. Green accounting and its application in forestry.

UNIT 4: INSTITUTIONAL ECONOMICS

- 4.1 Theory of cooperation & conflict
- 4.2 Analysis transaction costs

UNIT 5: SUSTAINABLE DEVELOPMENT.

Meaning of sustainable development; Role of polycentric organization in resource management sustainable development versus sustained yield; sustainable forest management; institutions and their role in resource management. Sustainability as a development policy.

COURSE CODE: SFM 712
COURSE TITLE: MICRO FINANCE & ENTERPRISES DEVELOPMENT COURSE

CREDIT HOUR: 1 Lecture Hours: 25

On completion of this course student will understand the evolving theoretical framework underlying micro finance and the institutional issues related to the demand and supply of financial services. On completion of Enterprises Development section of this course student will have full understanding of micro & small scale enterprises and have clear understanding of entrepreneurship.

The specific objectives of the course are to:

Micro Finance

- a. Understand the critical role and significance of micro-finance in the development of Nepalese economics.
- b. Build a solid understanding of the micro-finance sector
- c. Able to analyses the relationship between financial and other challenge and opportunities in the way of micro enterprises development in Nepal.

Enterprise Development

- d. Expose students to various economic development models and points of interventions.
- e. Enable students to have necessary knowledge on business startup effective tools for start up of enterprises, knowledge support service, and analyze market viability.
- f. Impart students knowledge on marketing relationships, building, mobilization of financial resources and development of business plan.
- g. Increase understanding on risk management (Change management, legal formalities for enterprises and corporate social responsibility).
- h. Impart knowledge on Development Practices with Business Principles.

Micro Finance

UNIT 1 INTRODUCTION AND ROLE OF MICRO FINANCE

- 1.1 Definition of micro finance
- 1.2 Micro finance - models (individual, solidarity group system, village Banking Gramin Bank & cooperative)
- 1.3 Role of micro finance in poverty reduction
 - (a) Linking Micro Finance with poverty reduction
 - (b) Characteristics of a successful micro finance provider
 - (c) Gender and Micro Finance
- 1.4 Legislative perspective of Business in Nepal.

UNIT 2 LENDING, SAVING & INSURANCE METHODOLOGIES

2.1 Review characteristics, approaches, comparative advantages and disadvantages of

2.1.1 Individual lending or saving methodologies

2.1.2 Group lending and saving methodologies

Solidarity Group Lending

Village Banking

2.2 Explore the practical implications of implementing these various Lending, Saving

insurance methodologies

UNIT 3 ISSUES AND TRENDS IN MICRO FINANCE

3.1 Discuss different poverty targeting methods

3.2 NGOs led development of micro enterprise finance

3.3 Role of Credit Unions

3.4 How Commercial Banks stepped in to meet the challenge

3.5 Linkages with non-financial programs

3.6 Adding literacy and health training to microfinance

UNIT 4. MICRO FINANCE DEVELOPMENT POLICY

4.1 Key national policies

4.2 Role of the Government in implementing policies in reducing obstacles.

4.3 Government's National policy relating to development and growth of micro-finance.

4.4. Specific measures need in financial sector reform enabling micro finance institutions grow.

Enterprise Development

UNIT 5: DEFINITION AND CONCEPT

5.1 Definition of Development, enterprise, entrepreneurship

5.2 Development models and business incubation for start-up enterprises.

5.3. Points intervention in enterprises.

UNIT 6: BUSINESS SUPPORT SERVICES AND MARKETING

6.1 Concepts of business support services

6.2 Analyses of market viability & support services

6.3 Market linkage strategies

6.4 Strategies of Marketing

UNIT 7: BUSINESS PLAN (PROJECT WORK)

7.1 Concept of Business plan

7.2 Development of Business plan for small Forestry related enterprises.

7.3 Mobilization of financial resource (Understanding, acquiring, mobilizing, investment of

Dis investment (ROS)

UNIT 8: MANAGEMENT AND INNOVATION

- 8.1 Risk Management (R & D, Definition of innovation, Risk calculation and Working in risk.
- 8.2 Change management (Analyses of change needed, when to change & how to change).

COURSE CODE: SFB 709
COURSE TITLE: AGROFORESTRY I
CREDIT HOUR: 2 Lecture Hours: 50

GENERAL OBJECTIVE:

Students will acquire advances of AF and be able to utilize the knowledge and skills in AF research and development.

SPECIFIC OBJECTIVES:

- Be familiar with agroforestry practices and their role in farming and forest systems.
- Understand and describe AF systems in Nepal

UNIT 1: INTRODUCTION AND DESCRIPTION OF AGROFORESTRY SYSTEM (5)

- 1.1 The definition, system approach and classification of agro forestry practices
- 1.2 AF practices in Nepal and South Asia
- 1.3 Farming systems in Nepal and their linkage with agro forestry systems.
- 1.4 Farmland and forest-based AF practices

UNIT 2. FARMING SYSTEMS IN NEPAL (14)

- 2.1 Agriculture systems (Crops, Trees and Livestock)
- 2.3 Sustainable agriculture and forestry

Common crops (cereals, horticulture, cash crop) their cultivation, management, production, crop protection,

Livestock - production and management systems

Trees - fodder trees/tree fodder, fuelwood, rangeland management

Fisheries management

Forestry - Farming linkages

UNIT 3: GENERAL ENVIRONMENTAL ISSUES WITHIN THE CONTEXT OF AF SYSTEM (6)

- 3.1 Characteristics of rural communities
- 3.2 Population and land resources
- 3.3 Factors determining the land use management
- 3.4 Constrains in resource management and use
- 3.5 Effects of resources depletion on environment and rural economy

UNIT 4: AGROFORESTRY PRACTICES (16)

- 4.1 Importance, status and use of indigenous knowledge about AF systems and practices
- 4.2 Shifting cultivation and Taungya
- 4.3, Contour hedgerows, SALT, inter-cropping Alley cropping
- 4.4 Soil conservation and bio-engineering
- 4.5 Farm forestry
- 4.6 NTFPs in agro forestry system.
- 4.7 Appropriate AF practices for rural income generation (e.g. sericulture, apiculture and wild edible fruits and vegetable)

4.8 Role of AF in livestock management

UNIT 5: APPROPRIATE AGROFORESTRY SYSTEM (8)

- 5.1 Rehabilitation of degraded sites of forest land
- 5.2 Rehabilitation of degraded farmland
- 5.3 Rehabilitation of degraded grazing land/gullies/landslide areas
- 5.4 Reclamation of river-affected fallow land through agro forestry

UNIT 6: SOIL MANAGEMENT IN AGROFORESTRY SYSTEM

- 6.1 Physical & Chemical Properties of Soil for Agroforestry Management
- 6.2 Soil plant nutrient relationship
- 6.3 Choice of Agro forestry species as per soil types
- 6.4 Organic matter management

EXERCISES

Project/ Term paper

Field visit to local areas

COURSE CODE: WME 709
COURSE TITLE: SOIL GENESIS AND GEOMORPHOLOGY
CREDIT HOUR: 2 Lecture Hours: 50

General Objectives: This course gives the knowledge on general process of soil formation and how the soils are classified. It will help to examine the soil in the field. It will also help to know about the knowledge about landscape.

UNIT 1. INTRODUCTION TO SOIL GENESIS (6)

- 1.1 Historical development
- 1.2 Perspective on the origin of the science of soil genesis
- 1.3 Some fundamental concepts of soil genesis
- 1.4 A soil as an anatomical specimen
- 1.5 A soil as an open system
- 1.6 Methods of soil genesis studies
- 1.7 Morphology of soils
- 1.8 Soil micro-morphology
- 1.9 Soil composition and characterization

UNIT 2. WEATHERING AND SOIL FORMING PROCESS (6)

- 2.1. Soil environment
- 2.2. Parent materials
- 2.3. Relief and landscape
- 2.4. Climate
- 2.5. Organisms
- 2.6. Time

UNIT 3. PRINCIPLE AND HISTORICAL DEVELOPMENT OF SOIL CLASSIFICATION (12)

- 3.1 Nepalese traditional soil classification and nomenclature
- 3.2 Modern system of soil classification
- 3.3 FAO/UNESCO soil classification system
- 3.4 USDA seventh approximation system of soil classification
- 3.5 Soil orders available in Nepal and their distribution

UNIT 4. EXAMINATION OF SOIL IN THE FIELD (9)

- 4.1 Parent materials of soil
- 4.2 Landform relief and drainage
- 4.3 Identification and nomenclature of soil horizon
- 4.4 Soil colour
- 4.5 Soil texture, soil structure, and consistency
- 4.6 Soil reaction and its classes
- 4.7 Special feature of soil formation
- 4.8 Organic matter and roasts
- 4.9 Accelerated soil erosion

- 4.10 Vegetation
- 4.11 Land use

UNIT 5 - PROCESS GEOMORPHOLOGY -AN INTRODUCTION

- 5.1 Introduction/scope/Concept
- 5.2 Basics of process geomorphology
 - 5.2.1 The Delicate balance
 - 5.2.2 Force/Process/Resistance

UNIT 6 - CLIMATE AND INTERNAL FORCES

- 6.1 Introduction
- 6.2 The Endogenic effect
- 6.3 Climate Geomorphology

UNIT 7 - THE DRAINAGE BASIN-DEVELOPMENT, MORPHOMETRY AND HYDROLOGY

- 7.1 Slope Hydrology and Runoff generation
- 7.2 Initiation of channels and the drainage network
- 7.3 Basin Hydrology
- 7.4 Basin Denudation

UNIT 8 - GLACIERS AND GLACIAL MECHANISM

- 8.1 Introduction
- 8.2 Glacial origins and types
- 8.3 Mass balance
- 8.4 The movement of glaciers
- 8.5 Ice structures

UNIT 9- FLUVIAL PROCESSES AND LAND FORMS

- 9.1 Introduction
- 9.2 The river channel
- 9.3 Sediment in channel
- 9.4 Channel pattern
- 9.5 Flood plains
- 9.6 Fluvial terraces
- 9.7 Fans
- 9.8** Delta
- 9.9** Soil and landscape processes

UNIT 10- LAND FORM &ITS DEVELOPMENT

Practical: The students will carry out a survey of a given area and prepare a soil survey report

REFERENCE

1. Process geomorphology: Dele F. Ritter, WM.C Brown Publishers college division, 1986, ISBN no. 0-697-05047-5
2. Geomorphology " A systematic analysis of late Cenozoic landforms" : Arthur L. Bloom , Prentice hall of India Private limited New Delhi 1979
3. The Text book of Geology : G.B. Mahapatra, CBS Publishers & Distributors. 4596/1-A, Daryaganj New Delhi first edition 1987
4. Geology for Technical Student: Ranjan Kumar Dahal, Bhrikuti Academic Publications, Blood Bank Complex, Exhibition road Kathmandu, Nepal.

COURSE CODE: SFM 713
COURSE TITLE: SOCIAL AND CULTURAL ISSUES

CREDIT HOUR: 2 **Lecture Hours: 50**

UNIT 1. INTRODUCTION: BASIC CONCEPTS (11)

- 1.1 The concept of culture and its relevance for NRM
- 1.2 The concept of natural resource: social and cultural perspectives
- 1.3 The concept of community: the context of NRM
- 1.4 Pressure of population on resources: Different viewpoints
- 1.5 Human/Cultural Ecology: Understanding Empirical Diversities in NRM
- 1.6 Biodiversity conservation and Ethics of Development
- 1.7 Knowledge Systems: Indigenous/Local, Traditional and Scientific

UNIT 2. RESOURCE MANAGEMENT INSTITUTION AND GOVERNANCE (14)

- 2.1 Forestry Sector
 - 2.1.1 Government/State Management: a) Policy, legislation and institutional framework, b) protected areas and conservation areas.
 - 2.1.2 Participatory/communal management: a) local/Traditional systems: b) formal users Group approaches
- 2.2 Farming sector
 - 2.2.1 Government/state management: a) Policy, Legislation and Institutional Framework; b) Land tenure and taxation; c) Pasture and Livestock Development and Management
 - 2.2.2 Agriculture: Subsistence vs Market Orientation
 - 2.2.3 Livestock, Farm, Forestry Linkages
- 2.3 Water Resource
 - 2.3.1 Government/state management: a) Policy, Legislation and institutional framework
 - 2.3.2 Irrigation Schemes and Farmer Managed Irrigation Schemes.
 - 2.3.3 Management for: Hydropower, Household and other Uses by State and Communities

UNIT 3. SOCIAL AND INSTITUTIONAL ISSUES (25)

- 3.1 Disparities, Inequality and Stratification
 - 3.1.1 Social and Cultural-Caste, Ethnicity, Gender
 - 3.1.2 Economic and Regional - Class, Rural vs Urban
 - 3.1.3 Gender and Regional--Class, Rural vs Urban
 - 3.1.4 Women and NRM (Chipko in India, Women FUGs and Mothers Groups in Nepal).
- 3.2 Poverty Alleviation and Livelihoods
 - 3.2.1 Role of Forestry: Policies and Practice
 - 3.2.2 IGA: Farm, Off-Farm, Forest Product Based, Off-Forest, etc.

- 3.3 Local/Indigenous Knowledge and Practices
 - 3.3.1 Local/indigenous knowledge and intellectual property rights
 - 3.3.2 Local /indigenous people and conservation-Knowledge and practices
- 3.4 Land and Tree Tenure
 - 3.4.1 Guthi, Kipat, Birta, Jagir, Raikar
 - 3.4.2 Tree Tenure: Concept and Practice
 - 3.4.3 Issues of Land and Resource Ownership in Community Forestry
- 3.5 Decentralization and Devolution
 - 3.5.1 Analysis of Legal and Policy Frameworks including Local Self Governance Act.
 - 3.5.2 Decentralization/Devolution: Illustrations from Forestry Sector in Nepal'
 - 3.5.3 Participatory Management of Resources in Nepal: The Rhetoric and Reality
- 3.6 Conflict Management (5)
 - 3.6.1 Nature and Sources of Conflicts in NRM (e.g. Resource control as an issue)
 - 3.6.2 Formal and Informal Arrangements for Conflict Management

COURSE CODE: SFM 805
COURSE TITLE: RESEARCH METHODOLOGY AND PARTICIPATORY ACTION RESEARCH
CREDIT HOUR: 3 Lecture Hours: 50

OBJECTIVES OF THE COURSE:

General:

After completion of this course the students will be able to understand general concepts, meaning and philosophy of research methods and develop basic skills for Principle and practices of planning, designing, conducting and reporting research in the management of natural resources.

Specific: Students completing the course should be able to:

1. Understand the meaning and types of research and their characteristics
2. Write an effective research proposal
3. Identify major themes and problems in forestry research
4. Develop a research design to solve a research problem
5. Select execute and interpret appropriate measurement and statistical procedures
6. Understand, interpret and apply research findings

General:

After completion of this course the students will be able to understand general concepts, meaning and use of statistics and develop basic skills for computing and interpreting the data of social and biological sciences.

Specific: Students completing the course should be able to:

1. Understand the meaning and types of different statistical constants
2. Understand the importance of descriptive and inferential statistics
3. Identify major experimental designs used in forestry research
4. Select execute and interpret appropriate measurement and statistical procedures

Use statistical software to analyze the data

UNIT 1 DISCRETE AND CONTINUOUS PROBABILITY DISTRIBUTIONS (5)

- 1.1 The Poisson distribution

UNIT 2 INFERENCE STATISTICS: (7)

- 2.1 Estimation: point and interval
- 2.2 Hypothesis testing: Cross-tabulation, Chi-square, t-test, ANOVA

UNIT 3 EXPERIMENTAL DESIGN (4)

- 3.1 Important Experimental designs for social sciences
- 3.2 Important Experimental for biological sciences

UNIT 4 COMPUTER APPLICATION (5)

4.1 Use of statistical software (Excel and SPSS) to analyze the data

UNIT 5 INTRODUCTION: (5)

- 5.1 Definition of research
- 5.2 Research and scientific method
- 5.3 Types and steps in research
- 5.4 Research process
- 5.5 Examples of social/natural science research in Nepal.

UNIT 6 DEFINING AND MEASURING VARIABLES: (5)

- 6.1 Concepts, Construct, hypothesis, theory and research
- 6.2 Scale of measurement, types and sources of data, variables, and relationships
- 6.3 Test of reliability and validity, errors in measurement

UNIT 7 RESEARCH PROPOSAL AND PROBLEM IDENTIFICATION: (4)

- 7.1 Outline of a research proposal
- 7.2 Literature review
- 7.3 Problem identification

UNIT 8 RESEARCH DESIGN: (10)

- 8.1 Introduction
- 8.2 Descriptive research design
- 8.3 Experimental and quasi-experimental research designs
- 8.4 Applied research designs
 - 8.4.1 Action research
 - 8.4.2 Participatory action research
 - 8.4.2.1 Elements of PAR
 - 8.4.2.2 Use and Limitation PAR
 - 8.4.3 Evaluation Research
- 8.5 Sampling design
 - 8.5.1 Census and sampling
 - 8.5.2 Probability and non probability sampling
 - 8.5.3 Sample size determination

UNIT 9 INSTRUMENT DEVELOPMENT: (3)

- 9.1 Drafting questions/ checklists
- 9.2 Assembling and pre-testing,
- 9.3 Finalizing the instrument
- 9.4 Preparation for the field work

UNIT 10 DATA COLLECTION: (12)

- 10.1 Data collection methods:

- 10.2 Questionnaire
- 10.3 Interview
- 10.4 Survey
- 10.5 Experimental
- 10.6 Observation
- 10.7 Case study
- 10.8 Unobtrusive measure
- 10.9 Content analysis
- 10.10 Participatory methods: - RRA and PRA - tools and techniques

UNIT 11. DATA ANALYSIS (5)

- 11.1 Data coding, data entry and editing
- 11.2 Statistical tests
- 11.3 Interpretations of findings

UNIT 12. REPORT WRITING: (4)

- 12.1 Steps in Writing Research Report
- 12.2 Design Elements of Report
- 12.3 Use of Reference, Note, Citation and Appendix

COURSE CODE: WME 806
COURSE TITLE: GIS and REMOTESENSING
CREDIT HOUR: 3 Lecture Hours: 50, Practical: 25

Geoinformatics or geomatics or geographical information system (GIS) technology can be used for scientific investigations, resource management, and development planning. The purpose of the course is to educate students on the practical application of remote sensing and geospatial information systems for resource management.

Course goals:

- Introduce and implement key concepts of geospatial information systems, global positioning systems, and remote sensing.
- Understand why GIS, GPS, and remote sensing are important and useful for inventory and analysis.
- Increase understanding and building confidence to use geospatial data.
- Increase awareness of geospatial analysis and supporting decision-makers.

UNIT 1 INTRODUCTION TO GEOINFORMATICS (5)

- 1.1 Definition of Geoinformatics.
- 1.2 Purpose of Geoinformatics.
- 1.3 Required Functions for Geoinformatics.
- 1.4 Computer System for Geoinformatics.
- 1.5 Geoinformatics as a Multidisciplinary Science.
- 1.6 Areas of Geoinformatics Applications.
- 1.7 Geoinformatics as an Information Infrastructure.
- 1.8 Geoinformatics for Decision Support.

UNIT 2 DATA MODEL AND STRUCTURE (5)

- 2.1 Data Model.
- 2.2 Geometry and Topology of Vector Data.
- 2.3 Topological Data Structure.
- 2.4 Topological Relationships between Spatial Objects.
- 2.5 Geometry and Topology of Raster Data.
- 2.6 Topological Features of Raster Data.
- 2.7 Thematic Data Modeling.

UNIT 3 INPUT OF GEOSPATIAL DATA (6)

- 3.1 Required Data Sources for Geoinformatics.
- 3.2 Digitizers for Vector Data Input.
- 3.3 Scanner for Raster Data Input.
- 3.4 Digital Mapping by Aerial Photogrammetry.
- 3.5 Remote Sensing with Satellite Imagery.
- 3.6 Rasterization.
- 3.7 Vectorization.
- 3.8 Advanced Technologies for Primary Data Acquisition.

UNIT 4 SPATIAL DATABASE (6)

- 4.1 Concept of Spatial Database.
- 4.2 Design of Spatial Database.
- 4.3 Database Management System.
- 4.4 Hierarchical Model.
- 4.5 Relational Database.
- 4.6 Object Oriented Database.
- 4.7 Data quality and errors.
- 4.8 Data accuracy and precision.
- 4.9 Metadata.
- 4.10 Data sharing.

UNIT 5 MAP PROJECTIONS (5)

- 5.1 Coordinate System.
- 5.2 The Shape of the Earth.
- 5.3 Map Projection.
- 5.4 Coordinate Transformation.
- 5.5 Distance.
- 5.6 Scale, Accuracy and Resolution.

UNIT 6 DIGITAL TERRAIN MODEL (DTM) (6)

- 6.1 DEM and DTM.
- 6.2 Triangulated Irregular Network (TIN).
- 6.3 Generation of Contour Lines.
- 6.4 Interpolation of Elevation for Automated Generation of DEM.
- 6.5 Extraction of Terrain Information.
- 6.6 Hill Shade and Slope map.

UNIT 7 SPATIAL ANALYSIS (6)

- 7.1 Spatial Analysis.
- 7.2 Spatial Query.
- 7.3 Classification and Reclassification.
- 7.4 Coverage Rebuilding.
- 7.5 Overlay of Raster and Vector Data.
- 7.6 Connectivity or Network Analysis.
- 7.7 Shape Analysis and Measurement.

UNIT 8 DIGITAL IMAGE PROCESSING (6)

- 8.1 Flow of Digital Image Processing.
- 8.2 Radiometric Correction.
- 8.3 Geometric Correction.
- 8.4 Image Enhancement.
- 8.5 Spatial Filtering.
- 8.6 Feature Extraction.
- 8.7 Classification Methods.
- 8.8 Maximum Likelihood Classifier.

UNIT 9 VISUALIZATION OF GEOSPATIAL DATA (5)

- 9.1 How to Map?
- 9.2 Graphic Variables.
- 9.3 Gray Scaling.
- 9.4 Color Map.
- 9.5 Relief Map.
- 9.6 Map Cosmetics.
- 9.7 Map output.

UNIT 10: GIS/RS APPLICATIONS IN WATERSHED MANAGEMENT (2)

- 10.1. Concepts and principles**
- 10.2. Geographical information system and RS software**
- 10.3. Applications**

Laboratory schedule (50)

SN.	Topic	Lab
1.	Course organization, Software introduction	Start Project 1
2.	Digital Images	Project 1
3.	Thematic mapping	Project 1
4.	Charts and layouts	Project 1
5.	Cartography basics	Project 1 Due
6.	Getting data into software	Start Project 2
7.	Feature manipulations, Basics of software	Project 2
8.	Spatial analysis	Project 2
9.	Spatial analysis	Project 2
10.	3D analysis	Project 2 Due
11.	Introduction to Remote Sensing	Project 3
12.	Image Analysis	Project 3
13.	Image Analysis	Project 3
14.	More Remote Sensing	Project 3
15.	GPS introduction	Project 3 Due
16.	DGPS	Start Project 4
17.	Work on	Projects 4 and 5
18.	Course wrap up	Project 4 and 5 Due

COURSE CODE: WME 711
COURSE TITLE: LAND EVALUATION AND LAND USE PLANNING
CREDIT HOUR: 2 Lecture Hours: 50

General Objectives: On completion of this course the student will understand the different types of land under use in Nepal. They also can identify and evaluate different land uses and assess suitability of land for different uses. It will help to understand certain type of soil and how soil survey is carried out and the way a soil survey report is prepared.

UNIT 1. USE OF LAND RESOURCE SURVEYS (5)

- 1.1 Survey for special purposes
- 1.2 Priorities
- 1.3 Detail Objectives
- 1.4 Relationships between surveyors, planners and other users
- 1.5 Use of existing data
- 1.6 Computer or manual systems

UNIT 2. LAND CLASSIFICATION (3)

- 2.1 General concepts
- 2.2 Land capability classification
- 2.3 Land suitability classification
- 2.4 Agro-ecological zone
- 2.5 Factors of land classification: Economic factors, Physical factors, Project development consideration
- 2.6 Types of land classification: Standard types, Reconnaissance, Semi detailed, Detailed, Minimum requirement

UNIT 3. LAND/SOIL SURVEY AND EVALUATION (8)

- 4.1 Characteristic of soil maps and reports
- 4.2 Soil mapping
- 4.3 Preparation of field works
- 4.4 Plotting and assembly of field data
- 4.5 Coordination
- 4.6 Classification and terminology
- 4.7 Concepts of land evaluation
- 4.8 Land evaluation techniques
- 4.9 Land resources evaluation
- 4.10 Land resources attribute
- 4.11 Selection of parameters
- 4.12 Socio- economics evaluation
- 4.13 Environmental impact evaluation

UNIT 4. UNITS OF SOIL CLASSIFICATION & MAPPING (4)

- 5.1 Aerial photo interpretation
- 5.2 Soil mapping and formulation of soil legends
- 5.3 Plotting boundaries in the field
- 5.4 Soil correlation and inspection
- 5.5 Soil grouping on the map

UNIT 5. LAND CLASSES SPECIFICATION (6)

- 5.1 Specification for Land Classes and subclasses
- 5.2 Specification for Informative appraisals
- 5.3 Review of specifications
- 5.4 Symbols and conventional signs
- 5.5 Field correlation

UNIT 6. LAND USE PLANNING

- 6.1 Definition and concept of land use planning
- 6.2 Definition and concept of sustainable land use planning

UNIT 7. SUSTAINABLE LAND USE PLAN

- 7.1 General land use plan for protected and productive area
- 7.2 Preparation of existing and proposed general land use map
- 7.3 Suitability criteria for various land uses
 - 7.3.1 Agricultural area
 - 7.3.2 Forest land
 - 7.3.3 Grazing land
 - 7.3.4 Urban, commercial, industrial areas

UNIT 8. BASIC FRAMEWORK AND PRINCIPLES

- 8.1 General premises and thrust: Holistic approach, sustainability, land security, empowered communities
- 8.2 Basic approach in land use planning:
- 8.3 Biophysical assessment of the area, crop yield and carrying capacity

UNIT 10. PREPARATION OF SOIL SURVEY REPORTS (4)

Practical: The students will carry out a survey of a given area, evaluate the land and soil and prepare a sustainable land use plan report.

COURSE CODE: WME 710

COURSE TITLE: WATERSHED HYDROLOGY/ HYDROLOGICAL ISSUES IN WATERSHED

CREDIT HOUR: 2 Lecture Hours: 50

- Gain knowledge about the hydrological characteristic its applications to watershed management
- Be able to assess and effectively manage water quality in the mountain watershed context
- Be able to use hydrological instruments as well as water resource management.

UNIT 1 HYDROLOGICAL CHARACTERISTICS OF WATERSHED

UNIT 2: APPLICATION OF HYDROLOGY IN WATERSHED MANAGEMENT (4)

- 2.1. Water and energy budgets and cycles
- 2.2. Ecosystems perspective of the hydrologic cycle
- 2.3. Quantitative hydrologic methods (return period; frequency analysis; probability; time series analyses)

UNIT 3 : WATER RESOURCE IN NEPAL

UNIT 4. WATER AVAILABILITY AND DEMAND (7)

- 4.1 Basic concepts
- 4.2 Sources, methods and systems of irrigation
- 4.3 Control and application of irrigation water
- 4.4 Water harvesting methods
- 4.5 Water storage
- 4.6 Surface drainage and drainage techniques
- 4.7 Indigenous technology

UNIT 5: WATER QUALITY AND MANAGEMENT (5)

- 5.1 Water quality standards and criteria (for different uses)
- 5.2. Total maximum daily loads standards (TMDLS)
- 5.3. Water quality monitoring and assessment (principles & processes)
- 5.4. Water quality problems (point & non-point source pollution)
- 5.5. Water quality management (source and headwater protection; harvesting & ground water recharge)
(Field trip to see water sources, protection measures and pollution examples)

Unit 6 Water resource management and conservation
Flood

Unit 7 Hydrological instrumentation and measurements (precipitation, surface runoff, subsurface flow, infiltration, evapo-transpiration)

COURSE CODE WME 707

COURSE TITLE: SOIL CONSERVATION ENGINEERING AND REHABILITATION

CREDIT HOUR: 2

LECTURE HOURS: 50

- Student can gain the knowledge about soil its mechanical property
- Be able to know about soil and loads on it
- It is assumed that student can design structure and its load on soil
- Be able to design for stability on the basis of soil for sustainable structure
- Be able to rehabilitate watershed by using techniques and measures

UNIT 1 INTRODUCTION

- 1.1. Soil and Soil Engineering
- 1.2. Compaction
 - a. Standard proctor's test
 - b. Modified proctor's test

2: WATERSHED REHABILITATION TECHNIQUES (6)

- 2.1. Rehabilitation and reclamation principles and approaches
- 2.2. Major land rehabilitation techniques (mechanical, vegetative, bio-engineering including)
- 2.3 **Low cost soil conservation technique, ITK**
- 2.4 Functions of bioengineering system
- 2.5 Interaction between vegetative & engineering system
- 2.6 Ideal plant communities for bio-engineering
(Field trip to see different rehabilitation techniques)
- 2.7 Ecosystems approach to rehabilitation (Churia example; W.A.T.E.R. DSCWM strategy)

UNIT 3. REHABILITATION MEASURES (10)

- 3.1 Soil conservation measures,
- 3.2 Forestation,
- 3.3 Control grazing,
- 3.4 Soil reclamation and amelioration,
- 3.5 Plant nutrient replenishment,
Ample organic matter in soil
Control tillage

UNIT 4. MAINTAINING SOIL FERTILITY (13)

- 4.1 Reclamation of degraded soils (fertility; salinity/sodicity; acidity/alkalinity; organic matter)
- 4.2 Elements required in plant nutrition
Primary, Secondary, and Micronutrients
- 4.3 Basic soil-plant relationships,
- 4.4 Soil fertility evaluation
- 4.5 Use of fertilizers,
- 4.6 Organic manure- FYM application,
In-situ manure,

- Green manures
- Forest litter and its consequences
- Bio-fertilizers,
- 4.7 Composting and organic farming
- 4.8 Useful properties of algae for agriculture
- Fertilizers,
- 4.9 organic and inorganic Fertilizers: Nitrogenous, Phosphatic and Potassium fertilizers, Single and multi-nutrient fertilizers,
- 4.10 Fertilizers mixing, Handling, storage, and Fertilizer application (methods),
- 4.11 Fertilizer economy (loss and uptake, residual effect of applied fertilizers),
- 4.12 Cropping system and soil management.

UNIT 5 SHEAR STRENGTH

- 5.1. Theoretical considerations: Mohr's stress circle
- 5.2. Mohr coulomb failure theory
- 5.3. The effective stress principle
- 5.4. Measurement of shear test

UNIT 6 EARTH PRESSURE

- 6.1. Active and Passive states
- 6.2. Active and Passive earth Pressure: Rankine's theory
- 6.3. Coulomb's wedge theory
- 6.4. Design of gravity retaining wall

UNIT 7 STABILITY OF SLOPES

- 7.1. Stability analysis of Finite slopes
- 7.2. Swedish circle method
- 7.3. Method of Locating Centre of critical slip circle
- 7.4. Frictional Circle method
- 7.5. Taylor's stability Number and stability curves

UNIT 8 BEARING CAPACITY

- 8.1. Definition
- 8.2. Rankine's analysis
- 8.3. Terzaghi's analysis
- 8.4. Plate Load test
- 8.5. Penetration Test

UNIT 9 STABILIZATION OF SOIL

- 9.1. Mechanical, cement, Lime, chemical
- 9.2. Stabilization by heating
- 9.3. Electrical stabilization

UNIT 10 SITE INVESTIGATIONS & SUB SOIL EXPLORATION

- 10.1. Introduction
- 10.2. Site reconnaissance
- 10.3. Site exploration
- 10.4. Method of site exploration
- 10.5. Shallow foundation design

COURSE CODE: WME 708

COURSE TITLE: GLOBAL ENVIRONMENTAL CHANGE

CREDIT HOUR: 2

LECTURE HOURS: 50

UNIT 1 CLIMATE CHANGE AND GLOBAL WARMING

- 1.1 Definition
- 1.2 Causes
- 1.3 Green house gasses emission
- 1.4 Ozone depletion
- 1.5 Extreme weather events

UNIT 2: IMPACTS OF CLIMATE CHANGE

- 2.1 Agriculture and food security
- 2.1 Hydrology and data resources
- 2.1 Terrestrial and quarter ecosystem
- 2.1 Human and animal health
- 2.1 Biodiversity
- 2.1 Crop diversification
- 2.1 Forestry sector contribution to global climate change
- 2.1 Climate change Impact on goods and services

UNIT 3: CARBON SEQUESTRATION

- 3.1 Carbon emission
- 3.2 Carbon Credit
- 3.3 Options for sequestering and preserving green houses and gases in land use system
- 3.4 Bio-fossils and GH emissions
- 3.5 Land use change and forestry mechanism

UNIT 4: ADAPTATION AND MITIGATION STRATEGIES

- 4.1 Preparation for climate change
- 4.2 Negotiation and agreements

UNIT 5: CONVENTION ON

- 5.1 Desertification,
- 5.2 Biodiversity,
- 5.3 Water resources,
- 5.4 Traditional Knowledge to cope with Climate Change
- 5.5 Climate change adoption and link to Sustainable development
- 5.6 Treaties

UNIT 6: INTERNATIONAL POLICIES AND PROTOCOLS

- 6.1 Clean development Mechanism and quota
- 6.2 Problems and market prospects for developing countries

- 6.3 Initiatives to address global change
- 6.4 Case studies
- 6.5 Climate change research program
- 6.6 Fuel conservation and reduction in energy use
- 6.7 Alternate energy sources

UNIT 7: ENVIRONMENTAL POLICIES AND LEGISLATION OF NEPAL

UNIT 8: REDD

- 8.1 RPIN
- 8.2 R plan
- 8.3 Carbon trade

UNIT 9 PES

COURSE CODE: FPE 710
COURSE TITLE: NON-TIMBER FOREST PRODUCTS

CREDIT HOUR: 3 **LECTURE HOURS: 75**

UNIT 1. INTRODUCTION AND CLASSIFICATION

- 1.1 Introduction
- 1.2 Classification of NTFPs
- 1.3 Importance and value of NTFPs

UNIT 2. ROLE OF NTFPS ON LIVELIHOODS

- 2.1 NTFPs based Livelihood strategy
- 2.2 NTFPs and rural Livelihood
- 2.3 Livelihood Assets and framework

UNIT 3. RESOURCE ASSESSMENT OF NTFPS

- 3.1 Inventory techniques
- 3.2 Resource Measurement

UNIT 4. NURSERY PRACTICES AND TECHNIQUES OF IMPORTANT NTFPS

- 4.1 Nursery practices of different NTFPs
- 4.2 Propagation techniques of important species

UNIT 5. CULTIVATION AND DOMESTICATION OF IMPORTANT MEDICINAL AND AROMATIC PLANTS (MAP)

- 5.1 Importance of cultivation and domestication
- 5.2 Ethno-botanical knowledge
- 5.3 Cultivation Practices
- 5.4 Domestication of Important MAPs

UNIT 6. HARVESTING OF NTFPS

- 6.1. Importance of harvesting
- 6.2 Tools and techniques
- 6.3 Sustainable harvesting
- 6.4 Characteristics and seasonality

UNIT 7. PROCESSING AND VALUE ADDITION

- 7.1 Importance of processing and value addition
- 7.2 Challenges and Opportunities
- 7.3 Locally acceptable processing techniques
- 7.4 Role of entrepreneurs/enterprises/communities in processing and value addition

UNIT 8. POLICY AND PRACTICES FOR CONSERVATION OF NTFP SPECIES

- 8.1 Cites categories
- 8.2 Plants Conservation acts of Nepal
- 8.3 Red data book
- 8.4. Conservation assessment and management planning (CAMP) categories
- 8.5 Institutions involved in Conservation Practices

UNIT 9. NTFPS MANAGEMENT

- 9.1 Importance of NTFPs Management
- 9.2 NTFPs in Community based forest management
- 9.3 NTFPs-oriented Forest management

UNIT 10. USES OF NTFPS

- 10.1 Important NTFPs and uses
- 10.2 Ethno-botanical knowledge and their importance
- 12.3 Identifying criteria for important NTFPs

UNIT 11. IMPORTANT NTFPS INDUSTRIES

- 11.1 NTFPs based industries in Nepal
- 11.2 Prospects and Problems of Industrial Development
- 11.3 Scope of Community Based NTFPs Industries

UNIT 12. ENTERPRISE OF NTFPS

- 12.1 Importance of enterprises
- 12.2 Community based enterprises
- 12.3 Promotion of enterprises for local development
- 12.4 Preparation of business enterprise development plan

UNIT 13. CERTIFICATION OF NTFPS

- 13.1 Organic Certification
- 13.2 Regulations of General Agreement Trade and Treaty (GATT), World Trade Organization (WTO), Commission for International Trade of Endangered Species (CITES), Agreement on SAARC Preferential Trading Arrangement. (SAPTA) etc
- 13.3 Certification Organization

UNIT 14. TRADE AND MARKETING OF NTFPS

- 14.1 Importance of Trade and Marketing of NTFPs
- 14.2 Trade link and Channels
- 14.3 Policy and Regulations of NTFPs Marketing
- 14.4 Benefit Sharing and Community Support

Reference and Book Lists:

Keep as listed in earlier and add some more

Ref:

1. Non Timber Forest Products of Nepal : Author I.C.Dutta, Hill side Press kathmandu 2007.
2. Forest certification Seed Tree Nepal, UNDP,GEF-SGP Nepal.2004; SGP Publication 01/2004.
3. Cultivation of selected medicinal Plants : National medical Plats board, Dept of Ayush, New Delhi 2004.

REVISED COURSE

COURSE CODE: FPE 710
COURSE TITLE: NON-TIMBER FOREST PRODUCTS
CREDIT HOUR: 3
Lecture Hours: 75

UNIT 1. INTRODUCTION AND CLASSIFICATION

- 1.1 Introduction
- 1.2 Classification of NTFPs
- 1.3 Importance of NTFPs

UNIT 2. USES OF NTFPS

- 2.1 Important NTFPs and their uses
- 2.2 Ethno-botanical knowledge and their importance

UNIT 3. ROLE OF NTFPS ON LIVELIHOODS

- 3.1 NTFPs based Livelihood strategy
- 3.2 NTFPs and rural Livelihood
- 3.3 Livelihood Assets and framework

UNIT 4. RESOURCE ASSESSMENT OF NTFPS

- 4.1 Inventory techniques
- 4.2 Resource Measurement & Assessment

UNIT 5. NURSERY PRACTICES AND TECHNIQUES OF IMPORTANT NTFPS

- 5.1 Nursery practices of important species NTFP
- 5.2 Propagation techniques of important NTFP species

UNIT 6. CULTIVATION AND DOMESTICATION OF IMPORTANT MEDICINAL AND AROMATIC PLANTS (MAP)

- 6.1 Importance of domestication and cultivation
- 6.2 Domestication of Important MAPs
- 6.3 Cultivation Practices

UNIT 7. HARVESTING OF NTFPS

- 7.1 Importance of harvesting
- 7.2 Tools and techniques
- 7.3 Sustainable harvesting
- 7.4 Season of Harvesting

UNIT 8. PROCESSING AND VALUE ADDITION

- 8.1 Importance of processing and value addition
- 8.2 Challenges and Opportunities

- 8.3 Processing techniques
 - 8.4 Role of entrepreneurs/enterprises/communities in processing and value addition
- UNIT 9. NTFPS MANAGEMENT
- 9.1 Importance of NTFPs Management
 - 9.2 NTFPs in Community based forest management
 - 9.3 NTFPs-oriented Forest management
- UNIT 10. IMPORTANT NTFPS INDUSTRIES
- 10.1 NTFPs based industries in Nepal
 - 10.2 Prospects and Problems of Industrial Development
 - 10.3 Scope of Community Based NTFPs Industries
- UNIT 11. ENTERPRISE OF NTFPS
- 11.1 Importance of enterprises
 - 11.2 Community based enterprises
 - 11.3 Promotion of enterprises for local development
 - 11.4 Preparation of business enterprise development plan
- UNIT 12. POLICY AND PRACTICES FOR CONSERVATION OF NTFP SPECIES
- 12.1 Policy & regulation for NTFP conservation
 - 12.2 Plants Conservation acts of Nepal
 - 12.3 Red data book (Cites categories)
 - 12.4. Conservation Assessment and Management Planning (CAMP) categories
 - 12.5 Institutions involved in Conservation Practices
- UNIT 13. TRADE AND MARKETING OF NTFPS
- 13.1 Importance of Trade and Marketing of NTFPs
 - 13.2 Trade link and Channels
 - 13.3 Policy and Regulations of NTFPs Marketing
 - 13.4 Benefit Sharing and Community Support
- UNIT 14. CERTIFICATION OF NTFPS
- 14.1 Importance
 - 14.2 Methods
 - 14.3 Policy and Regulations of Certification
 - 14.4 Regulations of GATT, WTO, CITES, SAPTA etc
- UNIT 15. CHEMISTRY OF NTFPS
- 15.1 Oil seed
 - 15.2 Gum resin
 - 15.3 Tannins & dyes
 - 15.4 General method of isolation
 - 15.5 Physico chemical properties
 - 15.6 Classification & uses

Reference and Book Lists:

Keep as listed in earlier and add some more

**COURSE OF WOOD ENERGY- Passed by Subject Committee Meeting on 19th
Bhadra 2066**

CODE: FPE 802
TITLE: BIO FUEL
CR. HOUR: 2
Hours: 50

GENERAL OBJECTIVES:

After the completion of the course, the students will be able to work for development, management and efficient utilization of Bio Fuel for energy

SPECIFIC OBJECTIVES:

- Plan for resource development
- Work on proper management of Bio fuels
- Work on conservation and improved utilization of Bio Fuel
- Assess the demand and supply of bio fuel.
- Suggest for appropriate sources of energy.

UNIT 1. INTRODUCTION

- 1.1 Background
- 1.2 Bio fuel types
- 1.3 Use pattern

UNIT 2 RESOURCE DEVELOPMENT

- 2.1 Scope of resource development
- 2.2 Energy plantation
- 2.3 Bio-fuel strategy in Community Forestry
- 2.4 National program on resource development

UNIT 3. BIO-FUEL MANAGEMENT

- 3.1 Supply and demand assessment
- 3.2 Bio-fuel Pricing, marketing and sale
- 3.3 Sustainable management of bio-fuel

UNIT 4 .RESOURCE ANALYSIS

- 4.1 Source of Bio-fuel
- 4.2 Resource identification
- 4.3 Assessment of resources
- 4.4 National / Global bio fuel status

UNIT 5. POLICY AND PLANNING

- 5.1 National policies and regulations on bio-fuel
- 5.2 Planning for sustainable supply of bio-fuel
- 5.3 Institutional establishment for bio-fuel promotion

UNIT 6. GREEN FUEL - BIO-DIESEL

- 6.1 Jatropha as bio-diesel Resources
- 6.2 Jatropha seed harvesting and collection
- 6.3 Processing and production of bio-diesel
- 6.4 Bioethanol

UNIT 7. BIO- ENERGY

- 7.1 Wood and other forest products as fuel
- 7.2 Bio-gas
- 7.3 Bio-charcoal
- 7.4 Bio-briquette

UNIT 8: ALTERNATE ENERGY

- 8.1 Importance and scope
- 8.2 Dendro-thermal power
- 8.3 Solar and wind energy
- 8.4 Petroleum gas
- 8.5 Atomic and hydropower energy
- 8.6 Mines coal

UNIT 9. ENERGY CONSERVATION

- 9.1 Importance
- 9.2 Improved stove
- 9.3 Stove design and efficiency assessment
- 9.4 Energy conserving pots and utensils

REFERENCES AND BOOK LIST:

1. Manual of Forest Utilisation , Institute of Forestry, Hetauda Campus, 2003, Hetauda

Course Code : SFB 704

Course Title : **Advance Silviculture**

Credit hours : 2

Lecture hours : 50

General objective :

On completion of this course the student are expected to gain the necessary advance knowledge & skills for the management of different forest types and for different purposes, at the optimum level of resource input while maximization the gain, benefit from the forest by applying advance knowledge of silviculture.

Specific objective :

Specifically, the student will acquire the analytical knowledge and skills necessary in silviculture to plan & implement the forest management schemes necessary for managing the forest resources of the country.

Unit 1: Forest influences

- 1.1 Effects of forest on soil, vegetations physiography, local & microclimate
 - 1.1.2 Soil productivity, leaf litter decomposition and nutrient cycling (Nutrient loss)
 - 1.1.3 Stream flow, precipitation
- 1.2 Carbon sequestration and green house effect
- 1.3 Inter relationship between soil & silviculture
- 1.4 Measuring influences
 - Ecological tools for describing vegetation types,
 - Environmental & physical parameter
 - : Vegetation mapping
 - : Potential vegetation type mapping

Unit 2: Advance Nursery & Plantation Technique

- 2.1 Large scale plantation & their management

- 2.2 Comparative study of different ways of producing planting stocks (including tissue culture) and raising forest.

Unit 3: Natural regeneration technique for stand improvement and management

- 3.1 Stand improvement
- 3.2 Regeneration technique
 - Canopy manipulation for light, seed supply, soil condition.
 - : Burning for regeneration
 - : Slash management

Unit 4: Quantitative silviculture

- 4.1 Growth function - Empirical, Exponential, allometry and Backmen's growth function
- 4.2 Growth cycle and phases, co-relation between size & plant population
- 4.3 Probability of individual tree mortality
- 4.4 Models of tree mortality & yield for unthinned forest stands.
- 4.5 Dynamics of uneven aged forest
- 4.6 Competition for space, light and nutrients in forest stands and their effect on population
- 4.7 Plant geometry and self thinning, stand structure and allometry of trees during self thinning of pure stand.

Unit 5: Interpretation of self thinning rule

- 5.1 Disturbance and stand development
- 5.2 Disturbance & effects on forest development
 - Disturbance
 - Abiotic - Fire, Flood, Wind Storm
 - Biotic - Pathogene & pest

Unit 6: Silvicultural management of forest

- 6.1 User group forest, government forest

- 6.2 Hill, Terai & other
- 6.3 Forest on private land
- 6.4 Multiple use forest management

Unit 7: Urban forestry

- 7.1 Establishment and maintenance of tree in urban environment
- 7.2 Benefits of urban forest
- 7.3 Stress management in urban trees
- 7.4 Field practice in evaluating urban green space & tree resources

Exercise & Term paper

- 1. Field exercise
- 2. Written assignment

Course Code : SFB 709

Course Title : **Agroforestry**

Credit hours : 2

Lecture hours : 50

General Objective :

Students will acquire advances of agroforestry & be able to utilize the knowledge and skills in agroforestry research & development.

Specific objectives :-

- Be familiar with agroforestry practices and their role in forming and forest system.
- Understand & describe A.F. system in Nepal.

Unit 1: Introduction and description of A.F. system.

- 1.1 Definition, system approach and classification of agroforestry practices.
- 1.2 Agroforestry in Nepal and South Asia
- 1.3 Farming system in Nepal and their linkage with agroforestry system
- 1.4 Farm land & forest based A.F. practices
- 1.5 Agroforestry contribution t& Rural economy

Unit 2: Farming system in Nepal

- 2.1 Agricultural system (Crops, Trees & Livestock)
- 2.2 Sustainable agriculture and Forestry common crops (cereal, horticulture, cash crops (NTFPs) their cultivation, management production.
Livestock : Production and management system
Trees : Fodder tree, fuelwood, range land management
Fisheries / management

Unit 3: General environmental issues within the context of A.F. system

- 3.1 Characteristics of rural communities

- 3.2 Population & land resources
- 3.3 Factors influencing the promotion of A.F. system
- 3.4 Constrains in resource management & use
- 3.5 Effects of resource depletion on environment & rural economy
- 3.6 Use of common land through landless for income generation / livelihood.

Unit 4 : Appropriate Agroforestry System

- 4.1 Rehabilitation of degraded sites of forest land
- 4.2 Rehabilitation of degraded farm land
- 4.3 Rehabilitation of degraded grazing land/gullies/landslides areas.
- 4.4 Reclamation of river affected fallow land through agroforestry
- 4.5 Waste land development through agroforestry
 - 4.5.1 Major problem facing waste land development

Unit 5: Agroforestry & livelihood

- 5.1 A.F. technology for income generation
- 5.2 A.F. for improved livelihood & food security sustainability for small holder in rural areas.
- 5.3 Choice of A.F. species as per soil type
- 5.4 Organic matter management

Unit 6: A.F. & Environment (Global change)

- 6.1 The role of A.F. system in conserving biodiversity
- 6.2 A.F. system & carbon sequestration potential & perspectives
- 6.3 Climate change adaptation in farming system through A.F.

Unit 7: The economics of agroforestry

- 7.1 Introduction
- 7.2 Efficiency in A.F. system & project design
- 7.3 Distributive consideration in A.F. project design
- 7.4 Distortion of A.F. incentive

Unit 8: Developing programme of research

- 8.1 Programme development
- 8.2 Client participation
- 8.3 Essential concept
 - 8.3.1 The management concepts, locality, inventory, socio-economic policy control

Unit 9: The A.F. challenge in Nepal & in Asia

- 9.1 Need for A.F. technology
- 9.2 Exploitation of forest resources
- 9.3 Soil degradation and loss
- 9.4 Increasing population pressure
 - 9.4.1 Insecurity of land tenure
 - 9.4.2 Farm & grove system
 - 9.4.3 Planting trees among agriculture crops
 - 9.4.4 Combined tree, shrubs and animal production

Unit 10: Evaluation

- 10.1 Internal criteria
- 10.2 External criteria

Exercise :

- Field visit to local area
- Project / Term paper

Course Code : SFB 701
Course Title: **Silviculture**
Credit Hour: 2
Lecture Hours : 50

Objective :

The students will acquire the knowledge and skills necessary for the application of silvicultural practices on forest stands, growth and forms according to varying forest resource values and ownership objectives.

UNIT 1 . FOUNDATION SILVICULTURE

- 1.1 Ecology
 - 1.1.1 Locality factors
 - 1.1.2 Succession
 - 1.1.3 Soil
- 1.2 Silviculture of natural and man-made forests
 - 1.2.1 Natural Forests
 - 1.2.2 Plantation Forests
 - 1.2.3 Silvics
 - 1.2.4 Silvicultural systems

UNIT 2. FOREST INFLUENCES

- 2.1 Analysis of effects of forests on soil, vegetation, physiography, local and microclimate.
 - 2.1.1 Soil productivity, leaf-litter decomposition and nutrient cycling (nutrient loss)
 - 2.1.2 Stream flow, precipitation
- 2.2 Carbon sequestration and Green house effects
- 2.3 Measuring Influences:
 - Ecological tools for describing vegetation type, environmental and physical parameters
 - * Vegetation mapping
 - Potential vegetation type mapping
 - * Meteorological tools

UNIT 3 SILVICS OF FOREST TREES OF NEPAL

- 3.1 Intensive studies pertaining to distribution, phenology, growth behavior, autecology, synecology, community environment, and regeneration techniques of following species :
 - 3.1.1 Important fodder species (20)
 - 3.1.2 Indigenous species (15) and
 - 3.1.3 Exotic species (10)

UNIT 4. PLANTATION SILVICULTURE

- 4.1 Basic principles in nursery and afforestation techniques
- 4.2 Nursery

- 4.2.1 Soil and water management
- 4.2.2 Recent techniques in production (including tissue culture),
harvesting of bare root and container seedlings
- 4.2.3 Practices for improved nursery productivity
- 4.2.4 Scope of mechanization
- 4.3 Seed collection and testing
- 4.4 Pre germination treatment
- 4.5 Seed storage and viability
- 4.6 Plantation establishment
 - 4.6.1 Planning (choice of species, site-species, seed source matching)
and site preparation
 - 4.6.2 Plantation of bare root, container seedlings and broadcast
 - * Recent trends and techniques
 - * Scope of mechanization
- 4.7 Plantation in marginal lands and Churia hills
- 4.8 Plantation Management
 - 4.8.1 Tending operations including weeding, cleaning, pruning, thinning,
etc.
 - 4.8.2 Plantation Protection
 - * Pathogen related damages
 - * Insect related damages
 - * Fire related damages
 - * Grazing damages

UNIT 5. QUANTITATIVE SILVICULTURE

- 5.1 Growth functions - empirical, exponential, allometry and Backmen's
growth function
- 5.2 Growth cycle and phases, correlation between size and plant population
- 5.3 Probability of individual tree mortality
- 5.4 Models of tree mortality and yield for unthinned forest stands
- 5.5 Dynamics of uneven aged forests
- 5.6 Competition for space, light and nutrients in forest stands and their effect
on population
- 5.7 Plant geometry and self-thinning, stand structure and allometry of trees
during self-thinning of pure stand.
- 5.8 Interpretation of self thinning rule

UNIT 6. FOREST GENETICS AND TREE IMPROVEMENT

- 6.1 Introduction to genetic process in Evolution
- 6.2 Selection techniques of vegetative propagation
 - 6.2.1 Hybridization
 - 6.2.2 Polyploidy
 - 6.2.3 Establishment and management of seed orchard
 - 6.2.4 Clonal and progeny testing
 - 6.2.5 Speciation
 - 6.2.6 Macro-evolution

- 6.2.7 Mass propagation of improved planting materials
- 6.3 Elementary and conceptual models in Genetics
 - 6.3.1 Basic Population Genetics
 - 6.3.2 Quantitative Genetics

UNIT 7. SILVICULTURAL SYSTEMS

- 7.1 Application of silvicultural systems in various types of forests (including consideration of site quality)
 - 7.1.1 High forest system
 - * Clear felling system
 - * Shelter wood system
 - * Selection system
 - 7.1.2 Coppice system
- 7.2 Conversions

UNIT 8. URBAN TREE SILVICULTURE

- 8.1 Establishment and maintenance of trees in urban environment
- 8.2 Nature and benefits of trees, planting, soil and tree management
- 8.3 Pruning, repair and protection
- 8.4 Stress management in urban trees and other vegetation
- 8.5 Field practice in evaluating urban green space and tree resources

UNIT 9. SILVICULTURAL MANAGEMENT OF THE FORESTS OF NEPAL

- 9.1 Silviculture of User Group forests
 - 9.1.1 Hill
 - 9.1.2 Terai and others
- 9.2 NTFPs
- 9.3 Forests on Private Land
- 9.4 Multi-use forest species
- 9.5 Multiple-use forest management [managing the same area for different objectives).

EXERCISE AND TERM PAPER

- 1. Field exercise
- 2. Written assignments
- 3. Class/lab exercise

Course Code : PWM 703

Course Title : Biodiversity Conservation & Protected Area Management

Credit Hour : 2

Lecture Hours : 50

General Objective :

This course will offer a broad landscape level perspective to biodiversity conservation, protected area management and wildlife management.

Specific Objectives:

- Understand current Policy & approaches to biodiversity conservation, protected area (PA) management and wildlife conservation.
- Analyze, evaluate and prepare holistic management plan for PA.
- Develop capability to collaborate research activities linking with management.
- Understand the human dimensions in biodiversity conservation measures.

UNIT 1. INTRODUCTION

- 1.1 Concept & significance of biological diversity
- 1.2 Trends of PA Mgmt. System
- 1.3 Perspectives of wildlife conservation and uses
- 1.4 Criteria for selection of protected areas

UNIT 2. BIODIVERSITY STATUS OF NEPAL

- 2.1 Zoogeography
- 2.2 Biodiversity richness of Nepal
- 2.3 Distribution of major fauna/flora in Nepal
- 2.4 Protected species and alien species
- 2.5 Potential threats

UNIT 3. POICY, LEGISLATIONS AND CONVENTION

- 3.1 Global, regional and national conservation policies & conventions
- 3.2 National legislation
- 3.3 National biodiversity action plan

UNIT 4. APPROACHES TO BIODIVERSITY CONSERVATION

- 4.1 Principles of conservation biology
- 4.2 Gene and species conservation
- 4.3 Ecosystem approach to conservation
- 4.4 Landscape and eco-region approach
- 4.5 Ex-situ conservation

UNIT 5. PA MANAGEMENT RESEARCH

- 5.1 Current research approaches (participatory action, basic etc.)
- 5.2 Research design
- 5.3 Assessment of research gaps and prioritization

- 5.4 Research methodology for population ecology, habitat use, park-people interaction
- 5.5 Wildlife diseases and breeding program
- 5.6 Role of institutions involved in research

UNIT 6. HUMAN DIMENSIONS IN BIODIVERSITY CONSERVATION

- 6.1 Relationship between human and wildlife
- 6.2 Impacts (positive & negative)
- 6.3 Conflict management
- 6.4 Sustainable utilization
- 6.5 Community mobilization in conservation (Institutional building & strengthening, Capacity building, education, training)

UNIT 7. ECONOMICS OF PROTECTED AREA

- 7.1 Concept and analysis
- 7.2 Valuation techniques
- 7.3 Assessment and valuation (Cost benefit analysis)

UNIT 8. PROTECTED AREA PLANNING & MANAGEMENT

- 8.1 Basic elements of planning protected area
- 8.2 Planning models : conventional planning and modern planning
- 8.3 Levels of planning (long term, mid-term, short term; master/system plan, management plan, site plan)
- 8.4 Planning steps
- 8.5 Components of plan
- 8.6 Management considerations for biodiversity conservation (Zoning of Pas, Core zone, Buffer zone, Corridors & connectivity, Landscape)
- 8.7 Management plan models (Regional and national)
- 8.8 GIS derived information applications
- 8.9 Logical framework application (Monitoring indicators and MOV)

Course Code : SFM 708
Course Title : **Community Forestry**
Credit hour : 2
Lecture hours: 50

General Objective of the course is to expose students in new concept and theories in community forestry.

UNIT 1. PREVALENT CONCEPTS AND ISSUES

- 1.1 Common Property Resources - Tragedy of commons
- 1.2 Privatization and nationalization
- 1.3 Community based management

UNIT 2. REGIONAL AND GLOBAL CONTEXT

- 2.1 Sustainable development perspective
 - 2.1.1 Human development perspective
 - 2.1.2 Balancing ecological and social economic dimension
 - 2.1.3 Sustainable live livelihood framework
- 2.2 Policy and practices from the Asia Pacific
 - 2.2.1 Community Forestry Policy and practices from the Asia-Pacific
 - 2.2.2 Other regional of the world
 - 2.2.3 New silviculture and forest management in Community Forestry
 - 2.2.4 Elements of the new silviculture in community forests, participatory forest management process
 - 2.2.5 Guidelines and best practices, interface between formal and local forestry knowledge: the evolution of concept and practice of Farmers' Forest Management School in community forests in Nepal.

UNIT 3. COMMUNITY FORESTRY IN NEPAL

- 3.1 Evolution in Nepal
 - 3.1.1 Basic premises of CF (Use Right, Equity)
 - 3.1.2 CF as a social process
 - 3.1.3 Three stages (privatizations, nationalizations, populism and community based)
 - 3.1.4 Four Stages (emergence stage before 1951, expansion stage 1951-76, shift in approach stage 1976-87, transformation stage 1987+)
- 3.2 CF as a new development paradigm
 - 3.2.1 CF as a new development paradigm - From 1970s to 2000
 - 3.2.2 Evolution of Community Forestry in Nepal
 - 3.2.3 Emergence of community forestry concept, models, strategies
 - 3.2.4 Approaches over time, Progressive features of community forestry in National forestry policy (Master Plan for the Forestry Sector, 1987)
 - 3.2.5 Forest Act, 1993, Forest Rules, 1995, Community Forestry Operational Guidelines, CF related manuals and guidelines.

- 3.2.6 Emergence of social factors
- 3.2.7 Stakeholders (Government, Non-government, civil society and private sectors) in community forestry in Nepal.
- 3.2.8 Analysis of stakeholders' roles, responsibilities, authorities and accountability and effectiveness
- 3.3 New Silviculture and Forest Management in CF
- 3.4 Poverty, Income generation and distribution of benefits
 - 3.4.1 Poverty, income generation and distribution: contribution of CF to people's improved livelihood
 - 3.4.2 Conceptualising poverty and livelihoods - causes and factors of poverty in Nepal.
 - 3.4.3 Scope and limitation of sustainable livelihoods approach to development
 - 3.4.4 Sustainable Livelihood Framework - vulnerability context, capital formation and their flow (physical, social, natural, human and financial capita/assets/resources) Policy, Institutions and Processes (PIP), livelihood strategies and outcomes, Analysis of community forestry contribution to improve people's livelihoods.

UNIT 4. PARTICIPATORY MONITORING AND ADAPTIVE COLLABORATIVE MANAGEMENT : VALUE ADDED APPROACH TO CF.

- 4.1 Definitions and conceptual framework of Adaptive Collaborative Management.
 - 4.1.1 Conditions, Processes and Outcomes, Stages of adaptive management-mental model, vision collective learning and system thinking practical and field work consists of Project attachment involving study of CF project planning, design and implementation aspects.

Field work

Students will be required to undertake a field study on a topic of their choice. A written field report will be submitted.

Course Code : SFM 720A
Course Title : **Rural Development**
Credit Hour : 3
Lecture hours : 75

General objective : To expose students to the relationship with natural resources and livelihood of rural people.

Specific objectives :

- To familiarize with fundamental concepts and paradigms in relation to rural development
- To understand potentials and constraints of development for different people
- To understand the differences and implications of different actors, contexts, approaches and strategies to rural development
- To understand the natural and non-natural resource-based livelihood strategies
- To understand and critically assess the policies and legislations in relation to NRMSA & RD.

Unit 1. Rural development - Concept, Theories and Approaches

- 1.1 Concept
Households, family, villages, community, society
Development
Poverty (Who are poor?; poverty-dimensions- (Global, international, national, local) poverty line and indicators; distribution)
Gender
Empowerment, Emancipation
Participation/Exclusion
Livelihoods/Assets - Livelihood Framework (Conceptual Framework), [Eiils (2000) Pages 28-50]
- 1.2 Theories
Paradigm of development and shifts in development thinking
Conservation and development
- 1.3 Development Approaches
Classical
Populist
Neo-liberal
Livelihood

UNIT 2. DIVERSITY AND COMPLEXITY OF RURAL COMMUNITIES IN THE CONTEXT OF RD [6]

- 2.1 Understanding rural communities
- 2.2 Dimensions of diversity in rural communities
- 2.3 Social exclusion and discrimination in rural communities

- 2.4 Social structure of rural communities (stratification with respect to leadership, class, ethnicity, caste, gender etc.)
- 2.5 Social processes in rural communities (social cohesion, integration, conflict)
- 2.6 Community organizations (formal, informal, networks)

UNIT 3. ACTORS, CONTEXT AND SUSTAINABLE LIVELIHOODS [4]

- 3.1 Rural Development Actors
 - 3.1.1 Social Relations (gender, class, age, ethnicity)
 - 3.1.2 Institutions (rules and customs, land tenure, market in practice)
 - 3.1.3 Organisations, their policies and practices (governmental, non-governmental, private voluntary, community-based, civil society)
- 3.2 Context
 - 3.2.1 Socio-economic and political trends (political situation, macro-policies, economic trend)
 - 3.2.2 Natural and social shocks/vulnerability (natural hazards & calamities, political conflicts, diseases/epidemics)
- 3.3 Assets/Resources/Capitals: (Building and mobilisation of various capitals)
 - 3.3.1 Human
 - 3.3.2 Social/political
 - 3.3.3 Natural
 - 3.3.4 Physical
 - 3.3.5 Financial

UNIT 4. SUSTAINABLE LIVELIHOOD STRATEGIES AND OUTCOMES

- 4.1 Sustainable livelihoods strategies
 - 4.1.1 Natural resource-based strategies in relation to different types of capitals - social, financial, physical, human - to improve people's livelihoods (Watershed, Water resource, Forest (community forest⁵ry, leasehold forestry etc.), Biodiversity conservation (Buffer zone, conservation area, agro-biodiversity), Agricultural
- 4.2 Non-natural resource-based Strategies
 - 4.2.1 Enterprise Development (including entrepreneurship and off-farm activities)
 - 4.2.2 Micro-financing (saving & credit)
 - 4.2.3 Remittances
 - 4.2.4 Services
- 4.3 Livelihood Outcomes
 - 4.3.1 Livelihood security (food security, income stability, social inclusion-empowerment)
 - 4.3.2 Environmental sustainability (Sustainable natural resources management - agriculture, forestry, water, energy)

UNIT 5. INSTITUTIONAL CHALLENGES FOR RURAL DEVELOPMENT

- 5.1 National policy making and legislation
- 5.2 Good governance at macro, meso and micro-level institutions
 - 5.2.1 Compliance to rule of law
 - 5.2.2 Roles and responsibility & accountability
 - 5.2.3 Transparency
 - 5.2.4 Decentralization/devolution
- 5.3 Power balance (representation and participation in decision/policy making)

Course Code : SFM 720B
Course Title : **Conservation and Rural Development**
Credit Hour : 2
Lecture Hours : 50

Unit 1. RURAL DEVELOPMENT - CONCEPT 7 THEORIES

- 1.1 Concept
 - 1.1.1 Households, family, villages, community, society
 - 1.1.2 Gender
 - 1.1.3 Empowerment, emancipation
 - 1.1.4 Participation/Exclusion
 - 1.1.5 Sustainability, Rural-Urban
 - 1.1.6 Development
 - 1.1.7 Poverty (Who are poor?; poverty dimensions-global, international, national, local; poverty line and indicators; distribution)
 - 1.1.8 Livelihoods
- 1.2 Theories
 - 1.2.1 Feminist theory
 - 1.2.2 Development strategies and poverty alleviation
 - 1.2.3 Conservation and Development
 - 1.2.4 Paradigm of development & shifts in development thinking

UNIT 2. DIVERSITY AND COMPLEXITY OF RURAL COMMUNITIES

- 2.1 Socio-political context of community development
 - 2.1.1 Dimensions of diversity
 - 2.1.2 Social exclusion, discrimination
- 2.2 Community organizations (formal, informal, network)
 - 2.2.1 Social cohesion/integration/conflict (class, ethnic, caste, gender, etc)
 - 2.2.2 Stakeholder analysis

UNIT 3. STRATEGIES AND APPROACHES TO RURAL COMMUNITY DEVELOPMENT (16)

- 3.1 Strategies
 - 3.1.1 State (government) led
 - 3.1.2 Non-government led
 - 3.1.3 Market led
 - 3.1.4 Mainstreaming gender
 - 3.1.5 Community led (Social mobilization, e.g. Community forestry)
- 3.2 Approaches (6)
 - 3.2.1 Rights based approach
 - 3.2.2 Participatory (bottom-up)
 - 3.2.3 Blue print (top-down and conventional development planning)
 - 3.2.4 Dissemination of information technology (extension)
 - 3.2.5 Integrated, holistic, systemic, synergy
 - 3.2.6 Sectoral

- 3.2.7 Indigenous local knowledge and initiatives
- 3.3 Sustainable livelihood approaches
 - 3.3.1 Mobilization and building human, natural, social, physical, financial capital
 - 3.3.2 Local resource mobilization (micro-finance, IGA, Saving/Credit, Off-farm employment, enterprise development)
 - 3.3.3 Local institution building (Human resource capacity building self help groups)
 - 3.3.4 Integrated Conservation and Development Project (ICDP) approach

UNIT 4. NATURAL RESOURCE MANAGEMENT & SUSTAINABLE AGRICULTURE AND RURAL DEVELOPMENT

- 4.1 Management of Natural Resources and Agriculture for Rural Community Development
 - 4.1.1 NRM and RD (e.g. Community Forestry)
 - 4.1.2 Conservation and development (biodiversity, bufferzone, conservation area)
 - 4.1.3 Role of agriculture in RD
 - 4.1.4 Agroforestry
 - 4.1.5 Livestock/fishery/farm-fodder linkages
 - 4.1.6 Ecotourism and RD
- 4.2 NRM Linkage
 - 4.2.1 Sustainable agriculture intensification/rural productivity and natural resource use
 - 4.2.2 Agriculture-environment-poverty-nexus
 - 4.2.3 Population and resources
 - 4.2.4 Rural - urban linkages
 - 4.2.5 Case study/Field visits

UNIT 5. POLICIES AND INSTITUTIONAL CHALLENGES FOR RURAL DEVELOPMENT

- 5.1 Global issues, local action - the impact of IFIs, conventions, conferences on rural poverty
- 5.2 Decentralization and the role of state/local government
- 5.3 National policymaking, legislation, by laws, plans, programs and the influence of macro-economic policies, plans and programs.
- 5.4 Good (democratic) governance (responsibility, accountability, transparency)

Report Preparation

Choose 3 cases with certain approaches (selection criteria)

- Community (women) led - community forestry
- NGO led - biodiversity conservation
- Government led - watershed management

One field trip to Eco-tourism village in Sirubari, Syangja

Examples of Projects:

1. Biodiversity based livelihood programme - managed by a NGO-Rural Reconstruction Nepal, Pokhara.
2. In situ conservation of agro-biodiversity - managed by Libird NGO, NARC govt and IPGRI.
3. Watershed Management Project - managed by TOLO Team organizing for local initiative (NGO) - funded by JICA funded in the field of conservation, reforestation, S/C.
4. Annapurna Conservation Area Project (ACAP) - managed by KMTNC a NGO, in the field of Conservation and Development.
5. Eco-tourism - i. Managed by private sector as a village tourism model in Sirubari, Syangja ii. Baghmara community forest in Royal Chitwan National Park, Bufferzone, managed by CBO.
6. Machhapuchre Development Organisation - a NGO in the field of conservation, local governance, community development.
7. Participatory Technology Development - managed by Libird, a NGO in the field of local knowledge.
8. Lake Watershed conservation - managed by HMG, Ministry of Forests and Soil Conservation.
9. Kalika lake 11 homogenous groups, CBOs demonstrating rural-urban linkages.

Course Code : SFM 720C
Course Title : **Project Management**
Credit hour : 2
Lecture hours: 25, Practical 25

General objective : To expose students in project management activity so that they will be able to mobilize project resources effectively and efficiently.

Specific objective:

On the completion students will have:

- a. Knowledge of developing project, Understanding project framework & project environment.
- b. Knowledge of project management, Project monitoring & Project organizations
- c. Complete understanding of managing people in project organization and related skills of management
- d. Exposure to project implementation planning, procurements, contracts & use of professional services
- e. Ability to project finance and financial management analysis.

- Unit 1. Development project finance and financial management & development projects & project cycle.
- Unit 2. Evaluation of development assistance Framework & project Environment
- Unit 3. Beyond project: The wider context of project management & Project manager, monitoring
- Unit 4. Project organizations
- Unit 5. Managing people in project organization
- Unit 6. Skills of management
- Unit 7. Project implementation planning
- Unit 8. Procurements, contracts & use of professional services
- Unit 9. Project finance and financial management
- Unit 10. Evaluation of development assistance
- Unit 11. Current issues in development management and experiences in project management.

Course Code : PWM 715

Course Title : **Eco-tourism (Nature based Tourism) Planning and Management**

Credit Hour: 2

Lecture Hours: 50

General Objective:

The overall objective of this course will be to build up the capacity of the students to plan and manage tourism without damaging the natural and cultural environment for the benefits of communities.

Specific Objectives:

The specific objectives will be to make students able to :

- Understand the philosophy, concept and evolution of ecotourism concept
- Apply the skills and knowledge to design and manage ecotourism in natural and cultural areas;
- Assess and manage social, economic and environmental impacts of ecotourism;
- Motivate, organize, and mobilize communities for eco-tourism planning and management; and
- Promote and market eco-tourism.

UNIT 1. ORIGIN OF ECO-TOURISM AND ITS EVOLUTION

- 1.1 Evolution of tourism.
- 1.2 Segmentation of tourism market (Mass tourism, Adventure tourism, Nature based tourism, Eco-tourism, Village tourism, Village tourism, Rural tourism, Sustainable tourism).
- 1.3 Principles of Eco-tourism.
- 1.4 Shift in paradigm of Ecotourism.
- 1.5 Status of tourism and Eco-tourism in the World and Nepal.

UNIT 2. ECO-TOURISM IN AND AROUND PROTECTED AREA

- 2.1 Policy and legislation.
- 2.2 Trends of tourism growth and activities in protected areas
- 2.3 Symbiosis and conflicts

UNIT 3. ECO-TOURISM PLANNING TOOLS

- 3.1 Carrying capacity
- 3.2 Tourism/Recreation opportunity spectrum (TOR)
- 3.3 Limits of acceptable change
- 3.4 Visitor impact management
- 3.5 Measuring tourism demand.

UNIT 4. DESIGNING FACILITIES AND SERVICES FOR ECO-TOURISM

- 4.1 Designing infrastructure facilities and services
- 4.2 Designing recreational facilities and services
- 4.3 Designing interpretation facilities and services
- 4.4 Code-of-conducts

UNIT 5. ECOTOURISM PLANNING MODELS

- 5.1 Components of planning.
- 5.2 Elements of eco-tourism planning
- 5.3 Identifying tourism potential
- 5.4 Conventional approach
- 5.5 Participatory approaches
 - 5.5.1 Sustainable Tourism Planning Model (WTO-Model)
 - 5.5.2 ZOPP Model (Objective Oriented Planning)
 - 5.5.3 APPA Model (Appreciative Participatory Planning Approach)
 - 5.5.4 ICDP Model (Integrated Conservation and Development Planning).
 - 5.5.5 Case Studies : Quality Tourism Project, ACAP, Baghmara, RCNP, Langtang.

UNIT 6. COMMUNITY PARTICIPATION IN ECO-TOURISM

- 6.1 Community awareness
- 6.2 Mobilization and organization of community
- 6.3 Institutional strengthening
- 6.4 Community capacity building

UNIT 7. PROMOTION OF ECO-TOURISM

- 7.1 Identification of tourism potential
- 7.2 Tourism product development.
- 7.3 Marketing ecotourism: analysis of market chain and identification of stakeholders, entrepreneurship development, networking with market: publicity, and delivery of tourism product.

UNIT 8. MANAGING TOURISM IMPACTS

- 8.1 Impacts of tourism (social, economic and environmental).
- 8.2 Measuring tourism impacts
- 8.3 Mitigating negative impacts
- 8.4 Enhancing positive impacts

OBSERVATION, EXERCISE AND TERM PAPER

- Identification of tourism products
- Identification of impacts / social, environment economics and visitor satisfaction
- Designing interpretation
- Measuring tourism demand
- Development eco-tourism plan of an area.