DEPARTMENT OF AGROFORESTRY
Bangladesh Agricultural University
Mymensingh

Syllabus and Courses Profile for MS in Agroforestry Degree

July-December/October-March (New) Semester

A. Compulsory Courses (8 Credit hour)		
Course No.	Course Title	Cr. hr.
AF 501	Agroforestry Systems and Practices	3
AF 503	Agroforest Botany	3
AF 505	Agroforestry Research Methodology	2
B. Elective Courses (At least 4 Cr. hr. to be taken)		
AF 513	Silvicultural Practices in Agroforestry	2
AF 515	Medicinal Plants and Non-wood Products	2
AF 517	Soil Productivity and Conservation in Agroforestry	2
AF 519	Pest Management in Agroforestry	2
AF 502	Research work (3 Credits)	3(S/U)
Total credit		**15**

April-September (New) Semester

A. Compulsory Courses (8 Credit hour)		
Course No.	Course Title	Cr. hr.
AF 507	Agroforest Management Technology	3
AF 509	Social Forestry and Rural Development	3
AF 511	Component Interaction in Agroforestry	2
B. Elective Courses (At least 4 Cr. hr. to be taken)		
AF 521	Wood Quality and Wood Technology	2
AF 523	Land-use Planning in Agroforestry	2
AF 525	Environmental Protection in Agroforestry	2
AF 502	Research work (3 Credits)	3(S/U)
Total credit		**15**

Thesis Semester:		
AF 502	Research Work	2(S/U)
AF 504	Evaluation of Thesis	5
AF 506	Thesis Defense	3
Total credit		10
Grand Total		**40**

Courses Profile

Department of Agroforestry
Course Code: AF 501 **Course Title:** Agroforestry Systems and Practices
Credit: 03 **Contact Hours:** 03 **July-December/October-March**

Rationale

Different technologies of agroforestry practices and their scientific production systems opens up promising new prospects for resources conservation and communities' development that incorporate into the main curricula of the Master of Science in Agroforestry degree.

Course Learning Outcomes (CLO)

1. Explain the concepts, attributes and potential roles of agroforestry systems and practices for maximizing farm production and income as well as conserve natural resources in Bangladesh.
2. Demonstrate in-depth knowledge on various agrisilviculture, silvopasture and agrisilvipastural agroforestry systems.
3. Acquire knowledge of different aagroforestry systems of Bangladesh.
4. Analyze various tropical and temperate agroforestry systems in respect to their potential contribution for maintaining sustainable farm production.
5. Design appropriate agroforestry systems and practices for both temperate and tropical zones.
6. Apply their broad knowledge and technical skills to analyses the economic, environment and social aspects of different agroforestry systems and practices.

Summary of Course Contents

Content	**Aligned CLO**	**No. of Lectures**
Introduction: Nature, attributes and potential roles of Agroforestry.	CLO 1	4
Agroforestry systems and Practices: Traditional and other relevant agroforestry systems, practices & technologies- Agrisilvicultural systems, Silvopastural systems, Agrosilvopastural systems, Aquasilvicultural systems and other Agroforestry systems.	CLO 2 & 6	10
Agroforestry systems practiced in Bangladesh.	CLO 3	6
Class Room Test		1
Agroforestry systems practiced in other tropical countries: India, China, Indonesia, Pakistan, Nepal, Sri Lanka and Philippines.	CLO 4 & 5	10
Agroforestry systems in Temperate region: Agrosilvicultural uses of windbreaks & shelterbelts, silvopastoral system in	CLO 4 & 5	8

woodland, livestock grazing in managed plantation, current temperate-zone agroforestry systems and intercropping under hardwood species.		
Evaluation of Agroforestry systems: Methodology for evaluating Agroforestry systems, Productivity evaluation, Sustainability evaluation, and Adoptability evaluation.	CLO 6	6
Class Room Test		1
Assignment Presentation		2
Total		48

Teaching Strategy

- Lecture
- Videotape
- Assignment
- Plenary discussion
- Field visit and case studies
- Audio-Visual
- Problem Based Learning

Assessment Strategy

- Short answer
- Essay
- Completion
- Project
- Questionnaire

Recommended Books

Huxley, P.A. 1999. *Tropical Agroforestry.* Blackwell Sciences.

Haque, M.A. (ed.) 1996. Agroforestry in Bangladesh. VFFP, BAU, Mymensingh and SDC, Dhaka.

Jha, L.K. 1995. *Advances in Agroforestry.* APH Publishing Corporation, New Delhi.

Nair, P.K.R. 1993. *An Introduction to Agroforestry.* Kluwer Academic Publishers.

Mellink, W; Y.S. Rao and K.G. Mac Dicken (eds), 1991. *Agroforestry in Asia and the Pacific.* RAPA, FAO and Winrock International, Bangkok, Thailand.

Zabala, N.Q. 1990. *Development of Professional Education in the Forestry Sector.* IFCU, Chittagong and FAO, Rome, Italy

Zhaohua, Z; C. Mantang; W. Shiji and J. Youxu (eds.), 1991. *Agroforestry Systems in China.* The Chines Academy of Forestry and IDRC, Canada.

Nair, P.K.R. 1987. *Agroforestry Systems Inventory.* Agroforestry Systems 5: 301-317.

Department of Agroforestry
Course Code: AF 503 **Course Title:** Agroforest Botany
Credit: 03 **Contact Hours:** 03 **July-December/October-March**

Rationale

Identify the compatible tree-crop combinations for sustainable production of different agroforestry system. It also provides role of Multipurpose Trees and Shrubs (MPTS) and their suitability in various land-use systems of Bangladesh.

Course Learning Outcomes (CLO)

1. Describe woody perennials with their classification, characteristic and uses in Different Agroforestry Systems.
2. Explain the concept of Multipurpose Trees & Shrubs (MPTS) with their importance and uses in Agroforestry.
3. Discuss the selection criteria of MPTS and its importance on the basis of different agroecological zones in Bangladesh.
4. Describe the sylvan features of different MPTS.
5. Introduce and explain different techniques for the improvement of the selected agroforest species.

Summary of Course Contents

Content	**Aligned CLO**	**No. of Lectures**
Woody Perennials in Agroforestry: Classification, characteristic and uses in various agroforestry systems.	CLO 1	4
Multipurpose Trees & Shrubs (MPTS) in Agroforestry: Concepts, and variable uses of indigenous and exotic multipurpose trees; selection of MPTS and other woody perennials for different agroforestry systems in different agro-ecological zones of Bangladesh.	CLO 2 & 3	12
Class Room Test		1
Characteristic features of selected species: Botanical features, adaptability, propagation systems and uses of the selected species, their root spread, canopy growth, litter fall and phenophases.	CLO 4	20
Introduction and improvement of selected species: Improvement of varieties through selection procedure, introduction of adaptable exotic species, their production & distribution, tree improvement through vegetative propagation and grafting techniques.	CLO 5	8
Class Room Test		1
Assignment Presentation		2
Total		48

Teaching Strategy

- Lecture
- Videotape
- Assignment
- Field visit
- Audio-Visual
- Demonstration
- Problem Based Learning

Assessment Strategy

- Short answer
- Multiple choices
- Essay
- True-false
- Completion
- Project
- Questionnaire

Recommended Books

Bandyopadhyay, A. K. 1997. *A text Book Agroforestry with Applications.* UBS Publishers Distributors Ltd. New Delhi, India.

Khan, M.S. and M. K. Alam. 1996. *Homestead flora of Bangladesh.* BRAC, IDRC, SDC, Dhaka, Bangladesh.

Jha, L. K. 1995. *Advances in Agroforestry.* APH publishing Corporation, New Delhi.

MacDicken. K. G. 1994. *Selection and Management of Nitrogen-Fixing Trees.* Morriltion, Arkansas: Winkrock International, and Bankok : FAO.

Nair, P. K. R. 1993. *An Introduction to Agroforestry.* Kluwer Academic Publishers.

Das, D. K. 1990. *List of Bangladesh Village Tree Species.* Forest Research Institute, Chittagong.

Huq, A. M. 1986. *Plant Names of Bangladesh.* Bangladesh National Herbarium, 220, Green Road, Dhanmondi, Dhaka.

Department of Agroforestry
Course Code: AF 505 **Course Title**: Agroforestry Research Methodology
Credit: 02 **Contact Hours:** 02 **July-December/October-March**

Rationale

Improve existing agroforestry models through providing appropriate research design and develop sustainable agroforestry model for integrated agricultural production system.

Course Learning Outcomes (CLO)

1. Discuss research issues and principles of field experiment in Agroforestry.
2. Identification of problems as well as developing research plan.
3. Design of experiment and their management.
4. Demonstration on data collection procedure.
5. Data analysis and interpretation of results by using different methods.

Summary of Course Content

Content	**Aligned CLO**	**No. of Lectures**
General discussions on research issues in Agroforestry; principles of field experiment in Agroforestry.	CLO 1	3
Problem identification, developing program of research with written study plan.	CLO 2	4
Designing and management of Agroforestry experiment.	CLO 3	6
Class Room Test	-	1
Implementation of Agroforestry research	CLO 2 & 3	3
Procedure of data collection.	CLO 4	4
Data analysis and interpretation of results: Orientation to computer system for data analysis with computer package program.	CLO 5	8
Class Room Test		1
Assignment Presentation		2
Total		32

Teaching Strategy

- Lecture
- Videotape
- Assignment
- Field visit
- Audio-Visual

- Demonstration
- Problem Based Learning

Assessment Strategy

- Short answer
- Multiple choices
- Essay
- True-false
- Completion
- Project
- Questionnaire

Recommended Books

Avery, M.E.; M.G.R. Cannell and C. Ong (eds.). 1990. *Biophysical Research for Asian Agroforestry.* Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.

Burch, W.R. (ed.), 1990 *Applications of Social Science: Theory and Methods to Agroforestry Research.* Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.

Raintree, J.B. 1986. *D & D user's manual: an introduction to Agroforestry diagnosis and design.* ICRAF, Nairobi.

Huxley, P.A. (ed.), 1986. *A manual of methodology for the exploration of multipurpose trees (MPTs).* ICRAF, Nairobi.

Bentley, W.R. 1985. *Agroforestry: a strategy for research and action in India.* Ford Foundation New Delhi.

Department of Agroforestry
Course Code: AF 507 **Course Title:** Agroforest Management Technology
Credit: 03 **Contact Hours:** 03 **January-June/April-September**

Rationale

Incorporation of integrated management technologies to increase farm productivity and create marketing channels for Agroforestry products. It also provides strategies of harvesting and processing of products.

Course Learning Outcomes (CLO)

1. Describe structural management of important Agroforestry Systems.
2. Demonstrate different Agroforestry Systems for increased production and soil conservation through sustainable ways.
3. Illustrate tree management approaches for sustainable production and conservation.
4. Describe important methods of harvesting and processing of Agroforestry products under different agroforestry systems.
5. Develop skills to analyze economic aspects of agroforestry systems and identify the marketing channel of agroforestry products to increase farmer's income.

Summary of Course Contents

Content	**Aligned CLO**	**No. of Lectures**
Structural management of Agroforestry systems: Brief outline on structural development of important agroforestry systems, modification and replacement of existing systems in farmland and homestead plantations.	CLO 1	10
Management systems for sustainability and productivity in agroforestry: Sustainable management of different agroforestry systems for increased production; NFTs for soil conservation and fertility maintenance, management of degraded lands for maximizing outputs, byproduct utilization and nutrient recycling.	CLO 2	8
Tree management technologies in Agroforestry: Plantation, establishment & replacement techniques, nursing and protection of saplings, training and pruning for desired canopy structures, root & shoot management techniques under different Agroforestry systems.	CLO 3	8
Class Room Test		1
Harvesting & Processing of agroforestry products: Harvesting of woody perennials, severe branch pruning for forage and fuel woods, lopping, pollarding and tree felling techniques, harvesting of crops and other non-wood products under different agroforestry	CLO 4	10

systems, post-harvest processing of agroforestry products.		
Functional aspects and economics of Agroforestry systems: Inputs, labour utilization, system dynamics, affective factors, land-man ratio, economic policies and evaluation of individual systems, marketing of agroforestry products, risk and remedies.	CLO 5	8
Class Room Test		1
Assignment Presentation		2
Total		48

Teaching Strategy

- Lecture
- Videotape
- Assignment
- Field visit
- Audio-Visual
- Demonstration
- Problem Based Learning

Assessment Strategy

- Short answer
- Multiple choices
- Essay
- True-false
- Completion
- Project
- Questionnaire

Recommended Books

Alam, M.K.; F.U. Ahmed and S.M.R. Amin (eds.), 1997. Agroforestry: Bangladesh perspective. APAN, NAWG and RARC.

Haque, M.A. (ed.). 1996. Agroforestry in Bangladesh. VFFP, BAU, Mymensingh and SDC. Dhaka.

Nair, P.K.R. 1993. *An Introduction to Agroforestry,* Kluwer Academic Publishers.

Jha, L. K. 1995. *Advance in Agroforestry. APH Publishing Corporation, New Delhi.*

Mellink, W; Y.S. Rao and K.G. Macdicken (eds.), 1991. *Agroforestry in Asia and the Pacific.* RAPA, FAO and Winrock International, BHangkok, Thailand.

Zhaohua, Z; C. Mantang; W. Shiji and J. Youxi (eds.), 1991. *Agroforestry Systems in China,* The chinese Academy of Foresrt and IDRC, Canada.

Pirone, P.P. 1978. Tree Maintenance. Oxford Univ. Press. New York.

Department of Agroforestry

Course Code: AF 509 **Course Title:** Social Forestry and Rural Development

Credit: 03 **Contact Hours:** 03 **January-June/April-September**

Rationale

Incorporation of people-oriented forestry approaches towards contribution of sustainable use of natural resources and improvement of the livelihood of rural people into the main curricula of the Master of Science in Agroforestry degree.

Course Learning Outcomes (CLO)

1. Understand social forestry, benefits, principal and historical development of social forestry in Bangladesh perspectives. Also distinguish the specific role of rural women and NGOs on social forestry programs.
2. Demonstrate in-depth knowledge on different participatory forest management approaches with particular focus on livelihood development of rural people. Successfully identifies the different actors in social forestry and their power dynamics.
3. Design appropriate social forestry programs, and evaluate different people-oriented approaches in the context of Bangladesh.
4. Apply their broad knowledge and technical skills to create sustainable solutions for rural development with maintain both conservation and development goals.
5. Appropriately communicate issues, lessons learned and success stories of social forestry for climate change mitigation.

Summary of Course Contents

Content	**Aligned CLO**	**No. of Lectures**
Introduction: Concept, benefit, objectives of social forestry; principal of social forestry; overview of social forestry programs in South Asia countries; prospect of social forestry in Bangladesh.	CLO 1 & 2	8
Actors: Different actors in social forestry programs; analysis of macro-micro levels actors; leadership in social forestry; actors power, influence and interest in social forestry; role of women and NGOs in social forestry.	CLO 2	8
Governance: Enabling environment for social forestry; social forestry polices; rules and regulations of social forestry in Bangladesh; decentralization and devolution of power in social forestry; governance structure of social forestry in Bangladesh; women empowerment in social forestry.	CLO 2	6
Class room Test		1
Management: Participatory, joint and co-management approaches in social forestry; community based management in social forestry; planning, designing, monitoring and evaluation of social forestry programs.	CLO 3	6
Rural Development: The notion of community and rural development; goals and strategies; conceptual framework and competing theories; role of community leaders in social forestry; participation; property rights in social forestry; linkage between	CLO 4	8

social forestry and community development; common property resources and collective action in community development.		
Livelihood and Poverty: Analysis of sustainable livelihood and poverty alleviation strategies in line with social forestry programs. Identify the ways and process of poverty alleviation through social forestry program in the rural area. Determine and process of rural people livelihood development through implementation of social forestry approaches.	CLO 4 & 5	8
Class Room Test		1
Assignment Presentation		2
Total		48

Teaching Strategy

- Lecture
- Videotape
- Assignment
- Plenary discussion
- Field visit and case studies
- Audio-Visual
- Problem Based Learning

Assessment Strategy

- Short answer
- Essay
- Completion
- Project
- Questionnaire

Recommended Books

Rao, M.S. 1979. Introduction to social forestry. Oxford and IBH Publishing Company Limited, London, UK.

Ghosh, S. K. and Singh, R. 2015. Social forestry and forest management. Global Vision Publishing House, New Delhi, India.

Fox, J., Bushley, B.R., Miles, W. B. and Quazi, S. A. (eds.). 2008. Connecting communities and conservation: Collaborative management in protected areas in Bangladesh. Published by East-West Center and Bangladesh Forest Department.

Manno, V.C. 1986. Community forestry handbook. Field document no. 1, Asian Development Bank (ADB) community forestry project (UNDP/FAO/BFD/81/018) publication.

Islam, K. K. and Hyakumura, K. 2018. Political economy of participatory forestry in Bangladesh. *In:* Alam, K. (ed.), *Bangladesh: Economic, Political and Social Issues.* Nova Science Publishers, USA. pp. 47-65.

Arnold, J. E. M. 2001. Forest and People: 25 Years of community forestry. Food and Agriculture Organization (FAO) Publication, United Nation, Rome, Italy.

Tiwari, K.M. and Singh, R. V. 1990. Social forestry plantation. Oxford and IBH publication Co. Ltd., New Delhi, India.

Islam, K.K. and Sato Noriko. 2013. People oriented forest management in Bangladesh. LAP Lambert Academic Publishing, Germany.

Department of Agroforestry

Course Code: AF 511 **Course Title:** Component Interaction in Agroforestry

Credit: 02 **Contact Hours:** 02 **January-June/April-September**

Rationale

Indicate the natural resources utilization and sharing process among the different components of agroforestry practices. It also ensures the efficient utilization of resource pool (light, water and nutrients) and reveals the influence of the components on each other.

Course Learning Outcomes (CLO)

1. Describe Component interaction with its nature and types and ecological interaction for growth resources.
2. Explain the principles of natural resource (light, water and nutrients) capture and utilization and microclimate modification.
3. Determine tree-crop interaction effect and Land Equivalent Ratio (LER).
4. Design agroforestry models for efficient utilization of natural resources viz. light, water and nutrients.
5. Describe the role of root distribution of components in Agroforestry.

Summary of Course Content

Content	**Aligned CLO**	**No. of Lectures**
Introduction: Concept, nature and type of interactions.	CLO 1	3
Ecological interactions between Agroforestry components, competition between the components for growth resources.	CLO 1 & 2	3
Principles of Resource capture and utilization of light, water and nutrients.	CLO 2,3 & 4	6
Microclimate modification in Agroforestry.	CLO 3	3
Class room Test	-	1
Efficient use of growth resources for maximizing the overall productivity	CLO 3& 4	4
Tree-Soil-Crop interaction on slopes.	CLO 4	5
Root distribution of trees and crops: Competition and / or complementary.	CLO 3 & 5	5
Class Room Test	-	1
Assignment Presentation		1
Total		32

Teaching strategy

- Lecture
- Field Visit (BAU Botanical Garden, BAU Germplasm Centre, Forest, Woodlot, Forest Nursery, Homestead agroforestry)
- Demonstration
- Videotape
- Audio-visual

Assessment strategy

- Identification
- Observation
- Short answer
- MCQ and True/false
- Report/Assignment
- Interview
- Problem solution

Recommended Books

Ong, C.K. and P.A. Huxley. 1999. *Tree-crop Interaction: A Physiological Approach.* CABI Publishing.

Huxley, P.A. 1999. *Tropical Agroforestry.* Blackwell Sciences.

Alam, M.K.; F.U. Farid and S.M.R. Amin (eds.). 1997. *Agroforestry: Bangladesh Perspective.* APAN, NAWG and BARC.

Nair, P.K.R. 1993. *An Introduction to Agroforestry,* Kluwer Academic Publishers.

Vandermeer. J. 1989. *The Ecology of Intercropping.*

Department of Agroforestry
Course Code: AF 513 **Course Title**: Silvicultural Practices in Agroforestry
Credit: 02 **Contact Hours:** 02 **July-December/October-March**

Rationale

Integration of forest/wood related approaches in Agroforestry for maintaining forest resources with proper management through sustainable ways.

Course Learning Outcomes (CLO)

- Describe Silviculture with concepts, principles and its importance in Agroforestry.
- Explain different silvicultural systems practiced in Agroforestry.
- Illustrate tree seedling/sapling raising techniques and its out planting procedure.
- Construct several silvicultural techniques for forestland management in Bangladesh.
- Determine and analyze the growth and biomass yield of trees.

Summary of Course Content

Content	**Aligned CLO**	**No. of Lecturer**
Introduction: Concepts and basic principles of silviculture, concepts of Bangladesh forest and need for silvicultural practices in Agroforestry.	CLO 1	8
Silvicultural systems: Clear felling system, uniform system, group system, irregular shelter wood system, strip system, wedge system and selection system.	CLO 2	6
Class Room Test		1
Regeneration, Nursery operation & establishment technology: Natural and artificial regeneration: seed collection, processing and storage; pre-sowing treatments, germination and nursery operation, raising of polybag & bare-rooted seedling, vegetative propagation, artificial seed production & micropropagation, plantation & establishment of saplings, tending operation and protection of planting stocks.	CLO 3	7
Forest management in Bangladesh: Silvicultural management in forestland agroforestry with particular reference to hill forest, mangrove forest, sal forest and homestead forest.	CLO 4	4
Measurement of trees and forest: Measuring of diameter and girth, height, tree stem form, volume biomass, age and growth.	CLO 5	4
Class Room Test		1
Assignment Presentation		1
Total		32

Teaching Strategy

- Lecture
- Videotape
- Assignment
- Field visit and case studies
- Audio-Visual
- Problem Based Learning

Assessment Strategy

- Short answer
- Multiple choices
- Essay
- True-false
- Completion
- Project
- Questionnaire

Recommended Books

Mayhew, J and A.C. Newton. 1998. *The silviculture of Mahogony.* CABI publishing.

Srivastava, M.B. 1997. *Introduction to Forestry.* Vikas Publ. House, Bangalore, India.

Philip, M.S., 1994. *Measuring Trees and Forests. 2nd Edition. CABI Publishing.*

Dwivedi, A.P. 1992. *Agroforestry: Principles and Practices.* Oxford & IBH Publ. Co.

Matthew. J.K.; C.L. Bruce and D.O. Chaduick. 1992. *The Ecology and Silviculture of Mixed-species Forests.* Kluwer Academic Publishers.

Savill, P.S. 1991. *The silviculture of Trees used in British Forestry.* CABI Publishing.

Zabala, N.Q. 1991. *Silvicultural Systems.* IFCU, Chittagong and FAO, Rome, Italy.

Zabala, N.Q. 1990. *Principles and Practice of Silviculture.* IFCU, Chittagong and FAO, Rome Italy.

Shepherd, K.R. 1986. *Plantation Silvicuture.* Kluwer Academic Publishers.

Duryea, M.L. and T.D. Landis. 1984. *Forestry Nursery Manual: Production of Bareroot Seedling.* Kluwer Academic Publishers.

Prakash, R. and L.S. Khanna. 1983. *Theory and Practice of Silvicultural Systems.* International Book Distributions. Dehra Dun, Indian.

Department of Agroforestry
Course Code: AF 515 **Course Title**: Medicinal Plants and Non-wood Products
Credit: 02 **Contact Hours:** 02 **July- December/October-March**

Rationale

Introduction of medicinal plants and different non-wood products in agroforestry technologies and practices for their sustainable production, improvement and conservation through integrated ways in global perspective. It also helps to reveals their value in global herbal industry.

Course learning Outcomes (CLO)

1. Describe about common medicinal plants with concepts, benefits and its roles.
2. Analyze morpho-physiological characteristics as well as growth of selected medicinal plants
3. Identify the plant parts used as traditional medicine.
4. Design agroforestry practices for sustainable production, improvement and conservation of medicinal species.
5. Analyze industrial use of medicinal plants and non-wood products.
6. Identify non-wood products and their role in agroforestry.

Summary of Course Content

Content	**Aligned CLO**	**No. of Lecturer**
Introduction to common medicinal plants, their role in herbal medical science.	CLO 1	6
Morph-physiological characteristics, propagation and growth of medicinal plants commonly found in Bangladesh.	CLO 2	4
General introduction on useful parts of selected medicinal plants used in treating common diseases.	CLO 3	6
Class Room Test		1
Selection and improvement of medicinal plants regarding its medicinal value.	CLO 4	4
Accommodation, production and conservation of medicinal plants in different Agroforestry systems.	CLO 4	4
Medicinal plants in the development of herbal industry.	CLO 5	3
Non-wood products in Agroforestry.	CLO 6	2
Class Room Test		1
Assignment Presentation		1
Total		32

Teaching Strategy

- Lecture
- Videotape
- Assignment
- Field visit
- Audio-Visual
- Demonstration
- Problem Based Learning

Assessment Strategy

- Short answer
- Multiple choices
- Essay
- True-false
- Completion
- Project
- Questionnaire

Recommended Books

Alam, M.K., F.U. Ahmed and S.M.R. Amin (eds.). 1997. Agroforestry: Bangladesh Perspective. APAN, NAWG and BRAC.

Jha, L.K. 1995. Advance in Agroforestry. APH Publishing Corporation, New Delhi.

Wagner, H and N.R. Farnsworth (eds.). Economic and Medicinal Plant Research. Academic Press Limited. U.K.

Ayensu, E.S. 1985. The Healing Plants. Unasylva.

Dastur, J.F. 1977. Medicinal Plants of India and Pakistan. D.B. Taraporevala Sons & Co Pvt. Ltd., India.

Baquar, S.R. and M. Tasnif. Medicinal Plants of Southern West Pakistan, Central Laboratories, Pakistan Council of Scientific and Industrial Research, Karachi, Pakistan.

Ahluwalia, K.S. 1962. British Pharmaceuticals Codex Plants and Their Indian Substitutes. Ministry of Health, Govt. of India.

Batter, E., J.F. Caius and K.S. Mhaskar. Indian Medicinal Plants. Periodical Experts, D-42. Vivek Vihar; New Delhi.

Department of Agroforestry

Course Code: AF 517 **Course Title**: Soil Productivity and Conservation in Agroforestry

Credit: 02 **Contact Hours:** 02 **July- December/October-March**

Rationale

Incorporation of Soil Productivity and Conservation approaches into the MS curricula layout for sustainable production through agroforestry practices.

Course Learning Outcomes (CLO)

1. Describe soil conservation and sustainability through Agroforestry.
2. Design different Agroforestry model for controlling soil erosion.
3. Discuss concept and causes of soil degradation and effect of trees for reclamation of soil degradation.
4. Illustrate process of nutrient recycling through Agroforestry.
5. Analyze soil conservation hypothesis under Agroforestry; Upland soil management in Bangladesh.

Summary of Course Contents

Content	**Aligned CLO**	**No. of Lectures**
Introduction: Role of Agroforestry in soil conservation and sustainability.	CLO 1	3
Agroforestry practices for soil erosion control.	CLO 2	5
Agroforestry for maintenance of soil fertility and productivity: soil fertility and degradation, effect of trees on soil, trees and shrubs for soil improvement.	CLO 3	6
Class Room Test		1
Microsymbionts and nutrient recycling in Agroforestry system.	CLO 3 & 4	4
Soil-Agroforestry related hypothesis and its application in soil conservation.	CLO 3, 4 & 5	6
Soil conservation and management of upland soils (hilly areas) of Bangladesh.	CLO 4 & 5	5
Class Room Test		1
Assignment Presentation		1
Total		32

Teaching Strategy

- Lecture
- Videotape
- Assignment
- Field visit
- Audio-Visual
- Demonstration
- Problem Based Learning

Assessment Strategy

- Short answer
- Multiple choices
- Essay
- True-false
- Completion
- Project
- Questionnaire

Recommended Books

Young, A. 2000. *Agroforestry for Soil Management, 2nd Edition.* CABI Publishing.

Singh. P.: P.P.S. Pathok and M. M. Roy. 1999. *Agroforestry for Sustainable Land Use.* Oxford and IBH publishing.

Young, A. 1989. *Agroforestry for Soil Conservation.* CABI Publishing and ICRAF, Nairobi.

Lal. R. (ed.). 1988. *Soil erosion Research Methods.* Soil and Water conservation Society of North America. Ankeny, IOWA, USA.

Moldenhauer, W.C. and N. W. Hudson (eds.). 1988. *Conservation Farming on Steep lands.* Soil and water conservation Society of North America, Ankeny, IOWA, USA.

Greenland, D.J. and R. Lal (eds.). 1977. *Soil Conservation and Management in the Humid Tropics.* Wiley, Chichester, UK.

Department of Agroforestry
Course Code: AF 519 **Course Title**: Pest management in Agroforestry
Credit: 02 **Contact Hours:** 02 **July-December/October-March**

Rationale

Incorporation of agroforestry approaches into the mainstream curricula layout of agriculture for controlling pest and diseases in agroforestry through different ways.

Course Learning Outcomes (CLO)

1. Explain the concepts and importance of pest management.
2. Describe the scope of pest management in Agroforestry.
3. Identify common pest and diseases attacking on important Agroforestry species.
4. Discuss different methods of pest management in plantation/agroforestry systems.
5. Describe the nature of damage and way of controlling pest by using different means.

Summary of Course Content

Content	**Aligned CLO**	**No. of Lecturer**
Introduction and scope of pest management in Agroforestry, importance of insects and diseases in Agroforestry.	CLO 1 & 2	6
Common insects and disease occurring on important agroforestry species.	CLO 3	5
Class Room Test		1
Methods of pest management: cultural, chemical, biological and IPM technologies related to Agroforestry and other forestry systems.	CLO 4	8
Biology, nature, extent of damage and control of the major insects and diseases of important Agroforestry species.	CLO 5	10
Class Room Test		1
Assignment Presentation		1
Total		32

Teaching Strategy

- Lecture
- Videotape
- Assignment
- Field visit
- Audio-Visual
- Demonstration
- Problem Based Learning

Assessment Strategy

- Short answer
- Multiple choices

- Essay
- True-false
- Completion
- Project
- Questionnaire

Recommended Books

Speight, M.R. and F.R. Wylie. 2000. Insects Pests in Tropical Forestry. CABI Publishing.

Raychaudhuri, S.P. 1999. Forest Trees and Palms-Diseases and Control. Oxford and IBH Publishing Co. Pvt. Ltd.

Jha, L.K; 1995. Advance in Agroforestry. APH Publishing Corporation, New Delhi.

Browne, F.G. 1968. Pest and Diseases of Forest Plantation Trees. Clarendon Press, Oxford.

Findley, W.P.K. 1967. Timber pests and diseases. Pragman Press.

Graham, S.A. and F.D. Knight. 1965. Principles of Forest Entomology. McGraw Hill Boo Co.

Department of Agroforestry
Course Code: AF 521 **Course Title**: Wood Quality and Wood Technology
Credit: 02 **Contact Hours:** 02 **January–June/April-September**

Rationale

Integration of wood science approaches for learning about wood characteristics for better improvement of Agroforestry. It also provides strategies of wood harvesting, seasoning and preservation.

Course Learning Outcomes (CLO)

1. Describe the concept of wood, its types, classification and uses.
2. Explain Wood structures and Wood textures with aging of trees.
3. Demonstration of soft and hard wood structure (external and internal).
4. Discuss different types of Tree abnormalities and their remedies through management practices.
5. Illustrate Different methods and processes of wood harvesting, seasoning and preservation.

Summary of Course Content

Content	**Aligned CLO**	**No. of Lecturer**
Introduction: Concept of soft wood and hard wood, their types, classification and uses.	CLO 1	4
Wood structures and Wood textures: Structural nature of woody plants, sap wood and heart wood at early and later stages of maturity, textural qualities with ageing of the trees.	CLO 2	5
External and internal structures of soft and hard wood plants	CLO 2 & 3	6
Class Room Test		1
Tree abnormalities and Wound healing: Causes of abnormal tree growth and their remedies; non-parasitic injuries, lightening & electric injuries; gas, fire, smoke and soot injuries. girdling and other mechanical injuries, their remedies through management practices, grafting, wound treatments, cavity treatment, bracling and cabling.	CLO 4	6
Harvesting, seasoning and preservation of wood: Tree felling and conversion of woods, wood transporting and processing, different methods of seasoning, preservation and storing system.	CLO 5	8
Class Room Test		1
Assignment Presentation		1

Total		32

Teaching Strategy

- Lecture
- Videotape
- Assignment
- Field visit and case studies
- Audio-Visual
- Problem Based Learning

Assessment Strategy

- Short answer
- Multiple choices
- Essay
- True-false
- Completion
- Project
- Questionnaire

Recommended Books

Shrivastava, M.B. 1997. *Introduction to Forestry.* Vikas Publ. House, New Delhi.

Negi, S.S. 19986. *A Hand Book of Forestry,* International Book Distribution. Dehra Dun, India.

Hartmann, H.T. and D.E. Kaster. 1978. *Plant Propagation: Principles and Practices.* Prentice Hall, New Delhi.

Pirone, P.P. 1978. *Tree Maintenance.* Oxford Univ. Press. New York.

Esau, K. 1965. *Plant Anatomy,* John Wiley, New York.

Fahn. A. 1967. *Plant anatomy.* Pergaman Press. Oxford.

Department of Agroforestry
Course Code: AF 523 **Course Title**: Land-use Planning in Agroforestry
Credit: 02 **Contact Hours:** 02 **January-June/April-September**

Rationale

This course will be able to identify the land use planning and development approaches of Agroforestry, their management policies, technology design and redesigning of models and their implementations.

Course Learning Outcomes (CLO)

1. Explain the concepts of Land and Land Use Planning.
2. Describe the management planning and development of different categories underutilized land-use systems in Agroforestry.
3. Outline the current land-use system in institutional premises and design their sustainable improvement through agroforestry models.
4. Discuss the various techniques of designing windbreaks and shelterbelts for protection coastal, farms, roads/embankments and living areas.
5. Select appropriate appraisal tools for agroforestry systems and land-use planning.

Summary of Course Contents

Content	**Aligned CLO**	**No. of Lecturer**
Land and land-use: Ownership use and characteristics of land, combined use as a land management policy, the multiple problem of multiple uses, land & tree tenure.	CLO 1	4
Planning & development of land-use systems in Agroforestry: Existing land-use system in Agroforestry, planning and development of wasteland, fallow land, roadsides, riversides & degraded land, desert land, saline & coastal areas, dry & rocky areas, marshy lands following technologies.	CLO 2	8
Windbreaks and shelterbelts: Designing of windbreaks and shelterbelts, coastal windbreaks and shelterbelts, wind erosion control and shifting sand dunes, control ravages of wind in farms, houses, roads & other constructions, increase yield of agricultural & pasturelands.	CLO 4	8
Class Room Test		1
Agroforestry in institutional premises: Land-use system in the institutions today, future planning and development of institutional models for aesthetic & production purposes.	CLO 3	5
D & D and other appraisal tools for agroforestry systems and	CLO 5	4

land-use planning: Prediagnostic & diagnostic steps, technology design and redesigning of models and their in different farm categories and other places.		
Class Room Test		1
Assignment Presentation		1
Total		32

Teaching Strategy

- Lecture
- Videotape
- Assignment
- Field visit
- Audio-Visual
- Demonstration
- Problem Based Learning

Assessment Strategy

- Short answer
- Multiple choices
- Essay
- True-false
- Completion
- Project
- Questionnaire

Recommended Books

Singh, P., P.P.S. Pathok and M. M. Roy, (eds.) 1999. *Agroforestry for Sustainable Land use.* Oxford and IBH Publishing Co.

Alam, M.K., F.U. Ahmed and S.M.R. Amin (eds.). 1997. *Agroforestry: Bangladesh Perspective*. APAN NAWG and BRAC.

ICRAF, 1990. *Agroforestry Research for Development.* ICRAF, Nairobi.

Raintree, J.B. (ed.). 19986. *D & D users manual: an Introduction to Agroforestry Diagnosis and Design.* ICRAF, Nairobi.

Davidson, D.A. 1982. *Soil and Land use Planning. Second Edition,* Longman Press, London, U.K.

Davis, P. 1976. *Land Use.* Mcgraw Hill Book Company, New Delhi, India.

FAO. 1988. *Land resources Appraisal of Bangladesh for Agricultural Development.* UNDP/FAO Project BGD/81035, Technical Reports, FAO, Rome.

FAO, 1988. Land Resources Appraisal of Bangladesh for Agricultural Development. UNDP/FAO Project BGD/81/035, Technical Reports, FAO, Rome.

Department of Agroforestry

Course Code: AF 525 **Course Title**: Environmental Protection in Agroforestry

Credit: 02 **Contact Hours:** 02 **January-June/April-September**

Rationale

The course will able to know various environmental issues; their causes and impact on the environment as well as the ways of mitigating adverse climatic conditions in sustainable ways. It also provides the means of conserving biodiversity.

Course Learning Outcomes (CLO)

1. Discuss environmental conservation and management with its concepts, objectives, principles, policies and act.
2. Identify and describe the composition of environment.
3. Describe current environmental problems arising throughout the world as well as climate convention.
4. Analyze environmental Impact Assessment of different natural and plantation forests.
5. Explain the concept of biodiversity and the impact of biodiversity losses on environment.
6. Construct appropriate agroforestry programs for biodiversity conservation.

Summary of Course Content

Content	**Aligned CLO**	**No. of Lecturer**
Introduction: Concepts, principles and objectives of environmental conservation and management.	CLO 1	4
Nature and major component of environment: physical, chemical, biological, and meteorological environment.	CLO 2	4
Environmental issues: Deforestation & desertification, CO_2 and other greenhouse gas emission, global warming, sea level rise, ozone layer depletion, acid rain etc.	CLO 3	6
Class Room Test		1
Environmental Impact Assessment (EIA): Principles and methods of EIA, EIA guides prescribed by FAO, EIA on natural and plantation forests.	CLO 4	5
Environmental policies: National Environmental policy 1992, National conservation strategy 1992, National environmental Management Action Plan (NEMAP) 1995, Chronology of major environmental initiatives, environmental conservation Act 1995.	CLO 1	4
Environmental protection and biodiversity management through Agroforestry.	CLO 5 & 6	6

Class Room Test		1
Assignment Presentation		1
Total		32

Teaching strategy

- Lecture
- Field Visit
- Demonstration
- Videotape
- Audio-visual

Assessment strategy

- Identification
- Observation
- Short answer
- MCQ and True/false
- Report/Assignment
- Interview
- Problem solution

Recommended Books

Innes, J.L. and H.A. Hasan (eds.). 2000. Air pollution and the Forests of Developing and Rapidly Industrializing Countries. CABI Publishing.

Angelsen, A. and D. Kaimowitz. 1999. Agricultural Technologies and Tropical Deforestation. CABI Publishing.

Miller. G.T. 1999. Environmental Science. Longman Group Ltd. England.

Timothy O'Riodran, 1995. Environmental Science for Environmental Management. Longman Group Ltd. England.

Trivedi, R.N. 1993. A Text Book of Environmental Sciences. Anmol Publishing Pvt. Ltd., New Delhi.