

**INSTITUTE OF FORESTRY AND
ENVIRONMENTAL SCIENCES
UNIVERSITY OF CHITTAGONG**

**SYLLABUS FOR
M. PHIL IN FORESTRY**

SESSION 2015-2016 TO 2016-2017

COURSES FOR M. Phil IN FORESTRY

SESSION 2015-2016 To 2016-2017

Selective Courses:

Courses No	Course Title	TH	CR
FOR 801	Forest Management and Climate Change	100	4
FOR 802	Protected Areas, Biodiversity Conservation and Community Development	100	4
FOR 803	Research Methods in Forestry	100	4
FOR 804	Participatory Watershed Management	100	4
FOR 805	Common Property Resources Management	100	4
FOR 806	Climate Change and Forests: Theories and Response	100	4
FOR 807	Natural Resource Governance	100	4
FOR 808	Remote Sensing in Forest Monitoring and Evaluation	100	4
FOR 809	Agroforestry and Rural Development	100	4
FOR 810	Land Use	100	4
FOR 811	Forest Modeling Using Geographical Information System	100	4
FOR 812	Management of NTFPs and their Sustainability	100	4
FOR 813	Land Use Modeling and Policy Analysis	100	4
FOR 814	Plant Immune System	100	4
FOR 815	Immunological Bioinformatics	100	4
FOR 816	Co-management of Forest	100	4
FOR 817	Green Banking	100	4
FOR 818	Ecotourism Management	100	4
FOR 820	Viva-voce	100	4

FOR-Forestry
TH-Theory
CR- Credits

FOR 801 FOREST MANAGEMENT AND CLIMATE CHANGE

Theory: 100 (4cr) **Total:** 100 (4cr)

Course contents:

- 1. Introduction to Forest Management:** Nature, purpose, development and status site, stocking and spacing. Determination of site quality and stocking, their importance in timber production. Determination of desirable stocking.
- 2. Forest Growth and Yield Concept:** Yield tables in timber production; yield of even aged and uneven aged forest; Growth information in timber production, nature and components of forest growth.
- 3. Climate Change:** Definition, scope, important for planet with advanced protocols; Temperature rise, sea-level rise, precipitation change; carbon sequestration, droughts and floods.
- 4. Adaptation and Mitigation Process:** Socioeconomic development paths: Economic growth; technology; population and governance.
- 5. Emission and Concentrations:** Advanced knowledge on greenhouse gases and aerosols.
- 6. Climate Change Scenarios:** Derivation procedure, modeling approach, extrapolation methods from international to regional, national and local for decision making.

Recommended Bibliography:

- Davis, L.S. and Johnson, K.N. 1986 Forest management. Decision making principles and Cases. W.B. Saunders company.
- Davis.K.P. 1966. Forest management: regulation and valuation. Second edition, McGraw-Hill Book Company.
- Duerr, W.A. et al. (eds). 1979. Forest Resource Management: Decision making principles and Forest Management Plan. 1994. Management plan. Ministry of Environment and Forest. Dhaka.
- IPCC, 2001. Climate change 2001, Synthesis report. A contribution of working groups S. I,II, and III to the third assessment report of the intergovernmental panel on climate change [Watson, R.T and the core writing team (eds). Cambridge University Press. Cambridge. United Kingdom and New York, NY, USA. 398 pp.
- Miller (Jr), G.T. 2002. Environmental Science, Working with the Earth. Thompson learning Inc. 541pp.
- Shiva, M.P. and Mathur, R.B. 1996. Management of minor forest for sustainability. Oxford & Pant, M.M. 1990. Forest Management. Institute of Forestry, Chittagong University.

FOR 802 PROTECTED AREAS, BIODIVERSITY CONSERVATION AND COMMUNITY DEVELOPMENT

Theory: 100 (4cr);

Total: 100 (4cr)

Course contents:

- 1. Protected areas:** Definition, IUCN protected area category system, overview of protected areas in Bangladesh; International agreements and conventions; Social and economic agenda for protected areas, protected areas in sustaining local livelihoods; Challenges and opportunities for protected area; Emergence of community oriented protected areas, protected area governance and the importance of strengthening institutions;
- 2. Biodiversity Conservation:** Definition and measurement of biodiversity; Strategies for conservation; Biodiversity hot spots; Biodiversity loss rates and threats; International agreements and conventions; International and national initiatives; Biodiversity conservation and poverty alleviation.
- 3. Human Impacts on Biodiversity:** Habitat loss and fragmentation; Invasive nonnative species; Pollution, over exploitation, sustainability.
- 4. Impacts of Climate Change on Biodiversity:** Biogeography; Paleecology, Social mobilization, institutional development; Gender role in development; The critical role of the UN system; Bilateral donors, multinational business; GOs NGOs and private commercial sector in development; Linkages between protected areas, conservation and development, Population land environment interaction.
- 5. Biodiversity Conservation and Local Livelihood:** Biodiversity conservation and sustainable livelihoods; Social, economic and livelihood capitals.
- 6. Community Development:** Definition, strategies for development, social mobilization, institutional development, gender role in development; The critical role of the UN system, bilateral donors, multinational business, GOs, NGOs, and private commercial sector in development; Linkages between protected areas, conservation and development; Population land environment interaction.

Recommended Bibliography:

- Agarwal, S.K. Tiwari, S. and Dubey, P.S. 1996. Biodiversity and Environment. A. P. H. Publ. India.
- Ali, S. and Ripley, S. D. 1983. Handbook of the Birds of India and Pakistan Compact Edition. Oxford Univ. Press. New Delhi.
- Anon. 1973. Bangladesh Wildlife (Preservation) order, 1973. (President's Order no. 23 of 1973) - Published in the Bangladesh Gazette, Extraordinary, part. 111A dated the 28th March, 1973.
- Anon. 198. Report of the Wildlife Task Force the Forest Department Bangladesh, Ban Bhavan, Dhaka.
- Anon. 1986. Report of the Wildlife Task Force, - The Forest Department Bangladesh, Ban Bhavan, Dhaka.
- Bailey J. A. 1984. Principles of Wildlife Management John Wiley and Son. N.Y.
- Boyle, T. J.B. and Boontawee, B. (eds.). 1994. Measuring and monitoring biodiversity in tropical and temperate forest. Proceedings of IUFRO Symposium, Thailand.
- Brockman, O.F. 1959. Recreational use of Wildlife. McGraw Hill Book Company.
- Daniel, J. C. 1983. The Book of Indian Reptiles Bombay Natural History Society, Bombay.
- Groom M. J., Meffe G. K. and Carroll C. R. 1997. Principles of Conservation Biology. 3rd Edition. Sinauer Association, Inc. 793p
- Hasan, M. A. 2000. Biodiversity and Conservation. Hasan Book House. Dhaka.
- Hussain, K. Z. 1974. An Introduction to Wildlife of Bangladesh. Film and publication Govt. of Bangladesh.
- Khan, M..A. R. 1982. Wildlife of Bangladesh. University of Dhaka.
- Morrison M. L. 2002. Wildlife Restoration: Techniques for Habitat Analysis and Animal Monitoring. Island Press. 209p
- Negi, S. S. 1993. Biodiversity and its, conservation in India. Indies Publishing Company, New Delhi,
- Olivier, R. C. D. Wildlife Consultant, Field Document No. 10 on Wildlife Conservation and Management in Bangladesh, BFRI.
- Poore, D. and Sayer, J.1991. The Management of Tropical Moist Forest Lands: Ecological Guidelines. IUCN, Switzerland
- Primack R. B. 2000. A primer of Conservation Biology. Sinauer Associates, Inc. 319p
- Sarker, S. U. 1992. Parks and Wildlife Management UNDP/FAO Project BGD/85/011, IFUC, Chittagong.
- Sarker, S. U. 1992. Wildlife Ecology and Biology. UNDP/FAO Project BGD/85/011, IFUC, Chittagong.
- Sarker, S. U. and Sarker,N.Y. 1988. Wildlife of Bangladesh (A Systemic List), Rickom Printer, Dhaka
- Schulze. E. D. and Mooney, H. A. (eds.). 1993. Biodiversity and ecosystem function. Springer-Verlag, Gambtt & Co, Berlin.
- Terborgh, J. 1992. Diveresity and the tropical rain forest. W. H. Freeman &Co. Ltd. USA.
- Tewari, D. N. 1994. Biodiversity and Forest Genetic Resources. International Book Distributors, India
- Trippense, R.E. 1953. Wildlife Management Vol. I & II McGraw Hill Book Co.
- Van Tyne, J. and Berger, A. J. 1976. Fundamental Ornithology, N.Y.
- Wallace, G. J. and Mahan H. D., 1975. An Introduction to Ornithology. 3rd ed. MacMillan Publishing Co. Inc. N. Y
- Whitaker, R. 1982. Export Prospects from commercial Crocodile farms in Bangladesh. ITC/DIP63, 1982 Project No. GTO/03/07.
- Willey, J. C. 1962. The life of Birds. Philadelphia and London. Sawnders. Chapter 5.

FOR 803 RESEARCH METHODS IN FORESTRY

Theory: 100 (4cr);

Total: 100 (4cr)

Course contents:

- 1. Development of Research Proposal:** Literature review; Contemporary research issues in forestry; Developing research proposal or project about research issues based on forestry.
- 2. Choice of Research Method:** Types of research methods; Choice of research methods to address multiplicity of research problems in forestry; Strengths, limitations and validity of major research methods in forestry.
- 3. Data, Data Sources and Statistical Modeling:** Types of data; Sources of data; Precautions and restrictions in handling of different types of data relating to forestry; Processing and pre-analysis cleaning of data; Final analysis of data; Model specifications and selection of the best fitted model.
- 4. Interpretation of Results:** Interpretation of model fitting attributes and parameter estimates highlighting on data sources, data types, data collection methods and limitations of the model used; Uniqueness and limitations of the research work; Real world implication of the research outcomes with respect of contribution of the research work to existing body of knowledge, linking research outputs to problem solving, policy formulation and administration.
- 5. Writing the Research Manuscript:** Art and distinctiveness of scientific writings; Rules of writing dissertation/thesis; and of a peer reviewed research article.

Recommended Bibliography:

- ADB, 2004. Country Environmental Analysis: Bangladesh. 3rd draft. Asian development Bank, July 2004, v+74pp.
- Alam, K., Shamsuddoha, M., Tanner, T., Sultana, M., Huq M.J. and Kabir, S.S. 2011. The political economy of climate resilient development planning in Bangladesh. IDS bulletin. 42 (3): 52-61, May 2011.
- CBD, 2007. Biodiversity and climate change International day for biological diversity, convention on biological diversity (CBD). Available at: <http://www.cbd.int/doc/bioday/2007ibd-2007-booklet-01en.pdf>
- DARA, 2010. Climate vulnerability monitor-The state of the climate crisis. Report of the climate vulnerability initiative 2010, DARA and The climate vulnerable forum.
- Dobias, B. 2010. ADB climate change program evolution and strategies priorities. Asian development Bank, Kathmandu Nepal. [<http://www.scribd.com/oc/34211829/ADB-climate-change-program-evolution-and-strategic-priorities> website found on 22 Jne 2011.
- Ford, E.D. 2000. Scientific method for ecological research. Ambridge University press, Cambridge, UK. [Online] URL. [http:// assets.cambridge.or/ o52166/005x sample/052166005xwsc00.pdf](http://assets.cambridge.or/o52166/005x-sample/052166005xwsc00.pdf)
- Harmeling, S. 2011. Global climate risk index 2011: Who suffers most from extreme weather Events? Weather-related loss events in 2009 and 1990 to 2009, German watch Briefing, paper, bonn: German watch, 24p.
- Institute of Development Studies, Blackweel publishing Ltd., Oxford, UK and Malden, MA, USA.

IPPC, 1997. The regional impacts of climate change: An assessment of Vulnerability. Summary for policymakers. A special report of IPCC working group II. Published for the intergovernmental panel on climate changes, November 1997.

FOR 804 PARTICIPATORY WATERSHED MANAGEMENT

Theory: 100 (4cr); **Total:** 100 (4cr)

Course contents:

Concepts and important features of a watershed, watershed management as a component of environment; nutrient and hydrological cycle in forest ecosystem, precipitation, interception, infiltration, percolation, ground water, surface runoff, stream flow and their measurements in forested and other land use systems in hilly watershed; role of forest on precipitation, falling rain (interception) infiltration and water storage on upland watershed, stream density, drainage density, average slope of watershed and mean elevation of small and large watershed, erosion rates under different land uses and sediment load estimation methods with relative advantages and disadvantages, control measures of gully and shifting cultivation in hilly areas, planting and forest management techniques in steep sloped watershed, forest in relation flood, forest and water quality, water quality standards and water yield, measures of water quality-different water characteristics; natural water quality; polluted waters, soil water and vegetation sampling methods and data collection procedures in the watershed.

Recommended Bibliography:

- FAO/UNDP, 1971. Bangladesh Soil Resources, Soil Survey Project, AGL: SF/ PAK 6 Technical report 3, p. 185-198.
- Geyilk, M. P. 1983. Notes on soil erosion and specification of basic structural and vegetative control measures. Field document No. 6. Dept. Soil Management and Conservation's Education Project Nepal. His Majesty's Government of Nepa. UNDP/FAO37.
- Hewlett, K.D. 1982. Principles of forest Hydrology. He University of Gogrgia press Athens, 184 pp.
- Hundson, N. 1971. Soil Conservation. B.T. Bastford Limited. 320 pp.
- Kohnke, H and A. R. Bertrand. 1959. Soil conservation. Mcgraw Hill Book Co. New York. 298pp.
- Negi, S.S. 1983. Soil Conservation Fundamentals of Forestry. Vol. 401. Bishen Singh Mahendr Pal Singh. 23-4, Connaught place, Dehra Dun. 88p.
- Raeder-roitzsch, J.E. 1968. Lectuers on Watershed Management and Forest Hydrology, Pakist, Forest College, Peshwar. 244 pp.

FOR 805 COMMON PROPERTY RESOURCE MANAGEMENT

Theory: 100 (4 cr);

Total: 100 (4 cr)

Course contents:

1. **Introduction to Common Property Resources:** Concepts, Definition and types of common property resources; Common pool resources; Access, rights-to-use and management of natural resources; Evolution of resource management systems; Common property resource management systems in Bangladesh.
2. **Theories of Collective Action, Cooperation and Common Property:** The problem of collective action; Repeated games and multiple equilibrium; Cross scale linkages among institutions; Experimental collective action, role of communication and enforcement; Prescriptions and remedies.
3. **Power, Influence and the Distribution of Benefits:** Critiques of decentralization and devolution; Equity and efficiency; Distribution of benefits under different governance structures; Endogenous bargaining power; Comparison of common property management regimes with agricultural and industrial cooperatives; Incorporating technical uncertainty and local knowledge into adaptive ecosystem management.
4. **The Tragedy of Commons:** Theories, debates and examples.
5. **Economics of Common Property Resource Management:** Economic behavior of common property resources and the sustainability.
6. **Case Studies:** Case studies related to common property resource management systems.

Recommended Bibliography:

- Berkes, F. 1989(ed.). *Common Property Resources: Ecology and Community-based Sustainable Development*. International Book Distributors, Dehra Dun, India.
- Bray, Merino and Barry, 2006. *The Community Forests of Mexico: Managing for Sustainable Landscapes*. University of Texas Press: Austin.
- Camille Antinori and Rausser, Gordon, "Collective Choice and Community Forestry Management in Mexico: An Empirical Analysis", *Journal of Development Studies*, 43:3, pp. 512-536, 2007.
- David Mosse, "Collective Action, Common Property, and Social Capital in South India: An Anthropological Commentary," EDCC 2006.
- Garrett Hardin, "The Tragedy of the Commons" (*Science*, 1968).
- Gordon Rausser and Pinhas Zusman, *Political Power and Endogenous Policy Formation*, Cambridge University Press: New York, Forthcoming.
- Ostrom, Elinor. 1990. *Governing the Commons: The Evolution of Institutions for Collective Action*. New York: Cambridge University Press.
- Peter Taylor (2000). "Producing More with Less? Community Forestry in Durango, Mexico in an Era of Trade Liberalization", *Rural Sociology* 65:2, pp 253-274.

FOR 806 CLIMATE CHANGE AND FORESTS: THEORIES AND RESPONSES

Theory: 100 (4 cr);

Total: 100 (4 cr)

Course contents:

1. **Earth's Climate System:** the Atmosphere; the Climate; the Science and the Politics of Global Climate Change; Global Warming; Greenhouse Effect; Greenhouse Gases
2. **Earth's Carbon Cycle.**
3. **Historical Perspectives of Climate Change:** Theories and Debates on climate change; Is the Climate Changing?
4. **Global Initiatives, Negotiations, Policies, Treaties and Protocols Related to Climate Change.**
5. **Climate Vulnerability:** Global Climate Risk Index 2011.
6. **Projection of Climate Variables:** temperature, rainfall and sea level.
7. **Evidence of Climate Change on Different Physical and Biological Processes Around the Globe and in Bangladesh.**
8. **Future Effects of Climate Change.**
9. **Climate Change Impact on Different Systems, Sectors or Region:** Ecosystems; Coastal systems; Water systems; Agriculture; Arctic region; etc.
10. **Climate Change and Forests:** Threats and opportunities; Effects on biodiversity, growth, composition and structure of forests; Mitigation and adaptation role of forests on climate change; Forests in REDD/REDD++ and CDM.
11. **Bangladesh's Response in Climate Change Mitigation and Adaptation:** Government, non-government and community level initiatives.
12. **Organizations or Institutions Working on Climate Change.**

Recommended Bibliography:

- ADB, 2004. Country Environmental Analysis: Bangladesh. 3rd Draft. Asian Development Bank, July 2004, v+74 pp.
- Alam, K., Shamsuddoha, M., Tanner, T., Sultana, M., Huq M.J. and Kabir, S.S. 2011. The Political Economy of Climate Resilient Development Planning in Bangladesh. *IDS Bulletin*, 42(3): 52-61, May 2011. Institute of Development Studies, Blackwell Publishing Ltd, Oxford, UK and Malden, MA, USA.
- CBD, 2007. Biodiversity and Climate Change. International Day for Biological diversity, Convention on Biological Diversity (CBD). Available at: <http://www.cbd.int/doc/bioday/2007/ibd-2007-booklet-01-en.pdf>
- DARA, 2010. Climate Vulnerability Monitor- The State of the Climate Crisis. Report of the Climate Vulnerability Initiative 2010, DARA and The Climate Vulnerable Forum.
- Dobias, B. 2010. ADB Climate Change Program Evolution and Strategic Priorities. Asian Development Bank, Kathmandu, Nepal. [http://www.scribd.com/doc/34211829/ADB-Climate-Change-Program-Evolution-and-Strategic-Priorities] website found on 22 June 2011.
- Harmeling, S. 2011. Global Climate Risk Index 2011: Who Suffers Most from Extreme Weather Events? Weather-related Loss Events in 2009 and 1990 to 2009, Germanwatch Briefing Paper, Bonn: Germanwatch, 24p.
- IPCC, 1997. The Regional Impacts of Climate Change: An Assessment of Vulnerability. Summary for Policymakers. A special Report of IPCC Working Group II. Published for the Intergovernmental Panel on Climate Change, November 1997.

- Mohnen, V.A., Goldstein, W. and Wang, W.C. 1991. The conflict over global warming: The application of scientific research to policy choices. Global Environmental Change, Butterworth-Heinemann Ltd.
- OECD, 2004. The benefits of climate change policies. Organization for Economic Co-operation and Development, Paris, France, 323 pp.
- UNEP, 2011, Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication, www.unep.org/greeneconomy
- UNFCCC, 2011. The official website of United Nations Framework Convention on Climate Change (UNFCCC), <http://unfccc.int/2860.php>, last seen on 6 July 2011.
- World Bank 2008. Biodiversity, Climate Change, and Adaptation. Nature-Based Solutions from the World Bank Portfolio. The World Bank, Washington, DC 20433 USA, 112p.

FOR 807 NATURAL RESOURCE GOVERNANCE

Theory: 100 (4 cr);

Total: 100 (4 cr)

Course Contents:

1. Introduction:

Defining Governance, Governance Components and Principles, Debate on theory of governance, Governance in Practice, Natural resource governance in Bangladesh

2. Decentralization of Forest Governance:

Forest governance: mainstream and critical views, Forest governance in decentralized systems, Forest governance in Asian countries, Forest governance and REDD+, Forest governance reform

3. Collaborative Governance:

Collaborative governance: theory and practice, Collaborative action framework
Partnership as collaborative governance mechanisms

4. Environmental Governance:

Emerging Global environmental governance, Themes in environmental governance, Mechanism and strategy of environmental governance, Neoliberal environmental governance, Global environmental governance, Integrated climate governance, Good governance and environmental compliance and enforcement

5. Governance of Ecosystem Services:

Instruments for governance of ecosystem services, spatial planning in governance of ecosystem services

6. Assessment and Monitoring of Governance:

Framework for assessing and monitoring governance

Recommended Bibliography:

- Bonfiglioli, A. 2004. Lands for the poor: Local environmental governance and the decentralized management of natural resources. UNCDF, New York.
- Castro, A. P. and Nielsen, E. (editors). 2003. Natural resource conflict management studies: An analysis of power, participation and protected areas. FAO, Rome.
- Colfer, P, C.J. and Capistrano, D. (editors). 2005. The politics of decentralization: Forests, people and power. Earthscan, London.
- Contreras-Hermosilla, A., Gregersen, H. M. and White, A. 2008. Forest governance in countries with federal systems of government: Lessons for decentralization. CIFOR Governance Brief.
- Edmunds, D. and Wollenberg, E. (editors). 2003. Local forest management: The impacts of devolution policies. Earthscan, London.
- Glasbergen, P., Biermann, F. and Mol, A.P.J. (editors) 2007. Partnerships, governance and sustainable development: Reflections on theory and practice. Edward Elgar Publishing Limited, the UK.
- Kishor, Nalin and Kenneth Rosenbaum. 2012. *Assessing and Monitoring Forest Governance: A user's guide to a diagnostic tool*. Washington DC: Program on Forests (PROFOR).
- Miller, W. L., Dickson, M. and Stoker, G. 2000. Models of local governance: Public opinion and political theory in Britain. Palgrave, New York.
- Moeliono, M., Wollenberg, E. and Limberg, G. (editors). 2009. The decentralization of forest governance: Politics, economics and the fight for control of forests in Indonesian Borneo. Earthscan, London.
- Noel et al., 2009. A Companion to Environmental Geography. Wiley-Blackwell.

- Patti Moore, Xuemei Zhang, and Ronnakorn Triraganon (2011). Natural Resource Governance Trainers' Manual. IUCN, RECOFTC, SNV, Bangkok, Thailand.
- Rashid K.Y. et al., 2012. Natural resource governance: Best practices and lesson learned. IUCN, Dhaka.
- Rhodes, R. A. W. 1997. Understanding governance: Policy networks, governance, reflexivity and accounting. Open University Press, Philadelphia.
- Swiderska, K., Roe, D., Siegele, L. and Grieg-Gran, M. 2008. The Governance of Nature and the Nature of Governance: Policy that works for biodiversity and livelihoods. IIED.
- Thomas Greiber and Simone Schiele (eds.) (2011), *Governance of Ecosystem Services*. Gland, Switzerland: IUCN.
- Van Bodegon, A.J., Klaver, D., van Schoubroeck, F and van der Valk, O. 2008. FLEGT beyond T. Exploring the meaning of 'Governance' concepts for the FLEGT process. Wageningen University & Research Center, the Netherlands.
- Webb, E. L. and Shivakoti, G. P. (editors). 2008. Decentralization, forests and rural communities: Policy outcomes in South and Southeast Asia. SAGE Publications, India.

FOR 808 REMOTE SENSING IN FOREST MONITORING AND EVALUATION

Theory: 100 (4 cr);

Total: 100 (4 cr)

Course Contents:

1. **Concepts and Foundations of Remote sensing:** Energy source, Radiation concept, Interactions between energy and earth surface, Characteristics of real remote sensing system, Spectral signature
2. **Remote Sensing System:** Optical Sensors; Temporal characteristics.
3. **Photogrammetry:** Geometry of aerial photograph, image parallax, ground control of aerial photographs
4. **Earth Resource Satellites:** Landsat, Spot, Meteorological satellite programmes.
5. **Digital Image Processing:** Rectification and restoration; image enhancement, image classification: supervised and unsupervised.
6. **Applications in Forestry:** Forest inventory, monitoring and evaluation; Drainage system. Day to day management in tropical and temperate forests.

FOR 809 AGROFORESTRY AND RURAL DEVELOPMENT

Theory: 100 (4cr);

Total: 100 (4cr)

Course Contents:

1. **Introduction:** Principles, practices, potentials, classification and limitations.
2. **Silvicultural Perspective:** Principles and practices; Collection, processing, storage of seeds, Propagation, Techniques in raising nursery of improved seedling; Water and fertilizer management in nursery; Transplanting and management of Agroforestry plantation.
3. **Conservation Perspective:** Natural Resource conservation; Soil and water conservation; Conservation of Biodiversity.
4. **Production and Management:** Production systems and their management of sustainability; Improvement of Agroforestry system for sustainable production; Integrated management for higher and sustainable productivity; Management for Environmental improvement; Production system and soil management; Soil fertility management in Agroforestry.
5. **Economics of Agroforestry and Marketing of Agroforestry Products:**
6. **Rural Development Perspective:** Development of Agroforestry in homestead upland, cropland, marginal land, waste land; Bio-intensive Agroforestry; Agroforestry for rural uplift; Agroforestry livelihood technologies; Agroforestry and carbon sequestration potential; Agroforestry in CDM (Clean Development Mechanism) for rural livelihood.

Recommended Bibliography:

- Alam, M.K., Ahmed, F.U. and Amin, S.M.R. (eds.). 1997. Agroforestry: Bangladesh Perspective. BARC, Dhaka.
- Bandyopadhyay, A.K. 2001. A Text Book of Agroforestry with Applications. Vikas publishing house Pvt. Ltd. New Delhi-110014, 110p.
- Bruch, W.R. and Parker, J.J.K. 1991. Social Science Applications in Asian Agroforestry. Winrock international USA and Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi, 183p.
- Gender and Joint Forest Planning and Management: A research study in Uttara Kannada district. 1997. India Development service, Karnataka, India, 42p.
- Gordon, A.M. and Newman, S.M. 1997. Temperate Agroforestry Systems. CAB international, U.K. 269p
- Gupta, J.P., Sharma, B.M. 1997. Agroforestry for sustained productivity in Arid Regions. Scientific publishers, Jodhpur, India, 198p.
- Huxley, P.A. 1983. Plant Research and Agroforestry.
- IIRR, DENR and FF. 1998 Agroforestry Technology Information Kit: 1-6. Silang, Quezon city, Makati city, Philippines.
- Javis, P.G. 1999. Agroforestry Principle and Practices.
- Khan, M.S., Alam, M.K. 1996. Homestead flora of Bangladesh. Bangladesh Agricultural Research Council (BARC), IDRC, VFFP; Farmgate, Dhaka, Bangladesh, 275p.
- Khosla, P.K. and Kohli, R.K. 1987. Social Forestry for Rural Development. Natraj Publishers, Dehra Dun-248001; 282 p.
- Nair, P.K.R. 1989. Agroforestry Systems in the tropics. Kluwer Academic Publishers. The Netherland.
- Ong, C.K. and Huxley, P.A. 1996. Tree-crop Interactions: a Physiological Approach.
- Sharing forest management: Key features, best practices & ways forward. 1996. ODA, 94, Victoria street, London, 36 p.
- Singh, M.P. and Tewari, D.N. 1996. Agroforestry and waste lands. Anmol Publication Pvt. Let. New Delhi-110002, 299p.
- Victor, M. 1996. Income generation through Community Forestry. Regional Community Forestry Training Center, Bangkok, Thailand, 259p.
- Young, A. 1997. Agroforestry for soil management. ICRAF, CAB international, U.K. 320p.

FOR 810 LAND USE

Theory: 100 (4 cr);

Total: 100 (4 cr)

Course contents:

Land and soil basic knowledge of geology, soil science and forestry to describe land, soil profile and plant communication of a watershed; characteristics and qualities of a land and their evaluations land capability classes in a country and land classes that put under forests, land use policy, and use change and need for land use planning in Bangladesh; Classification of land based on flooding depth, factors determining land use, major land uses such as agriculture, forest, shrimp culture, urbanization, water bodies, brick filed, etc. in Bangladesh, multiple land uses, land use conflicts, changes in land use conversion of forest into other land uses and their impacts on hilly watershed like CHT's soil characteristics under forest compared to other vegetation type, deforested, clear felled, shifting cultivated, burn/fired and barren land, hill cuttings in land degradation and in ecosystem change.

Recommended Bibliography:

- Brammer, H. 2002. Land use and land use planning in Bangladesh. The university press limited. 554pp.
- Davidson, D.A. 1982. Soil and land use planning. Second impression, Longman. London, UK. 120pp.
- Davidson, J. and Khan, M.N. 1985 Computerized matching of tree species to sites, working Paper No. 1, FAO/UNDP project BGD/79/017.113pp.
- Davis, P. 1976. Land use, Mcgraw Hill Book Company, New Delhi, India. 324pp.
- FAO, 1988. Land Resource Appraisal of Bangladesh for Agriculture development, UNDP/FAO project BGD/81/035, Technical Reports – 1-7, FAO, Rome.
- FAO/UNDP, 1971. Bangladesh soil resources, soil survey project, AGL: SF/PAK 6 Technical report 3, p. 185-198.
- Muller, D. and Ellenberg. D.H. 1974. Aims and methods of vegetation ecology John Wiley and sons, London.
- Richard, B.N. and Hassan, M.M. 1989. Dendroecological Regions of Bangladesh: A land capability Assessment for tree species. OF: DP/BGD/83010. Working paper No. pp48.
- Sinthurahat, S. 1985. Land evaluation for rubber applied to some areas in thiland, M. Sc in Soil science thesis, International training centre for Post graduate soil scientists, state University of Gent, Belgium. 55pp.
- Stevens, P.R. 1987. A simplified filed manual for site classification and site suitability Assessment in Bangladesh forest. BGD/83/010, Working paper No. 1, 14pp.

FOR 811 FOREST MODELING USING, GEOGRAPHICAL INFORMATION SYSTEM

Theory: 100 (4 cr);

Total: 100 (4 cr)

Course contents:

1. **Introduction to geographic information system (GIS):** Evolution, components, approaches of GIS:
2. **Digital Representation of Geographic Data:** Technical issues pertaining to digital representation of geographic data, database and databases management system, Raster geographic data representation, vector data representation, object-oriented geographic data representation;
3. **Visualization of Geographic Information:** Cartography in the context of GIS: Visualization of analysis and visualization; Application of digital terrain models.
4. **Spatial Analysis and Modeling:** Acquisition of spatial data for the terrain: topographic mapping: attribute data for thematic mapping; Descriptive statistics, spatial autocorrelation, quadrat counts and Nearest Neighbor analysis, Trend surface analysis, GIS modeling.
5. **Decision-Support System:** Environmental and spatial data acquisition, synthesis and management for production climate change scenarios using GIS.
6. **Modeling the Environment with GIS:** Modeling framework, paradigms and approaches, spatial decision support systems; Development, calibration and validation of physical models.

Recommended Bibliography:

- Akthar, S. and Karki, A.S. 1999. Application of GIS to mountain land use planning. International Center Avery, T.F. and Berlin, G.L., 1985. Interpretation of aerial photographs. 4th edn. Burgess Publishing Co. Minneapolis, Minnesota.
- Buhmann, S. 1996. Geographic information system. Bruening, E.F. and Bossel, H. (eds) Natural resources system analysis.
- Burrough, P.A. and McDonnell, R. A. 1998. Principles of Geographic information systems. Oxford University press 333p.
- Chrisman, N. 1997. Exploring geographic information systems. John Wiley & Sons. 298p.
- Clarke, K.C. Parks, B.O. and Crane, M.P. 2002. Geographic information systems and environmental modeling. Prentice Hall of India. 306p.
- Colwell, R.N. Esters, I.C. and Thorley, G.A. (eds). 1983. Manual of remote sensing Vol. 2. Interpretation of application. Amer. Soc. Of photogrammetry, Virginia.

- De Mers, M.N. 1999. Fundamentals of Geographic information systems. Second edition. New York 498p.
- E GIS. 2000. Gego-spatial tolls for analysis of flood plain resources. UPL. 100p. ESRI, 2007. ArcGIS 9 using ArcGIS desktop.380 New York street Redlands, USA. 435pp.
- IDRIS, 2005. IDRIS softwares. IRIS resource center, Clark Unviersit, Worchester, MA, USA.
- Korte, P and George, B. The GIS Book. Onward press. 387p.
- Lillesand, T.M. and Kiefer, R.W. 1987. Remote sensing and image interpretation. Second edition. John Wiley and Sons. New York, USA.
- Sharma, M.K. 1986. Remote sensing and forest sureys. International Book distributors. Dehra Dun. India.
- Simonett, D.S. and Ulaby, F.T. (eds). 1983. Manual of remote sensing volume one. Second edition. American Societ of Photograpmmetry. USA.
- Walford, N. 1995. Geographical data analysis. John Wiley and Sons. 446p.

FOR 812 MANAGEMENT OF NTFPs AND THEIR SUSTAINABILITY

Theory: 100 (4 cr);

Total: 100 (4 cr)

Course contents:

1. **Introduction:** Classification, status, global view of potentials; Distribution; Role in conservation and prospects for development of non timber forest products.
2. **Management:** Policies on NTFPs management; New approach in management of NTFPs; Environmental aspects of NTFPs management; NTFPs management for ecosystem conservation and maintenance of biodiversity.
3. **Rural Development Perspective:** NTFPs in agroforestry, participatory forestry and joint forest management; Women in development of NTFPs and NTFPs based enterprises.
4. **Propagation and Silviculture:** Propagation of NTFPs and their improvement; Techniques for regeneration; Techniques for raising nursery; Plantation of NTFPs and their management; Monitoring and evaluation of growth performance of NTFPs.
5. **Utilization Management:** Sustainable harvest of NTFPs and forest management methods of utilization; Trends and prospects; Industrial utilization of NTFPs; NTFPs for forest conservation and health care.
6. **Collection and Processing:** Institutional aspects of NTFPs collection and processing; Economics of NTFPs cultivation; Marketing of NTFPs.
7. Marketing and Economics

Recommended Bibliography:

- Chair, G.B., Bhat, K.K.S., Burdey, J., Vantomme, P. 1997. Medicinal plants for forest conservation and health care: Non wood forest products series no. 11, FAO. Italy. 158p.
- Dwivedi, A.P. 1999. Forests: The non-wood resources. International Book Distributors 9/3, Rajapur Road, Dehra Dun-248001, India, 352 p.
- FRI & C. 1972. Indian Forest Utilization: Vol. I & II, Manager of Publication, Delhi, Dehra dun, 941p.
- Murty, T.K. 1993. Minor Forest Products of India. Oxford & IBH publishing Co. Ltd. New Delhi 110092, 645p.
- Shiva, M.P., Mathur, R.B. 1996. Management of Minor Forest Produce for sustainability. Oxford & IBH publishing Co. Pvt. ltd. New Delhi 110001, 573p.
- Wollenberg, E and Ingles, A. 1998. Income from the forest: Methods for the development and conservation of forest products for local communities. SMT Grafika Desa Putera, Indonesia, 227p.
- Yusuf, M., Chowdhury, J.U. Wahab, M.A. and Bagum, J. 1994. Medicinal Plants of Bangladesh. Bangladesh Council of Scientific and Industrial Research (BCSIR), Dhaka, 1205, Bangladesh, 340p.

FOR 813 LAND USE MODELING AND POLICY ANALYSIS

Theory: 100 (4 cr);

Total: 100 (4 cr)

Course contents:

1. **Land and Land Use Change:** Definition and scope; Historical land use changes in Bangladesh and other countries.
2. **Factors Influencing Trends of Land Use Change:** Factors of land use change, effects/problems of land use change.
3. **Land Use Planning:** Basic concepts and theories relevant to land use planning and management.
4. **Land Use Modeling:** Definition, scope, objectives and methods of land use modeling; Need for land use modeling and their uses; Land zoning and land use.
5. **Land Use Modeling for Climate Change:** Modeling changes in land use due to climate change impacts at different scales- global, regional, to local; Land use modeling in decision making processes including trade-offs between different policy objectives like, mitigation vs. adaptation.
6. **Land Rights, Valuation and Conflict Management:** Land rights and land tenure, process of land valuation, land use conflicts, land reforms and some experiences.
7. **Land Use Policy:** Approaches to land and land use policies; Need, scope and objectives of land use policy; National policies covering land and land use in Bangladesh, Land use policy in other countries.

Recommended Bibliography:

- Brammer, H. 2002. Land Use and Land Use Planning in Bangladesh. The University Press Limited, Dhaka.
- Davidson, D.A. 1982. Soil and Land Use Planning. Longman, London.
- Davies, K.P. 1976. Land Use. McGraw-Hill Inc. USA.
- FAO, 1988. Land Resources Appraisal of Bangladesh for Agricultural Development, UNDP/FAO Project BGD/81/035, Technical Reports 1-7, FAO, Rome.
- FAO. 1993. Guidelines for Land-use Planning. Food and Agriculture Organization of the United Nations, Rome (<http://www.fao.org/docrep/T0715E/t0715e0c.htm>).
- FAO/UNDP. 1971. Bangladesh soil Resources, Soil survey project, AGL: SF/PAK 6 Technical Report 3, 185-198pp.
- Hassan, M.M. 1999. Soils of Bangladesh: Their genesis, classification and use potential. March Printers Ltd., Dhaka.
- Mandal, R.B. 1990. Land Utilization: Theory and Practice. Concept Publishing, New Delhi.
- OECD, 1976. Land use policies and agriculture. Organization for Economic Co-operation and Development, Paris.
- Richards, B.N. and Hassan, M.M. 1988. A Co-ordinate Forest Soil Research Program for Bangladesh, 31-32pp.
- Richards, B.N. and Hassan, M.M. 1989. Dendroecological regions of Bangladesh: A land capability assessment for tree species. FAO/UNDP Project BGD/81/010, Working Paper- 7, BFRI, Chittagong.
- Sabrousse, R. 1984. Preliminary Report on the Ecological Classification of Plantations in the Chittagong and Chittagong Hill Tracts District. Working Paper No. 2, FAO/UNDP Project BGD/79/017.
- Stevens, P.R. 1987. A simplified field manual for site classification and site suitability assessment in Bangladesh forests. FAO/UNDP Project BGD/81/011- Assistance to the second Agricultural research Project.

FOR 814 PLANT IMMUNE SYSTEM

Theory: 100 (4 cr);

Total: 100 (4 cr)

Course contents:

Introduction to Immunity and Immune system: Definition and scope of Immunity and Immune system, Plant versus Animal Immune system, Types of Immunity – Active and Passive resistance in plants, History of Plant immunity investigations, Mechanisms regulating immunity in plants, Molecular basis of gene-for-gene interactions, Systemic acquired resistance, R-genes, Defense hormones

Cell wall and plasma membrane in Plant immunity: Cell wall integrity signaling and innate immunity in plants, Plasma membrane compartmentalization in plant immune responses, Receptor like kinase complexes in plant innate immunity, MAP kinase cascades in Arabidopsis innate immunity, Pathogen-associated molecular patterns (PAMPs), PAMP receptors

Intracellular Complexes in Plant Immunity: Intracellular immune receptor signaling complexes, Pattern recognition receptor (PRR) mediated signaling in plant immunity, Endoplasmic reticulum in plant immunity and cell death

Plant immune receptor regulation: Regulation of plant immune receptors by ubiquitination, Ubiquitin-mediated protein modification, Ubiquitin ligases, Global SUMO proteome responses in mRNA biogenesis and plant stress responses

Virulence factors in plant immunity: Virulence factors associated with bacterial pathogens of plants and mammals, Effector triggered post translational modifications and their role in suppression of plant immunity

Understanding plant immunity: Molecular cloning of disease resistance genes, Biochemical characterization of resistance proteins, Tools for detection of protein-protein interactions, Proteins interacting with resistance gene products, Positive and negative regulators of disease resistance identified by genetic screening

Microbial defense against plant immunity: Alteration of host cell transcriptome by the *Xanthomonas AvrBs3/PthA* effectors, Host resistance genes against *Xanthomonas*, Suppression of PAMP-triggered immunity by pathogen effectors, Virus induced gene silencing, RNA interference and T-DNA mutagenesis

References

1. Wang, T. L. 1986. Immunology in Plant Science, CUP Archive, 228pp
2. Sessa, G. (Ed.) 2012. Molecular Plant Immunity, John Wiley & Sons, 304pp
3. Eguen, T.E. (Ed). 2013. Early Signaling in Plant Immunity, 108pp
4. Vidhyasekaran, P. 2013. PAMP Signals in Plant Innate Immunity: Signal Perception and Transduction, Volume 21 of Signaling and Communication in Plants, Springer Science & Business Media, 442 pp
5. McDowell, J. G. 2011. Plant Immunity: Methods and Protocols: Volume 712 of Methods in Molecular Biology, Humana Press, 280 pp
6. Metlitski , L. V.; Ozeretskovskaia, O. L. 2013. Plant Immunity: Biochemical Aspects of Plant Resistance to Parasitic Fungi, Springer, 114 pp

FOR 815 IMMUNOLOGICAL BIOINFORMATICS

Theory: 100 (4 cr);

Total: 100 (4 cr)

Course contents:

Introduction: Immune Systems and Systems Biology, Challenges in Immune System research, Sequence Analysis in Immunology, Plant Interactome, Antigen, Haptens, adjuvants, mitogens, Antibodies – structure, functions, Regulation of immune response - Humoral and Cell mediated response
Antigen processing and presentation, MHC, complement system. Bacterial, viral, protozoal and parasitic infections with reference to (Diphtheria, influenza virus, malaria and helminthes) with specific representative examples of each group.

Methods Applied in Immunological Bioinformatics: Use of Protoplasts to Study Innate Immune Responses, DNA Microarrays in Immunology, Gene Functional Prediction Using Clustering Methods for the Analysis of Tomato Microarray Data

Tools for Plant Immunity Research: Marker Exchange Mutagenesis and Complementation Strategies for the Gram Negative Bacteria *Xanthomonas oryzae*, Whole Genome Analysis to Identify Type III Secreted Effectors, Use of Nipponbare BAC Clones for Physical Mapping of an R Gene Locus in Rice, Identification of Components in Disease Resistance Signaling in Arabidopsis by Map Based Cloning, Yeast Two Hybrid Approaches to Dissecting the Plant Defense Response, Massively Parallel Signature Sequencing to Study Genes Expressed During the Plant Defense Response, Microarray Analysis to Dissect the Plant Defense Response

Bioinformatics and Its Applications in Plant Biology, Robust Long Serial Analysis of Gene Expression to Identify Novel Fungal and Plant Genes Involved in Host Pathogen Interactions, Virus Induced Gene Silencing for Gene Function in Rice and Plant roots, RNA Interference to Dissect Defense Signaling Pathways in Rice,

Bioinformatic databases and tools related to plant immunity: PHI-Base database, PhytoPath, EnsemblFungi, PathoPlant, BioModels, Colletotrichum Database, SAGE and superSAGE, Gene ontology consortium database, PAMGO, PAMDB, HPIDB, PRGDB

1. Lesk, A. 2013. Introduction to Bioinformatics, OUP Oxford, 371 pp
2. Lund, O. 2005. Immunological Bioinformatics, MIT Press, 296 pp
3. Novartis Foundation. 2004. Immunoinformatics: Bioinformatic Strategies for Better Understanding of Immune Function - Novartis Foundation Symposia, John Wiley & Sons, 272 pp
4. Schönbach, C.; Ranganathan, S. and Brusic, V. 2008. Immunoinformatics - vol 1 of Immunomics Reviews, SpringerLink: Springer e-Books, Springer Science & Business Media, 200 pp
5. Flower, D.R. and Timmis, J. (Eds). 2007. In Silico Immunology, SpringerLink: Springer e-Books, Springer Science & Business Media, 451 pp
6. Flower, D.R.; Davies, M., and Ranganathan, S. 2012. Bioinformatics for Immunomics - vol 3 of Immunomics Reviews, Springer New York, 192 pp

FOR 816 CO-MANAGEMENT OF FOREST

Theory: 100 (4 cr);

Total: 100 (4 cr)

Introduction: Definition and scope, Rationale of forest co-management, Evolution of the concept of co-management of forests, Co-management in context of participatory forestry, community forestry and community based forest management, Co-management of other natural resources management.

History: Historical development of the concept of Co-management, Formal and informal approaches towards co-management, driving forces behind the development of the concept of co-management, different versions of forest co-management, History of co-management in other countries.

Legal setting: The current legal framework of co-management of forests in Bangladesh, Formation and maintenance of a co-management system, Stakeholders in a co-management system, Role of GOs and NGOs in the co-management structure in Bangladesh, Strength and weaknesses of the current legal framework, Political dimension in co-management, Community based organizations in co-management system

Geographical scope: Co-management in Bangladesh and in other countries, Co-management of forests in Bangladesh – the geographical aspects, Cases of co-management of forests in Bangladesh,

Financing co-management: External and internal funding sources, Challenges of funding the co-management system, Revolving loan fund, Co-operative structure of CBOs on the co-management and their financial aspects

Problems and prospects: Challenges of establishing a co-management system in general, Challenges of establishing a co-management system in Bangladesh,

References:

1. Fox, J.; Mustafa, M.G.; Bushley, B. R.; Brennan, S. M. and Durand. L. (eds.). 2013. Connecting communities and conservation: co-management initiatives implemented by ipac in wetlands and forests of Bangladesh, Integrated Protected Area Co-Management Project, USAID, Dhaka, 206 pp
2. Huda, K. S. 2005. Co-management of protected areas in Bangladesh: a strategy for establishing an institutional framework, Nishorgo Support Project, USAID, Dhaka, 39 pp
3. Sharma, R. 2005. Co-management of protected areas in south Asia with special reference to Bangladesh, Nishorgo Support Project, USAID, Dhaka, 20 pp
4. DeCosse, P. J. and Jayawickrama, S. S. 1996. Co-management of Resources in Sri Lanka : Status, Issues and Opportunities. USAID's Natural Resources and Environmental Policy Project, IRG, Sri Lanka.
5. Borrini-Feyerabend, G.; Michel, P.; Farvar, M. T.; Kothari, A. and Renard, Y. 2004. Sharing Power. Learning by doing in co-management of natural resources throughout the world. IIED and IUCN/CEESP/CMWG, Cenesta, Tehran.

6. Anar Koli. 2010. Protected Area Co-management in Bangladesh - Can enhance the adaptation of the forest communities? BENJapan, Proc. of International Conference on Environmental Aspects of Bangladesh (ICEAB10), Japan, Sept. 2010, Tsukuba University, Japan
7. Chowdhury, M.S.H.; Koike, M. and Muhammed, N. 2009. Embracing Collaborative Protected Area Management for Conservation: An Analysis of the Development of the Forest Policy of Bangladesh. *International Forestry Review* 11(3):359-374. 2009

ENV 817 GREEN BANKING

Theory: 100 (4 cr);

Total: 100 (4 cr)

Financial Systems: Role of financial systems; financial intermediaries, securities and markets. Taxonomy of financial institutions. Structure of financial markets (direct and indirect finance, dealers and brokers, banks, mutual funds, pension funds, and insurance companies), Bank-based systems against market-based systems; Types of banking - Retail, private, corporate, investment, Islamic, International; Role of banks, theories of financial intermediation, current issues in banking

Regulation of Banks: Legal aspects. Regulation of banks (free banking, arguments for or against regulation, traditional regulation mechanisms, alternatives to traditional regulation). Risks in Banking - Market risks, Liquidity risk, interest rate risk, foreign exchange risk. Credit risk: Screening and monitoring, credit rationing, collateral.

Green banking: Definition, history, current status in global context, Current status in Bangladesh context, CSR in context of green banking

Country status: Legal and policy aspects related to green banking in Bangladesh, Bangladesh bank and its initiatives, Initiatives by other banks, the role of customers, businesspeople and media in green banking.

Indicators of Green banking: need for indicators, Types of indicators, Methods of development of indicators. LCA in the context of green banking, Comparing among banks, among branches of banks and among different products in terms of greenness, paperless vs paper based banking

References

1. Masukazzaman, M. and Aktar, S. 2013. Green Banking in Bangladesh: A Commitment towards the Global Initiatives, *Journal of Business and Technology (Dhaka)*, Volume VIII: 1 and 2, 17-40 p
2. Ullah, M. 2013. Green Banking in Bangladesh- A Comparative Analysis *World Review of Business Research*, Vol. 3(4), 74 – 83 pp

ENV 818 ECOTOURISM MANAGEMENT

Theory: 100 (4 cr);

Total: 100 (4 cr)

1. **Nature and Scope of Ecotourism:** History of ecotourism and its definitions; Nature based tourism, Characteristics of ecotourism; Benefits of ecotourism; Environmental, socio-cultural and economic impacts of ecotourism;
2. **Ecotourism Management:** Concept and procedures; Recreation and the environment; recreational impacts on the environment; ethical and legal concerns; code of practice for ecotourism operators; incorporating ecotourism principles into activities; interpretation; visitor guidelines; planning for minimal impact; quality control; Waste management – concept, needs, design and implementation.
3. **Ecotourism and Protected Areas:** Protection of the ecosystems; Conservation of forests, biodiversity, local cultures and heritage; Assessing Eco-Tourism Potential of a particular area/forest; Role of private sectors in Ecotourism and forest conservation; Co-management of protected areas and Ecotourism in Bangladesh
4. **Ecotourism and Development Issues:** Ecotourism as a growth sector within the tourism industry; Ecotourism and community development;
5. **Marketing Ecotourism:** The ecotourism market; Situation analysis; Market research; Promotion; Advertising; Sales; Trends in international tourism; Understanding the needs of the consumer; Consumer expectations; Development, Promotion and Marketing of ecotourism in Bangladesh; Ecotourism branding, certification and labeling.
6. **Ecotourism Facility Development:** Infrastructures and signage; Interpretations; Accommodation facilities including camp sites, cabins, resorts, etc.; Layout of facilities; Accepted practices for service facilities; Identifying catering options for different ecotourism activities; Tourism attractions and infrastructures in Bangladesh.
7. **Safety in Ecotourism:** Safety strategy, hazards and first aid; Identify/establish safety precautions/requirements/procedures for an ecotourism enterprise.
8. **Sustainability of Ecotourism:** Maintenance of Carrying Capacity; Environmental education program; Community livelihoods; Legal and policy supports from the government;
9. **Ecotourism Management Plan (EMP):** Concept, procedures and implementation of EMP.
10. **Planning an Ecotourism Activity:** A special project where the student plans out an ecotourism activity including: budget, accommodation, licenses, meals, destination, etc.

References :

- Drumm, A. & Moore, A. (2005). *Ecotourism Development: An Introduction to Ecotourism Planning* (Vol. I). (A. Singer, Ed.) Arlington, VA, USA: The Nature Conservancy.
- Drumm, A. & Moore, A. (2004). *Ecotourism Development: Volume II - The Business of Ecotourism Development and Management* (Vol. II). Arlington, VA, USA: The Nature Conservancy.
- Mowforth, M., & Munt, I. (2009). *Tourism and sustainability* (3rd Edition). London, UK: Routledge.
- Newsome, D., Moore, S.A., & Dowling, R.K. (2002). *Natural area tourism*. Bristol, UK: Channel View Publications.
- Weaver, D. (2008). *Ecotourism* (2nd Edition). Hoboken, NJ: JS Wiley.