Tribhuvan University
Institute of Science and Technology
4 Years Bachelor of Science (B.Sc.) Programme
B.Sc. 3rd Year Zoology

Course Title : Natural Resource Management **Full Marks: 50**
Course No. : Elective Zool.303 **Pass Marks: 17.5**
Nature of Course : Theory **Year: III**
Instruction Hours : 75

Objectives of the Course:

At the end of course students will be able to:

- Understand an overview of the various natural resources
- Know the resource degradation problem
- Be familiar with issues and conservation of natural resources

Unit	Sub-unit	Description of content of the sub-unit (depth)	Lectures	Text/Ref. for the topics (for detail see the list of text & references)
Introduction to Natural Resources and Management (10 Lectures)	**Concept and values**	Introduction and importance of natural resources. Scopes of natural resource management.	1	Miller & Spoolman; Ramad; Owen, Chiras & Reganold; Khadka.
	Types of natural resources	Renewal and non renewal resources.	2	
	Consumption trends	Trends and drivers of resource use (demography, ecological settings, economic growth, patterns of developments, etc.).	2	
	Resource depletion	Causes and consequences of resource depletion.	1	
	Management	Principles, Issues and approaches (community based, adaptive and integrated).	2	

	Sustainable development	Concept and evolution of sustainable development.	1	
	Policy and Governance	Importance of legal, policy and governance in natural resource management.	1	
Water Resources (10 Lectures)	**Introduction**	Introduction of water resources.	1	Sharma; Asthana & Asthana; Miller & Spoolman; WESC; Khadka; Peter, Dixit & Athukorala.
	Hydrological cycles	Description of hydrological cycle.	1	
	Major Sources of water	Description of major sources of water for human.	1	
	Use and depletion of water resources	Use, causes and impacts of water resource depletion.	1	
	Status of water resources of Nepal	Resource base, surface water, ground water, requirement.	2	
	Water resource management	Policies (Water resource Act 1992, Water resource rule 1994), Strategy (Water Resources Strategy Nepal 2002) and Management practices (rain water harvesting, watershed management; multipurpose water resource management programs, etc.).	4	
Land resources (9 Lectures)	**Concept of land resource and land use**	Concept of land resource and land use, land use types, land use classification.	3	Ramade; Asthana & Asthana; Khadka.
	Land degradation	Causes, types and effects of land degradation.	2	
	Land resource management	Land use and land reform policy, land use planning, land resource management practice (mechanical, biological methods, fertility management).	4	
Mineral Resources (7 Lectures)	**Introduction, types and importance of mineral resources**	Mineral resources, types (metallic and non metallic minerals) and distribution of mineral resources, importance of mineral resources.	2	Ramade; Asthana & Asthana; Miller & Spoolman.
	Consequence of mineral extraction	Rapid depletion, wastage, environmental pollution.	1	

	Mineral resources of Nepal	Major mineral resources and their status, distribution and extraction in Nepal.	2	
	Conservation of mineral resources	Policy, strategy and practice (reuse, recycle, sustainable extraction, etc).	2	
Mountain Resources (4 Lectures)	**Mountain natural resource and conservation**	Importance of mountain as natural resources, degradation and its management. Mountain and tourism.	4	Pandey.
Biodiversity Resource (11 Lectures)	**Introduction, types of biological resources**	Biological resource and their types .	1	Primack et al.;
	Importance of biological resources	Ecological, socioeconomic, evolutionary, climatic services.	2	
	Concept of biodiversity, State and threats of biodiversity of Nepal	Concept, components of biodiversity. State and general threats of biodiversity of Nepal.	2	
	Bio-piracy and bio-safety	Basic concept and their relevance.	2	
	Management of biodiversity	Concept, policies, strategy and practices (ex-situ and in-situ conservation).	4	
Forest Resources (8 Lectures)	**Importance**	Introduction and importance (economic, ecosystem service, carbon storage/trade, climatic service).	1	Stainton; Miller & Spoolman; Asthana & Asthana; Khadka.
	Forest types of Nepal	Forest types and characteristics of Nepal.	2	
	Forests products and their uses in Nepal	Timber, fuel wood, fodder, NTFP, etc.	1	
	Forest Degradation	Causes and consequences of forest degradation.	1	
	Forest Management Community Forestry Program in Nepal	Forest management- management policy, strategy and programs of Nepal.	2	
		Policy, programs and implementation of community	1	

		forestry.		
Energy Resources (10 Lectures)	**Introduction, consumption trends of energy**	Concept, types, energy and development, global consumption trends.	2	Ristinin & Kraushaar; Miller & Spoolman; Asthana & Asthana; Khadka.
	Sources of energy: Renewable and non renewable sources	Definition, types and potentials of renewable (solar, wind power, hydropower, biomass, geothermal, tidal, etc.) and non renewable (coal, oil and natural gas) energy resources.	4	
	Consequences of rapid consumption of non renewable energy	Causes and ecological and economic effects of rapid consumption of fossil fuels.	2	
	Status of energy resources of Nepal	Status of energy availability and use in Nepal.	1	UNDP/NPC (1995)
	Energy policy	Energy policy of Nepal.	1	
Natural Resources and Climate Change (6 Lectures)	**Introduction to Climate Change**	Basic concept and historical account of climate change, green house effects, future prediction of climate change.	1	WECS 2011;
	Climate change impacts and vulnerability on natural resources	Impacts of climate change on natural resource, climate change vulnerability on resource.	2	
	Climate change mitigation and adaptation	Strategy, policy and practices. Climate Change response on Natural Resources. Role of Forests in Climate Change mitigation and adaptation, Community Adaptation to Climate Change.	3	

Text Books and References:

Agarwal, K.M., Sikdar, P.K., Deb., S.C. 2005. A Text Book of Environment. Macmillan India Limited.

Asthana, D.R. and Asthana, M. 2012. Environment: Problems and Solutions. S Chand and Company PVT LTD.

HMGN/MFSC. 2002. Nepal Biodiversity Strategy. Government of Nepal.

Khadka, N.B. 2008. Natural Resource and Conservation.

Klee, G.A. 1991. Conservation of Natural Resources. New Jersey: Prentice Hall Publ. Co.

Miller, G.T. (Jr.) and Spoolman, S.T. 2010. Living in the Environment. Brooks/Cole. Belmont, California, USA: Wardsworth Publishing Company.

Nalini, K.S. 1993. Environmental Resources and Management. Anmol Publishers.

NPC, 2011. Climate-Resilient Planning. [Working Document], Government of Nepal, National Planning Commission, Kathmandu, Nepal.

Owen, O.S., Chiras, D.D. & Reganold, J.P, 1998. Natural Resource Conservation Management for a Sustainable Future (7th Edition). Prentice Hall.

Pandey, R.K. 1999. Mountain Dimensions: As Altitude Geographic Analysis of Environmental & Development of the Himalayas. Pilgrim Book House.

Peter, M., Dixit, A. and Athukorala, K. (edited). 2007. Integrated Water Resources Management: Global Theory, Emerging Practice and Local need. Sage Publication.

Primack, R.B., Poudel, P.K & Bhattarai, B.P. 2013. Conservation Biology: A Primer for Nepal. Dreamland Publication, Kathmandu.

Ramade, F. 1984. Ecology of Natural Resources. John Wiley & Sons Ltd.

Ristinin, R.A. and Kraushaar, J.J. 2006. Energy and Environment. New York: John Wiley and Sons, Inc.

Sharma, V.K. 1985. Water Resources Planning and Management. Himalaya Pub. House.

Stainton, J.D.A. 1972. Forests of Nepal. John Murray, London.

WECS. 1995. Alternative Energy Technology – Overview and Assessment. Kathmandu: WECS, GoN.

WECS. 2011. Water Resources of Nepal in the Context of Climate Change. Water and Energy Commission Secretariat. GoN.