**COURSE TITLE : NATURAL RESOURCE ECOLOGY, CONSERVATION**

**& MANAGEMENT**

**COURSE CODE : ENV7107**

**CREDIT UNITS : 4CU, 60CH**

**COURSE LEVEL : YEAR I, SEMESTER I**

**COURSE DESCRIPTION**

The course describes how ecological concepts and processes are applied at various scales to conserve and manage renewable natural resources (e.g., plants, animals, water, soil) in terrestrial and aquatic systems—it explains how ecological science is applied to help solve real-world problems. In most cases, these problems are caused by the actions of people, and the course emphasizes potential conservation and management strategies to mitigate anthropogenic issues such as, but not limited to, habitat fragmentation, invasive species, disease, and climate change.

**COURSE JUSTIFICATION/RATIONALE**

The need to analyze the role of climate change in this context and discuss strategies for mitigating negative effects of climate change on renewable resources

**LEARNING OBJECTIVES**

By the end of this course, the student should be able to:

* introduce the principles for successful natural resource management NRM
* discuss the process of recognizing and defining NRM issues within an ecosystem management framework
* explore the techniques of collecting, handling and interpreting NR data
* consider a range of management methods and their applicability in different situations
* Explain how different ecological principles are applied to solve specific problems affecting the conservation and management of natural resources at different spatial and temporal scales
* Understand and define the concept of biodiversity, describe ecological and socioeconomic values of biodiversity, and make science-based arguments as to why biodiversity should be conserved
* Describe how and why natural systems are organized at scales ranging from biome to population and provide examples
* Explain how biotic and abiotic factors affect the abundance and distribution of plants and animals and understand how organisms adapt and evolve in response to changing environments;
* Explore different practical approaches to conservation of natural resources and the limitations of each.

**LEARNING OUTCOMES**

A student completing the course is expected to:

* use Geographic Information Systems (GIS) for providing management relevant information about natural resources and environmental issues
* review and give examples of other techniques and tools for increasing availability and accessibility of environmental information such as indicators
* effectively communicate environmental conservation and policy issues to the broader society.
* critically think, analyze and compare both intended and unintended consequences of diverse conservation measures and environmental policy instruments.
* develop the ability to relate principles of NRM to successful NRM planning
* assess what data is needed for specific NRM projects and how to gather it and analyze it.
* describe a range of management methods and gauge their appropriateness to the solution of particular problems
* gain exposure to comprehensive NRM projects
* develop the ability to critically evaluate NRM projects

**DETAILED COURSE CONTENT**

**Unit 1: Natural Resource Ecology**  **(15 hours)**

* Principles of Ecology: Ecosystem Structure
* Principles of Ecology: Ecosystem Function
* Principles of Ecology: Ecosystem Balance and Imbalance

**Unit 2: Natural Resource Conservation (20 hours)**

* Diversity of natural resources, economic growth, and carrying capacity
* Current state of natural resource conservation and justifications for natural resource management and conservation policy
* Reviewing major environmental policy instruments
* Research methods in natural resource conservation and environmental policy analysis. Topic selection for research paper and presentation
* Policy instruments for managing air resources
* Conservation and policy instruments for managing water resources
* Policy instruments for land and waste management
* Policy instruments for energy resource management
* Conservation and policy instruments for management of mineral resources
* Conservation and policy instruments for fisheries, and coastal and marine resources
* Conservation and policy instruments for forest resources, biodiversity conservation and endangered species management
* Policy instruments for global climate change
* Impact evaluations for environmental policy instruments
* Policy innovations in environmental and natural resource management
* Presentations of student research projects

**Unit 3**: **Natural Resource Management** **(25 hours)**

* Soil basics, including soil physical and chemical properties and soil taxonomy
* Soil erosion by water and by wind, and the USLE equation
* Water conservation and quality
* Spatial analysis tools in natural resource management (GIS, GPS)
* Basic ecological principles & their application to natural resource management
* Forest ecology and management
* Coastal ecology and management
* Global change biology (climate change, land-use change, etc.)
* Wildlife ecology and management
* Ecosystem goods and services
* Principles and practices for sustainably managing natural resources (soil, water, forests, fisheries, biodiversity); systems, cases, models, drivers, scenario evaluation, adaptive learning, and collaborative decision-making.

**MODE OF DELIVERY**

* Lectures and discussions
* Experiments and laboratory activities
* Laboratory reports
* Reading and problem assignments

**INSTRUCTIONAL MATERIALS AND / OR EQUIPMENT**

* Whiteboard and Markers
* Flip Charts
* LCD Projectors
* CDs, DVDs and Tapes

**COURSE ASSESSMENT**

* Continuous assessment tests 20%
* Group and individual project 20%
* End-of-Semester Examination 60%

**Total 100%**

**READING MATERIALS / LIST**

1. Rosenbaum, W.A. 2010. Environmental Politics and Policy, 7th Edition. CQ Press: Washington, DC.
2. Tietenberg, T. and L. Lewis. 2009. Environmental and Natural Resource Economics, 8th Edition. Addison-Wesley: Boston, MA.
3. Singer, M. J., and Muns, D. N. 2006.Soils, an Introduction. Chap. 1 pp.1-14.
4. Singer, M. J., and Muns, D. N. 2006.Soils, an Introduction. Chap. 14 pp.354-384.
5. Water Conservation & Quality
6. Chiras, D. D., Reganold, J. P., and Owen, O. S. 2005.Managing water resources sustainably (Ch.10) & Water pollution (Ch. 11). In Natural Resource Conservation: Management for a Sustainable Future (9th ed.). Prentice-Hall.pp.219-298.
7. Bolstad, P. 2005. Data Model (Ch. 2). In GIS Fundamentals: A First Text on Geographic Information Systems (2nd ed.). Eider Press, Minnesota. pp.25-65.
8. Bolstad, P. 2005. The Global Positioning System (Ch. 5). In GIS Fundamentals: A First Text onGeographic Information Systems (2nd ed.). Eider Press, Minnesota. pp.159-186.
9. Chiras, D.D. and Reganold, J.P. 2010. Natural Resource Conservation: Management for a Sustainable Future.10th ed. Benjamin Cummings. pp. 50-85 Forest Ecology & Management
10. Smith, D.M., Larson, B.C., Kelty, M.J. and Ashton, P.M.S. 1997. The Practice of Silviculture:Applied Forest Ecology.John Wiley & Sons, Inc. pp. 3-19.
11. Mann, K.H. 2000.Ecology of Coastal Waters with Implications for Management (2nd Edition). Chap. 2-5, pp.18-78 & Chap. 16, pp.280-303.
12. Vitousek, P.M. 1994. Beyond global warming: Ecology and global change. Ecology 75, 1861-1876