

## U.G. 1<sup>st</sup> Semester

### Paper: EWS101A (AECC) Environmental Studies

Credits: 2 = 2+0+0 (32 Lectures)

#### Unit 1: Basics of Environmental Science (8 lectures)

Definition and scope of environmental science; segments of the environment – atmosphere, hydrosphere, lithosphere, biosphere; natural resources; environmental impact assessment; energy and the environment; concept of sustainable development; GPS, GIS and Remote Sensing

#### Unit 2: Natural History and Ecology (8 lectures)

Why, how and what of natural history? concept of biodiversity, its value and measurement; biodiversity from genes to ecosystem; levels of ecological organisation; concept of population, community and ecosystem; biogeography of plants and animals; plant-animal interactions

#### Unit 3: Conservation Biology and Wildlife Sciences (8 lectures)

Introduction to ornithology, mammalogy, herpetology and vegetation science; an overview of different wildlife habitats; concept of flagship, keystone and umbrella species; wildlife laws; human dimension of biodiversity conservation; citizen science initiatives such as eBird, Assam Biodiversity Portal and SeasonWatch; habitat loss and fragmentation; poaching and hunting; Invasive Alien Species; extinction; urban biodiversity; concept of biodiversity hotspot and Protected Areas; concept of Threatened species.

#### Unit 4: Environmental Issues and Management (8 lectures)

Population growth; global warming and climate change; environmental pollution and management; hazards and disaster management; public health; solid waste management; resettlement and rehabilitation issues; sustainable agriculture and food security-biotechnological approach; environmental organizations; environmental laws and policies.

#### Field-work (one of the following)

1. Visit to a local polluted site
2. Study of common plants, insects, birds within the cotton campus
3. Study of an ecosystem

#### Suggested Readings

1. Sawyer CN, McCarty PL, Parkin GF (2003). *Chemistry for Environmental Science and Engineering*, Tata-McGraw-Hill Edition
2. De AK (2000). *Environmental Chemistry (4<sup>th</sup> Edition)*. New Age International (P) Ltd., New Delhi, India
3. Molles Jr MC (2016). *Ecology: Concepts and Applications (7<sup>th</sup> Edition)*. McGraw Hill Higher Education
4. Sodhi NS and PR Ehrlich (2010). *Conservation Biology for All*. Oxford University Press

5. Fleischner TL (2005). Natural history and the deep roots of natural resource management. *Natural Resources Journal* 45: 1-13
6. Fleischner TL (2011). Why natural history matters. *Journal of Natural History Education and Experience* 5: 21-24
7. Feldhamer GA, Drickamer LC, Vessey SH and Merritt JF (2003). *Mammalogy: Adaptation, Diversity and Ecology (2<sup>nd</sup> Edition)*. McGraw Hill, New York.
8. Lovette IJ and Fitzpatrick JW (eds) (2016). *Handbook of Bird Biology (3<sup>rd</sup> Edition)*. Cornell University
9. Vitt, LJ and Janalee P Caldwell (2013). *Herpetology: An Introductory Biology of Amphibians and Reptiles*. Academic Press.
10. Duellman WE and T Linda (1986). *Biology of Amphibians*. JHU Press
11. Seigo C (1999). *Environmental Science*. McGraw Hill
12. Miller GT (2000). *Living in the Environment*. Brooks/Cole
13. Canter LW (1996). *Environmental Impact Assessment (2<sup>nd</sup> Edition)*. McGraw-Hill, New York
14. Soubbotina TP (2004). *Beyond Economic Growth: An Introduction to Sustainable Development (2<sup>nd</sup> edition)*. The World Bank, Washington, DC
15. Eggleton, T (2013). *A Short Introduction to Climate Change*. Cambridge University Press, New York
16. Lillesand T, Kiefer RW and J Chipman (2015). *Remote Sensing and Image Interpretation (7<sup>th</sup> Edition)*. Wiley

**Paper: EWS102M (Modular Elective)  
Biodiversity and Environmental Management**

**Credits: 4 = 3+0+1 (48 Lectures)**

**Unit 1: Ecosystem and Biodiversity (7 lectures)**

Concept of ecosystem and ecosystem services; food chains, food webs and ecological pyramids; biogeographical classification of India; why tropics is so rich in biodiversity; concept of ecological community; why world is go green?; why there are so many kinds of animals and plants?

**Unit 2: Conservation Biology (8 lectures)**

What is conservation biology? Impact of linear infrastructure (e.g., roads, railways etc.) on biodiversity; human-wildlife interaction; extinction; principals of reintroduction and restoration; in situ and ex situ conservation of biodiversity; wildlife trade; folklore, religion, belief system and biodiversity conservation; traditional ecological knowledge

**Unit 3: Biodiversity Management (9 lectures)**

Assam Rhino Vision and Pygmy Hog Reintroduction Programme, Concept of Project Tiger and Project Elephant; environment versus development; tragedy of the Commons; environmental movements in India; role of non-governmental organisation (NGOs) and civil society in biodiversity conservation; major

international conventions: Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Convention on the Conservation of Migratory Species of Wild Animals (CMS) and Convention on Biological Diversity; concept of eco-development and joint forest management; Biopiracy and Biodiversity Diversity Act, 2002; role of an individual in conservation of natural resources

#### **Unit 4: Environmental Hazards and Management (12 lectures)**

Introduction to hazards; hazard classification-types of hazards; natural hazards: landslides: causes, prevention and correction methods; earthquake: concept of seismic waves, magnitude and intensity, causes, distribution of earthquake zones, effects, protection from earthquake; volcanic activity; flood and tropical cyclone: nature and frequency; cause, impacts and management; El-Nino, La-Nina, ENSO; Western disturbances; forest fires; disaster management cycle; Occupational Health Hazards

#### **Unit 2: Energy and Environment (12 lectures)**

Concept of resource and reserves, resources of energy and their classification – renewable and non-renewable energy; current energy related problems, energy production and consumption pattern – world and India; fossil fuels; nuclear energy; solar energy; wind energy; tidal energy; ocean thermal energy; geothermal energy; hydroelectric power; bioenergy; energy conservation strategies; green building concept

#### **Field Work:**

1. Visit to a Protected Area and identify the major conservation issues

#### **Suggested Readings**

1. Molles Jr MC (2016). *Ecology: Concepts and Applications (7th Edition)*. McGraw Hill Higher Education
2. Sodhi NS and PR Ehrlich (2010). *Conservation Biology for All*. Oxford University Press
3. Gupta HK (2003). *Disaster Management*, Universities Press (India) Pvt. Ltd
4. Coppola DP (2006). *Introduction to International Disaster Management*, Butterworth-Heinemann
5. Nakicenovic N (ed) (1998). *Global Energy Perspectives*, Cambridge University Press.