

ENSC-407: BIODIVERSITY & CONSERVATION (THEORY) (02 Credit hrs)

PRE-REQUISITES: ENSC-204, ENSC-209

LEARNING OUTCOMES

- Understanding the concepts of Biodiversity
- Explaining the importance of biodiversity
- Understanding the concept of conservation and its significance
- Underpinning the threats to biodiversity
- Understanding the ways to manage biodiversity
- Explaining the biodiversity and modern human challenges

CONTENTS

The current course is designed to introduce the fundamentals of biodiversity and conservation and ways to manage biodiversity. It includes understanding the definitions, types, structure and function of biodiversity. Understanding genes, species and ecosystem level diversity and its significance. Understanding the economic, educational and aesthetic values of biodiversity. Explaining the threats such as, habitat loss, habitat fragmentation, extinction, climate change, invasive species, disease, overexploitation to biodiversity. Explaining the ways to manage the biodiversity through ecosystem, species and population management, reserve and protect areas management and ex-situ and in-situ management of species. Finally, the course also aims to analyze human social, economic and political factors to manage biodiversity in modern times.

Unit 1: Biodiversity and its importance

- 1.1. Definitions and types of biodiversity
- 1.2. Species, genes and ecosystem diversity and their significance
- 1.3. Alpha, beta and gamma diversity
- 1.4. Economic, ecological, aesthetic, cultural and educational Values of biodiversity

Unit 2: Threats to Biodiversity

- 2.1.1. Extinction rate and extinction processes, IUCN red list of endangered species
- 2.1.2. Habitat loss, habitat fragmentation, pollution, desertification
- 2.1.3. Overexploitation and history of species extinction
- 2.1.4. Invasive species, disease, climate change

Unit 3: Maintaining Biodiversity

- 3.1. Fundamentals of conservation biology
- 3.2. Ex-situ and in-situ conservation strategies
- 3.3. Protecting and managing ecosystems
- 3.4. Protecting and managing species and populations
- 3.5. Protected area, reserves and biodiversity conservation

Unit 4: Biodiversity and modern human challenges

- 5.5. Social factors and biodiversity
- 5.6. Economic factors, trade and biodiversity
- 5.7. Political factors and biodiversity

TEACHING – LEARNING STRATEGIES

- Lectures based examinations
- Presentation/seminars
- Class discussion
- Quizzes

ASSIGNMENTS – TYPE AND NUMBER WITH CALENDAR

It is continuous assessment. The weightage of Assignments will be 25% before and after midterm assessment. It includes:

- Class participation,
- attendance,
- meeting deadlines of assignments and presentation,
- homework
- attitude and behavior,
- hands-on-activities,
- short tests, quizzes etc.

ASSESSMENT AND EXAMINATIONS:

Sr. No.	Elements	Weightage	Details
1.	Mid Term Assessment	35%	It takes place at the mid of the semester
2.	Formative Assessment	25%	It is continuous assessment. It includes: classroom participation, attendance, deadlines of assignments and presentation, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

RECOMMENDED TEXT BOOKS / SUGGESTED READINGS

1. Gaston, K. J., & Spicer, J. I. (2013). *Biodiversity: an introduction*. John Wiley & Sons.
2. Gillespie, A. (2013). *Conservation, biodiversity and international law*. Edward Elgar Publishing.
3. Sodhi, N. S., & Ehrlich, P. R. (Eds.). (2010). *Conservation biology for all*. Oxford University Press.
4. Van Dyke, F. (2008). *Conservation biology: foundations, concepts, applications*. Springer Science & Business Media.
5. Primack, R. B., Primack, R. B., Primack, R. B., & Primack, R. B. (2008). *A primer of conservation biology* (No. QH75 P74 2000). Sunderland: Sinauer Associates.
6. Carroll, S. P., & Fox, C. W. (Eds.). (2008). *Conservation biology: evolution in action*. Oxford University Press.
7. Hunter Jr, M. L., & Gibbs, J. P. (2006). *Fundamentals of conservation biology*. John Wiley & Sons.

ENSC-407: BIODIVERSITY & CONSERVATION (PRACTICAL) (01 Credit hr)

PRE-REQUISITES: ENSC-204, ENSC-209

LEARNING OUTCOMES

- Understanding fundamentals of biodiversity
- Identification, classification and nomenclature of lab specimens of plants and animals
- Collection/observation of plants (bryophytes, pteridophytes, angiosperm and gymnosperms), for their nomenclature, classification and understanding various systems
- Collection/observation of animals (amphibians, reptiles, birds, mammals) their nomenclature, classification and understanding various systems
- Understanding various ecological processes such as, pollination, competition, predation, parasitism in the field
- Underpinning threats to species, population and ecosystem
- Understanding management of biodiversity at Ex-situ and in-situ sites

CONTENTS

Practical knowledge of Biodiversity and conservation is necessary to reinforce the fundamental concepts of biodiversity, its values and significance, threats and its management. The practical course is therefore, designed to emphasize the identification and collection of plants and animals in the field for their nomenclature, classification and understanding various systems. Secondly, the practical course is designed to underpin various threats to biodiversity and their role in species extinction and declines. Finally, the practical will also intend to visit different ex-situ and in-situ sites for species conservation. Lastly, some model habitats will be studied to see the human impacts on natural ecosystems and species.

Unit-1: Fundamentals of Biodiversity and Conservation

- 1.1. Demonstrating fundamental concept of biodiversity
- 1.2. Explaining/demonstrating, genes, species, population, community and ecosystem
- 1.3. Evaluating values of different species

Unit-2: Plants and Biodiversity

- 2.1. Collection/observation of various plants
- 2.2. Identification of various plants
- 2.3. Nomenclature, classification of plants
- 2.4. Understanding various systems in plants

Unit-3: Animal and Biodiversity

- 3.1. Collection/observation of various animals
- 3.2. Identification of various animals
- 3.3. Nomenclature, classification of animals
- 3.4. Understanding various systems in animals

Unit-4: Evaluation of Threats to Biodiversity

- 4.1. Considering some model plant species and evaluating its threats
- 4.2. Considering some model animal species and evaluating its threats
- 4.3. Evaluating threats to some model ecosystems

Unit-5: Biodiversity Management

- 5.1. Visiting some ex-situ site (e.g. botanical gardens) and understating measures taken for species conservation
- 5.2. Visiting some in-situ site (e.g. national park) and understating measures taken for species conservation
- 5.3. Enlisting protected areas in Pakistan and their significance in biodiversity conservation

TEACHING – LEARNING STRATEGIES

- Lectures and practical performance based examinations
- Demonstrations,
- Field based learning
- Class discussion
- Quizzes

ASSIGNMENTS – TYPE AND NUMBER WITH CALENDAR

It is continuous assessment. The weightage of Assignments will be 25% before and after midterm assessment. It includes:

- Class participation,
- attendance, practical performance
- meeting deadlines of assignments and presentation,
- homework
- attitude and behavior,
- hands-on-activities,
- short tests, quizzes etc.

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6. Hunter Jr, M. L., & Gibbs, J. P. (2006). *Fundamentals of conservation biology*. John Wiley & Sons.
7. Lindenmayer, D., & Burgman, M. (2005). *Practical conservation biology*. Csiro Publishing.