

**Bot-208 & 208L      BIODIVERSITY AND CONSERVATION Credit Hours 4 (3+1)**  
**THEORY:**

**Introduction of the Course**

The course focuses on intensive losses of biodiversity due to the impacts of anthropogenic and catastrophic events. It highlights the importance of dire need for biodiversity conservation. Through this course, the theory and principles of conservation will be delivered to the students. It highlights the current and forthcoming situation of biodiversity at national and international level, governmental and non-governmental efforts to protect natural environments and develop sustainable practices to meet the needs to human generations to come.

**Course Objectives:**

The course is designed:

1. To enhance learning about regional and global biodiversity patterns and different factors affecting variations in terrestrial, aquatic and marine ecosystems.
2. To enable students in making philosophical and ethical questions of biodiversity conservation in the light of tangible and non-tangible value of biodiversity.
3. To familiarize students with the threats to biodiversity resulting from anthropogenic activities through HIPPO dilemma.
4. To prioritize biodiversity conservation studies, practices and exercises.
5. To improve awareness about different conservation approaches such as, community-based conservation (CBS) and integrated conservation and development (ICDPs), etc.

**Contents:**

**1. Basic concepts**

- 1.1 Introduction to biodiversity and its tangible and intangible value
- 1.2 Biodiversity hotspots (tropical and coral reef ecosystems)
- 1.3 Introduction and levels of biodiversity (Alpha, Beta and Gamma)
- 1.4 Biodiversity distribution, importance and Reduction.
- 1.5 Major and Current threats to biodiversity
- 1.6 Inventorying and monitoring of Biodiversity: baseline data (study)
- 1.7 Policies and legislation related to biodiversity loss and conservation
- 1.8 Different types of protected areas for biodiversity conservation
- 1.9 Understanding opportunities and challenges of biodiversity conservation

**2. Cause and depletion of biodiversity**

- 2.1 Concept of habitat and niche
- 2.2 Habitat loss
- 2.3 Habitat fragmentation
- 2.4 Concept of speciation
  - 2.4.1 Loss of existing species
  - 2.4.2 Origin of new species

**3. Species inventory and its utilization**

- 3.1 Baseline data of biodiversity
- 3.2 Use of species inventory in EIA (Environmental Impact Assessment)
- 3.3 Preparing species inventory at first level
- 3.4 Monitoring of biodiversity
- 3.5 Red data books and lists

**3. Species extinction**

- 3.1 How species become endangered?

### 3.2 How species become threatened?

#### 3.2.1 Criteria for recognizing different categories of threatened species

### 3.3 IUCN threatened species categories

### 3.4 Concept of extinct and extant species

### 3.5 Extinction of species

### 3.6 Theory of mass extinction

## 4. Species invasion and its impacts on local biodiversity

### 4.1 Concept of invasive, alien and native species

### 4.2 Species invasion and its major types

### 4.3 Intensively invasive species and its out-competing potential for native species

### 4.4 Concept of direct and indirect competition of local resources

## 5. Biodiversity conservation

### 5.1 Introduction to conservation, its history, guiding principles, and characteristics

#### 5.1.1 *In situ* conservation – conservation at species and population level

#### 5.1.2 *Ex situ* conservation – conservation in man-made ecosystems, croplands, cities.

### 5.2 Reconfirmation assays of existing biodiversity

### 5.3 Museums, arboreta, herbarium, zoos

### 5.4 Natural parks, sanctuaries, and biosphere reserves

### 5.5 Gene bank management and operation

## 6. Biodiversity conservation – role of masses

### 6.1 Public awareness strategies

### 6.2 Population explosion role of herbaria and botanical gardens in conservation

### 6.3 Legal protection of species and habitats

### 6.4 National and international laws and agreements for species and habitat Protection

## 7. National conservation strategy of Pakistan

### 7.1 Major prioritized sites for conservation

### 7.2 Priorities in conservation and conservation planning (case studies & exercises)

### 7.3 National Conservation Strategy of Pakistan

### 7.4 Major protected areas and national parks of Pakistan

## PRACTICAL:

1. Study the causes of local species extinction
2. Data collection and preparation of an inventory of the flora of a given region
3. To carry out base line study of any designated category of protected areas
4. Collection of some Invasive species and study of their characteristics
5. Study of evidence regarding value of species and extinction of species.
6. Study on threatened and endangered wild-life of Pakistan.
7. Field excursion

## Teaching Learning Strategies:

1. Assignments / Seminars Workshops
2. Laboratory work
3. Lectures
4. Visits to different biotechnology laboratories

## Learning Outcomes:

1. The students would know about importance of biodiversity and currently faced threats due to human activities.
2. The course will enable students to grasp the concept of conservation approaches that are currently in practice both at national and international level.
3. The course will enable students to learn biodiversity and conservation practices that are job market-driven.

4. The students will be able to learn about application of biodiversity and conservation in the human interventions such as, in Environmental Impact Assessment (EIA) of developmental projects.

**Assessment Strategies:**

1. Lecture-based quiz (both objective and subjective)
2. Brief and detailed assignments
3. Class tests
4. Group activities

**Recommended Readings:**

1. Baldauf, C. (2020). *Participatory Biodiversity Conservation: Concepts, Experiences, and Perspectives*. Springer Publishers. ISBN: 978-3-030-41686-7.
2. Dar, G.H., Khuroo, A.A. (2020). *Biodiversity of the Himalaya: Jammu and Kashmir State*. Springer Publishers. ISBN 978-981-329-174-4.
3. Holl, K.D. (2020). *Primer of Ecological Restoration*. Island Press. ISBN: 9781610919722.
4. Prach, K., Walker, L.R. (2020). *Comparative Plant Succession among Terrestrial Biomes of the World*. Cambridge University Press. ISBN: 9781108561167.
5. Wang, Y. *Terrestrial Ecosystems and Biodiversity* (2<sup>nd</sup> Ed.). CRC Press – Taylor & Francis Group. ISBN: 9781138333918.

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