

**FORMAN CHRISTIAN COLLEGE**

(A Chartered University)

SPRING Semester 2023

**Department of Environmental Sciences**

**COURSE INFORMATION:**

**ENVR / BIOL 323: Ecology & Evolution**    *04 credits (3-1)*

Prerequisite: None

Lecture Room: S-425

Lecture Time: **11:00- 11:50 (MWF)**

Lab: S120

Lab Class: **14:00-15:50 (M)**

**COURSE INSTRUCTOR:**

**SUMAIRA AKRAM**

Lecturer

Office: S-027D, Armacost Science Building

Office Hours: Monday and Wednesday: 12:00 - 14:00

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**Objectives:**

The course will:

- develop an understanding about ecology, its fundamental concepts, description of populations, communities and ecosystems
- provide basic concepts related to physiological ecology and exploring the effect of major environmental factors on the life of organisms
- enable the students to assess the effects of various environmental factors on plant growth and development.
- provide understanding of techniques for the scientific methods of study of community structure, interactions within the communities, and the community dynamics

**Learning Outcomes:**

At the end of this course, students will be able to:

- develop interrelationships of organisms with their environment.
- deal with community structure, interactions within the communities, and the community dynamics.
- think critically and conduct the environmental research project confidently and accurately.
- develop connection between sources and resources for conservation and sustainability of environment.

- gather information from web, libraries and electronic journals, read and report on current events related to environment and community, and their interaction.

### **Textbooks:**

1. Fundamentals of Ecology. Odum, E P. and Baret, G.W. 5<sup>th</sup> Ed. Thomson Brooks/Cole, 2004.
2. Ecology (concepts and applications). Moles, M C J 4<sup>th</sup> ed. WCB/McGraw-Hill. New York.
3. Field and laboratory manual of plant ecology. Hussein, F., H.E.C., Islamabad. 1989.

**All supporting material of this course will be available via the Moodle**

### **Course Requirement:**

Course content will be covered from the textbook chapters; however, the students will be encouraged and guided for securing additional information from digital sources. In the lab the students will be required to perform the experiments and record observations and complete the lab notebook in time. In field they will relate their gained knowledge with the real world.

### **Course Policies:**

**Attendance:** Students must attend all class meetings to assure the best possible grades; failure to do so will drastically affect the grade. If a student fails to attend 75% of the lectures and 75% of the laboratory work, he/she will not be allowed to appear in the Final Examination.

**Exams:** There will be two exams and a lab exam during the term. Mid Term Exam will be of one-hour duration and the Final Exam will be of two-hour duration. Mid Term and the Final Exam will constitute 25% each of the grade. The lab exam will be of two-hour duration and will constitute 15% of the grade. The Mid exam will include the topics covered during the first seven weeks whereas Final exam will be based on 70% of the course covered after the seventh week and 30% will include review of the first seven weeks course. The format of the exams will be both objective and essay type (limited choice will be given in the long answer type questions).

**Quizzes and Assignments:** There will be two quizzes and two assignments apart from, midterm and final exams. The quizzes and assignment will carry 10% and 20% weightage of the grade respectively.

**Missed Exam:** Students must take all the exams. If you do not appear in the exam you will be awarded zero point and your grade will be drastically affected. Make up-exam will not be given except on account of death of immediate family member.

### **Course evaluation:**

#### Weightage and Grading:

ACTIVITY	WEIGHT AGE
Midterm exam	25%
Final exam	25%

<b>Lab exam</b>	15%
<b>Quizzes</b>	10%
<b>Assignments</b>	20%
<b>Attendance</b>	5%
<b>Total</b>	<b>100%</b>

The grading system for the course is as follows:

<b>GRADES</b>	<b>QUALITY POINTS</b>	<b>NUMERICAL VALUE</b>	<b>MEANING</b>
<b>A</b>	<b>4.00</b>	<b>93-100%</b>	<b>Superior</b>
<b>A-</b>	<b>3.70</b>	<b>90-92%</b>	
<b>B+</b>	<b>3.30</b>	<b>87-89%</b>	
<b>B</b>	<b>3.00</b>	<b>83-86%</b>	<b>Good</b>
<b>B-</b>	<b>2.70</b>	<b>80-82%</b>	
<b>C+</b>	<b>2.30</b>	<b>77-79%</b>	
<b>C</b>	<b>2.00</b>	<b>73-76%</b>	<b>Satisfactory</b>
<b>C-</b>	<b>1.70</b>	<b>70-72%</b>	
<b>D+</b>	<b>1.30</b>	<b>67-69%</b>	
<b>D</b>	<b>1.00</b>	<b>60-66%</b>	<b>Passing</b>

<p style="text-align: center;">WEEKLY PLANNER ENVR/BIOL-323: Ecology and Evolution 4 (3+1) Credits</p>		
Week NO.	Contents	Class Activities/Discussion topics/Quiz/Graded assignments/ Field Work
1	<p>Introduction to Ecology: Nature, aims and applications of Ecology</p> <p>History of ecology</p> <p>Linking Ecology and Evolutionary Biology</p>	ELICITATION SESSION
2	<p>Basic Concepts of Ecology Scope of Ecological Research</p> <p>Levels of ecological organization Species, Population, Community and Ecosystems</p>	Field Work

	<p>Ecosystems: What Are They and How Do They Work?</p> <p>Biotic and Abiotic factors</p>	
3	<p>Key factors determining earth's weather and climate How does climate determine major Biomes on earth</p> <p>Life on Land (Terrestrial Ecosystems): Role of water, light, temperature, topography and Wind as ecological factors</p> <p>Direct and indirect effects of human activities on major terrestrial biomes</p>	<p>Class Assignment</p> <hr/> <p><u>GRADED Assignment</u></p>
4	<p>Community Structure and Species Diversity Types Of Species Factors affecting the Species Diversity in Communities</p> <p>Roles of Species in Communities</p> <p>Ecological Interactions Importance of Ecological Interactions Types of ecological interactions</p> <ol style="list-style-type: none"> <li>1. Competition</li> <li>2. Predation</li> <li>3. Parasitism</li> <li>4. Mutualism</li> <li>5. Commensalism</li> <li>6. Symbiosis</li> </ol>	<p>Class assignment</p> <p>Field Work</p>
5	<p>Ecological Succession: Ecological Succession: Communities in Transition</p> <p>Primary Succession: Establishing Life on Lifeless Ground Secondary Succession: Life Building on Life</p> <p>Ecological Stability, Complexity, And Sustainability</p>	<p>Class assignment</p>
6	<p>Protection of Natural Systems---The Precautionary Principle</p>	

7	<p>Ecosystem Ecology</p> <p>Energy Flow In Ecosystem</p> <p>Species Abundance and Diversity</p> <p>Rank abundance curve</p> <p>Food Chains and Food Webs</p>	<p>QUIZ</p> <p>Field Work</p>
8	<p>Biodiversity and Conservation</p> <p>Importance of Biodiversity</p> <p>Components of biological diversity</p> <p>Threats to Biodiversity</p> <p>The Red List Categories</p> <p>Causes of species extinction</p> <p>Biodiversity Conservation</p>	<p>Class assignment</p>
9	<p>Population Ecology</p> <p>Population Dynamics and Carrying Capacity</p> <p>Reproductive Patterns and Survival</p> <p>Effects of Genetic Variations on Population</p> <p>Human Impacts on Natural System</p> <p>Applying Population Ecology: The Human Population</p> <p>Factors Affecting Human Population Size</p> <p>Population Age Structure</p> <p>Cutting Global Population Growth</p> <p>Demographics of Pakistan</p>	<p>Class assignment</p> <p>GRADED Assignment</p>
10.	<p>Biogeochemical Cycles</p> <p>Gaseous cycles: Carbon, Oxygen, Nitrogen, and the Water Cycle</p> <p>b) Sedimentary cycles: Sulphur, Phosphorous, and Rock Cycle</p>	<p>Class assignment</p> <p>QUIZ</p>
11	<p>Phytoremediation: A new Approach for Remediation,</p> <p>Types of Phytoremediation</p>	<p>Class assignment</p>
12	<p>Impact of Human Activities on Ecosystems</p>	<p>Class Presentations</p>
13	<p>Evolution and Biodiversity</p> <p>How Did Life Emerge on the Primitive Earth,</p> <p>Evolution and Adaptation, Biological Evolution, microevolution and macroevolution, Natural</p>	<p>Class Discussion</p> <p>Group Assignment:</p>

14	Selection, ecological niche, speciation, extinction, and biodiversity	VIVA EXAMS
15	FUTURE OF EVOLUTION Artificial Selection: to change genetic characteristics of populations Genetic Engineering? Transferring Genes between Species	Class Discussion
16	Hardy-Weinberg Problems, Evolution: social selection & sexual selection	REVISION