



**Tentative Course Plan**  
**DEPARTMENT OF BOTANY**

**Class: BS**

**Semester- 3rd**

**Session: 2019-2023**

<b>Instructor</b>	<b>Dr. Syeda Sadaf Zehra</b>	<b>Email: sadaf.zahra@iub.edu.pk</b>	
<b>Course Title</b>	<b>Cell Biology, Genetics &amp; Evolution</b>	<b>Program</b>	<b>BS</b>
<b>Course Number</b>	<b>BOTA-01304</b>	<b>Credit Hours</b>	<b>4(3+1)</b>
<b>Lecture</b>	.....day: ..... period (00:00a.m to 00: 00a.m), Room# 00		

**Course Objective:**

1. To enable the students to understand structure and functions of cell, nature of genetic material and hereditary process ,familiarization with evolutionary processes
2. To enable the students to access & generate new knowledge in purposeful fashion.
3. Gene expression regulation during embryogenesis
4. Gene expression misregulation in carcinogenesis
5. To understand that a phylogenetic tree depicts lines of evolutionary descent
6. To understand that no living species is ancestral to another

**Course Outcomes:**

Graduates of the Genetics and Biotechnology BS program will be able to:

1. Students will learn the basic principles of inheritance at the molecular, cellular and organismal levels.
2. Students will understand causal relationships between molecule/cell level phenomena (“modern” genetics) and organism-level patterns of heredity (“classical” genetics)
3. Students will test and deepen their mastery of genetics by applying this knowledge in a variety of problem-solving situations
4. Display a broad understanding of core molecular genetics concepts including molecular biology, genetics, cell biology, physiology, and evolution.
5. Understand the evidence that living species share descent from common ancestry and how this fact explains the traits of living species
6. Understand that evolution entails changes in the genetic composition of populations
7. Understand the source of genetic variation and how it is shaped in the absence of selection (Hardy-Weinberg; genetic drift)
8. Understand the concept of fitness and how heritable differences in fitness result in natural selection.

**Methods of Teaching**

- Assigned readings
- Group activities & Discussion
- Audiovisual aids lectures
- Web-assisted instruction
- Student-Directed Teaching

**Resource Material**

1.Books Prescribed  
Latest additions of books will be recommended from stock available in the main library of the university  
Cell biology, genetics, molecular biology, evolution and ecology by verma, agarwal 2005,  
Cell and molecular biology, by P. K Gupta, 2012.  
  
Cytology Genetics Evolution and Ecology By P. K. Gupta. 2010.

**2.Reference Book**

i

ii

**4.Hot Research Papers**

i

ii

**3.Research Papers**

i

ii

**5.Web Resources**

i

ii

<b>Office Help Hours</b>	.....day, .....day: 00:00am		
<b>Grading</b>	Exam (Date to be announced) Mid- Exam (30%) Final Exam (50%) Problem Session/Assignments (20%)		
<b>Problem Session</b>	.....day: 00 and 00 periods (0:00-00:00am), Room# 00		
<b>SEQUENCE OF TOPICS TO BE COVERED</b>			
Session/Week	Topics (outline of main topics and sub topics)	Chapter #	Tutorial /Laboratory
<b>1</b>	Introductory lectures		
<b>2</b>	Structures and Functions of Bio-molecules i. Carbohydrates ii. Lipids iii. Proteins iv. Nucleic Acids		Extraction and estimation of carbohydrate, protein,
<b>3</b>	Physico-chemical nature of plasma membrane and cytoplasm. Ultrastructure of plant cell with a brief description and functions of the following organelles i. Cell wall ii Endoplasmic reticulum iii. Plastids vi. Mitochondria		Study of cell structure using compound microscope and elucidation of ultrastructure from electron microphotographs
<b>4</b>	Ultrastructure of plant cell with a brief description and functions of the following organelles v. Ribosomes vi. Dictyosomes vii. Vacuole		
<b>5</b>	Nucleus: Nuclear membrane, nucleolus, ultrastructure and morphology of chromosomes, karyotype analysis		
<b>6</b>	Reproduction in somatic and embryonic cell, mitosis and meiosis,		Study of mitosis and meiosis by smear/squash method and from prepared slides
<b>7</b>	Chromosomal aberrations; Changes in the number of chromosomes. Aneuploidy and euploidy. Changes in the structure of chromosomes, deficiency, duplication, inversion and translocation		
	<b>Mid Term Exam</b>	Course/Discussion	
<b>8</b>	Introduction, scope and brief history of genetics. Mendelian inheritance; Laws of segregation and independent assortment, back cross, test cross, dominance and incomplete dominance		Genetical problems related to transmission and distribution of genetic material

9	Sex linked inheritance, sex linkage in Drosophila and man (colour blindness), XO, XY, WZ mechanisms, sex limited and sex linked characters, sex determination		
10	Linkage and crossing over: definition, linkage groups, construction of linkage maps, detection of linkage		
11	Molecular genetics; DNA replication. Nature of gene, genetic code, transcription, translation, protein synthesis, regulation of gene expression (e.g. <i>lac</i> operon)		
12	Transmission of genetic material in Bacteria: Conjugation and gene recombination in <i>E.coli</i> , transduction and transformation		
13	Principles of genetic engineering / biotechnology		
14	The nature of evolutionary forces, adaptive radiations, differential reproductive potential, first plant cell, origin of organized structures.		
	<b>Final Term Exam</b>	Course/Discussion	

**Student Evaluation criteria:**

Attendance	5%
Workshop / Assignments/Case study	5%
Surprise Test/Sudden Test , Quizzes	5%
Class Participation	5%
Mid Term Paper	30%
Final Term paper	50%
<b>Total</b>	<b>100%</b>

**Student Responsibilities:**

Students must attend class. Failure to attend class may result in failure in the course. Students must also arrive on time and remain in class for the entire period. Cellular Phones and Beeper must be Turned off (Proper classroom decorum [behavior] adopts, Course outlines and calendars explain requirements and assignments, students are responsible for knowing what they say. Students are also responsible for doing all assigned work on time. Excessive absences (more than 03) will result in "F Grade". Students may prepare Sketchbook for taking notes and for references.

**Instructor/Tutor**

**Approved by:**

**Dean/ Chairman/ HOD/ Subject Specialist/ Program Coordinator**