**BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI**

**First Semester 2023-2024**

**11-Aug-2023**

**COURSE HANDOUT (PART II)**

In addition to part‑I (General Handout for all courses) printed on page 1 of the timetable book, this portion gives further specific details regarding the course.

**Course Number : BIO F214**

**Course Title : INTEGRATIVE Biology**

**Instructor-in-Charge : JAYATI RAY DUTTA**

**Other Instructors : JAYATI RAY DUTTA & Hemanjali Mude**

**1. Course Description**:

The course intends to bridge the gap as well as open new vistas to students taking up biology. The course covers two tracks, essentially. The first track introduces the student to the ordering that helps biologists to actually study the vast diversity of the living world. This track would encompass questions related to the origin and evolutionary pathways followed in nature, as well as the methods followed by biologists to systematically categorize and document them. The second track highlights the uses and applications of biology in everyday life – whether in the economic or in the social realms. Together, the course projects the subject in a way from which the student can choose and implement his biological knowledge vis-à-vis his/her interests.

**2. Scope and Objectives:**

Being the second course on general biology, the course exposes the students to those foundational aspects as described above. At the end of the course, the student will have developed a basic understanding of the evolutionary processes, rationale for taxonomic arrangements and familiarity of selected, representative members of the major kingdoms of living organisms. Further, the student will also become aware of how knowledge of biology is applied for creating opportunities for livelihood.

**3. Textbook:**

Raven P.H. and George B. Johnson. Systematics and Evolutionary Biology (BITS-Pilani Custom Edition 2012). New Delhi: Tata McGraw-Hill Publishing Company Ltd., 2012.

**4. Reference Books:**

RB1: Campbell, N.A., *et. al.* Essential Biology with Physiology (2nd edition). New Delhi: Pearson Education Inc., 2009.

RB2: Starr, Cecie. Biology: Concepts and Applications (6th edition). India: Thomson Brooks/Cole, 2007.

**5. Lecture Plan:**

|  |  |  |  |
| --- | --- | --- | --- |
| Lect. No. | **Learning Objectives** | **Topics to be covered** | **Chap. No.** |
| 1-3 | Genes within populations | Genetic variation and evolution, Hardy-Weinberg principle; agents of evolutionary change; fitness; interaction among evolutionary forces; maintenance of variation; selection acting on traits; experimental studies on natural selection; limits of selection | 20 |
| 4-7 | Evidence for evolution | Evidence of natural selection; artificial selection; fossil and anatomical evidence for evolution; convergent evolution; Darwin's critics | 21 |
| 8-10 | Origin of species | The nature of species; the biological species concept; reproductive isolation; genetic drift and natural selection in speciation; geography of speciation; species clusters; pace of evolution; speciation and extinction | 22 |
| 11-14 | Systematics and the phylogenetic revolution | Systematics; cladistics; systematics and classification; phylogenetics and comparative biology; phylogenetics and disease evolution | 23 |
| 15-16 | Genome evolution | Comparative genomics; evolution of whole genomes | 24 |
| 17-19 | Protists | Introduction to protists; origin and endosymbiosis; economic importance of, and diseases associated with protists | 29 |
| 20-23 | Green plants | Introduction to green algae, bryophytes, tracheophytes, lycophytes, pteridophytes and angiosperms; evolution of seed plants and their economic importance | 30 |
| 24-26 | Fungi | Introduction to fungi; ecology, fungal parasites and pathogens; economic importance of fungi | 31 |
| 27-29 | Overview of Animal Diversity | General features of animals; evolution of the animal body plan; the classification of animals | 32 |
| 30-35 | Noncoelomate and Coelomate invertebrates | Some important features of noncoelomate and specific features of coelomate invertebrates | 33,34 |
| 36-40 | Vertebrates | Description of characteristics of fish, amphibians, reptiles, birds and mammals; evolution of the primates | 35 |

**6. Evaluation Scheme:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **No.** | **Evaluation component** | **Duration** | **Weight** | **Date and Time** | **Remarks** |
| 1 | Mid-sem | 90 min. | 25% | 13/10 - 2.00 - 3.30PM | CB |
| 2 | Assignments |  | 20% |  | OB |
| 3 | Surprise quizzes |  | 20% |  | CB |
| 4 | Comprehensive Examination | 180 min. | 35% | 19/12 FN | CB |

**Chamber consultation hour**: To be announced in the class.

**Notices:** All notices will be displayed on the CMS.

**Make-up policy:** Make-up will be granted only to genuine hospitalization cases. No make-up for assignments and surprise quizzes.

**Academic Honesty and Integrity Policy:** Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

**Instructor-in-Charge**

**BIO F214**