



**COURSE HANDOUT (PART II)**

**First Semester 2018-19**

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 : INTEGRATED BIOLOGY**

**Instructor-in-Charge : PANKAJ KUMAR SHARMA**

**1. Course Description:**

The course intends to bridge the gap and 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 the 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 (5<sup>th</sup> edition). New Delhi: Pearson Education Inc., 2016.

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





## 5. Lecture Plan:

Lecture No.	Module Learning Objectives	Lecture / Tutorial Session	TB Chap. #	Learning Outcome
1-3	Genes within populations	L1. Genetic variation and evolution, Hardy-Weinberg principle; L2. Agents of evolutionary change; fitness; interaction among evolutionary forces; maintenance of variation; L3. Selection acting on traits; experimental studies on natural selection; limits of selection T. Assignment/activity	20	The student would be introduced to the course and understand the forces leading to evolution
4-7	Evidence for evolution	L4. Evidence of natural selection; L5. Artificial selection; L6. Fossil and anatomical evidence for evolution; L7. Convergent evolution; Darwin's critics T. Assignment/activity/quiz	21	The student would look at Darwin's theories of evolution and compare the same with other theories
8-10	Origin of species	L8. The nature of species; the biological species concept; L9. Reproductive isolation; genetic drift and natural selection in speciation; L10. Geography of speciation; adaptive radiation; pace of evolution; speciation and extinction T. Assignment/activity/quiz	22	The student would learn the biological species concept and understand how it is important to the study of evolution
11-13	Systematics and the phylogenetic revolution	L11. Systematics; cladistics; L12. Systematics and classification; L13. Phylogenetics and comparative biology; phylogenetics and disease evolution T. Assignment/activity/quiz	23 / Class notes	The student would learn to read and design evolutionary trees
14-17	Genome evolution	L14. Comparative genomics; L15. Evolution of whole genomes; L16. Regulatory function of DNA L17. Disease prevention and treatment; crop improvement through genome analysis T. Assignment/activity/quiz	24	The student would learn the process of evolution as it works at the genomic level





18-19	Evolution of Development	L18. Brief overview of evolutionary developmental biology L19. New functions for a gene T. Assignment/activity/quiz	25	The student would compare development in selected organisms and correlate the same to evolution
20-21	The Tree of Life	L20-21. Brief overview on classification of organisms T. Assignment/activity/quiz	26	The student would learn to classify organisms in categories
22-25	Protists	L22. Introduction to protists; origin and endosymbiosis; L23-25. Protist groups and their economic importance T. Assignment/activity/quiz	29	The student would compare features of protists
26-32	Green plants and economic botany	L26. Introduction to green algae, bryophytes, tracheophytes; L27. Lycophytes, pteridophytes; L28. Evolution of seed plants; L29. Gymnosperms and angiosperms L30-31. Application of botanical knowledge for benefit of mankind T. Assignment/activity/quiz	30; class notes	The student would compare features of plants
33	Fungi	L32. Brief overview (Lecture / self-study) T. Assignment/activity/quiz	31	The student would compare features of fungi
34-37	Animal Diversity and economic zoology	L33. General features of animals; L34. Evolution of the animal body plan; L35. The classification of animals; specific examples L36. Specific examples of invertebrates and vertebrates; L37-39. Application of zoological knowledge for benefit of mankind T. Assignment/activity/quiz	32; class notes	The student would compare features of selected animals
38	Epilogue	Concluding the course	-	-

## 6. Evaluation Scheme:





#	Evaluation component	Duration	% Weightage (Marks)	Date and Time	Remarks
1	Mid-semester test	90 min.	27.5 (55)	14/10 2:00 - 3:30 PM	CB
2	Class quizzes and Assignments	Variable	30 (60)	To be announced	Announced or Surprise
3	Comprehensive Examination	180 min.	42.5 (85)	14/12 FN	CB/OB

## 7. Learning Outcomes

*After completing this course, the students should be able to:*

- 1) Comprehend and define different terms used in evolutionary biology and taxonomy.
- 2) Classify the living organisms into different groups based on given morphological/anatomical/genetic evidences.
- 3) Apply the principles learned to argue controversial topics in evolution such as Darwinism vs Creationism.
- 4) Compare different classes of organisms w.r.t. different parameters such as ancestry / phylogeny / etc.
- 5) Assess the economic importance of organisms based on their unique structural properties or metabolic products.
- 6) Formulate their own hypothesis about origin of the diverse forms of life.

## 8. Grading Policy:

Award of grades would be guided by the histogram of marks and course average. If a student happens to be in the borderline of two grades, the decision on the final grade will be based on his/her regularity in attending classes, participation in discussions, and an assessment whether the student has shown an upward trend in scoring in the course.

## 9. Make-up Policy:

If a student misses any of the evaluation components due to genuine reason, there exists a provision to apply for make-up. For a foreseen absence, the student should meet the Instructor-in-Charge personally to request for a make-up, ahead of the scheduled evaluation component. In extreme emergency, the student should contact the Instructor-in-Charge as soon as practically possible. No make-up will be granted for class quizzes and assignments.





BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, Pilani  
Pilani Campus  
Instruction Division

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**10. Chamber Consultation Hour:**

Will be announced in the class.

**11. Course Announcements:**

They will be displayed on the notice board of the Biological Sciences department/Nalanda.

**INSTRUCTOR-IN-CHARGE**

**(BIO F214)**



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Please Do Not Print Unless Necessary

