

# BIOLOGY

Teaching Hours: 75  
Full Marks: 50(35+15)  
Pass Marks: 20(14+6)

## I. Introduction

This course in Biology is designed to provide students with sufficient understanding and knowledge of the fundamental Biology contents as per equivalent to Higher Secondary Level. The course demands emphasis on conceptual understanding of the biological phenomena. The practical component of this course is designed to supplement learning through the application of learned theory. The nature of the course is both theoretical and practical.

## II. General Objectives

On completion of this course, the students will be able to:

- a. acquaint with principles of biology and their applications to become confident citizens in a technological world.
- b. handle simple apparatus and apply their knowledge of biology to real life examples.

## III. Specific objectives

After the completion of this course the students will be able to:

- (1) explain the concepts of Mendelian and post-Mendelian genetics.
- (2) discuss of role of DNA as a genetic material,
- (3) explain the principles of wildlife and forest conservation.
- (4) describe the functioning of biogeochemical cycles in nature.
- (5) describe the type, structure and function of plant tissues.
- (6) discuss the principles of biotechnology and their application.
- (7) describe a flowering plant in semi-technical language and its identification.
- (8) explain the methods of reproduction and the process of development of embryo in plants
- (9) explain the process of embryo development in animals (frog)
- (10) describe the structure and function of various glands in animals.
- (11) Discuss the application of biology in tissue and organ transplantation and test tube baby production.
- (12) explain the basic concepts of mountain environment.
- (13) discuss the causes and consequences of rapid population growth.
- (14) describe the structure of sense organs (eye and ear)
- (15) describe the adaptational features in animals.
- (16) identify the bones of rabbit

- (17) recognise the internal structure of various organs of mammals.
- (18) recognise various developmental stages of frog.
- (19) identify flowering plants upto family
- (20) recognise the internal structure of plant parts and plant embryo.

## **IV. Course Contents**

### **Unit 1. Plant Taxonomy: Families**

**5 hrs**

- (a) Cruciferae (Mustard family)
- (b) Solanaceae (Potato family)
- (c) Papilionatae (Pea family)
- (d) Compositae ( Sunflower family)
- (e) Graminae (Grass family)

### **Unit 2. Mendelian and Post-Mendelian Genetics**

**6 hrs**

Replication of DNA, DNA as genetic materials, gene expression, mendelian genetic expression (epistasis, pleiotropism), sex linked inheritance. mutations, polyploidy, gene expression in prokaryotes and eukaryotes, genetic code, protein synthesis.

### **Unit 3. Environment:**

**6 hrs**

wildlife conservation, forest conservation, Biogeochemical cycle, effect of pesticides, plant communities

### **Unit 4. Plant Anatomy:**

**5 hrs**

Types of tissues, meristematic and permanent tissues. Internal structure of dicot root and stem, secondary growth of dicot stem, Internal structure of monocot root and stem.

### **Unit 5. Biotechnology :**

**4 hrs**

Plant tissue culture, concept of breeding techniques. Disease resistant varieties of plants. Green manures. Fermentation: alcohol and antibiotic fermentation.

### **Unit 6. Plant Growth Hormones:**

**2 hrs**

Auxins, gibberellins and cytokinins, role of plant hormones in relation to seed germination and apical dominance.

### **Unit 7. Developmental Biology :**

#### **(A) Developmental Biology of Plants :**

**4 hrs**

Reproduction and development in Angiosperms : Asexual reproduction, Development of male and female gametophyte, Pollination, fertilization.

**(B) Developmental Biology of Animals :** 7 hrs  
Development of Frog. Fertilization to coelom formation,

**Unit 8. Blood Group** 2 hrs

**Unit 9. Endocrine glands :** 6 hrs  
Pituitary, thyroid, adrenal, pancreas, testes & ovary

**Unit 10 Applications of Biology.** 4 hrs  
Tissue & organ transplantation, test tube baby, amniocentesis.

**Unit 11. Animal adaptation** 3 hrs

**Unit 12. Human population growth, consequences & control measures .**  
3 hrs

**Unit 13. Concept of mountain environment-** 1 hrs

**Unit 14. Sense organs: eye & ear** 2 hrs

## V. Practical

### (Zoology)

1. Study of bones of rabbit; Axial, appendicular & girdle bones. 4 hrs
2. Study of histological slides of mammal; 4 hrs  
V.S. of skin, T.S. of oesophagus, stomach, intestine, rectum, lung, kidney, testes, ovary, liver, pancreas
3. Embryological slides of Frog; 2 hrs  
Zygote, cleavage, morula, blastula, gastrula. and development of embryo.

### (Botany)

1. Taxonomy \_ any 3 families 6 hrs
2. Anatomy 2 hrs  
Plant tissue, Stem (monocot + dicot), Root (monocot + dicot)
3. Embryology; permanent slides. 2 hrs  
– i) T.S. of anther  
– ii) L.S. of ovule (anatropous)

- iii) L.S. of dicot embryo
- iv) L.S. of monocot embryo

## VI. EVALUATION SCHEMS (Theory + Practical)

S.N.	Type of Questions	Duration	Number of Questions	Maximum Marks	Full Marks	Pass Marks
1.	Th. Very Short		8	8x1=8	25	
2.	Th. short	1 hour	2	2x3=6		
3.	Th. long		2	5+6=11		
4.	Practical	3 hours	experiments records + viva	3+3= 6 1+1		

## VII. Reference Books

1. Bhujaraj, D.R. 2064. Essentials of Biology  
Hajurko Prakashan, Kathmandu
2. Bhujaraj, D.R. 2061. A class Book of Higher Secondary Biology, Goodwill,  
Publication.
3. Prasad, K, Magan and R.B. Mahto 2002.  
Text Book of Biology, Ekta Publisher
4. Mahto, R.B. 2002. Text Book of Biology  
Ekata Publisher, Kathmandu.
5. Keshari, A.K, 2004. A Text Book of Higher Secondary Biology, Bidyarathi  
Pustak Bhandar, Kathmandu.
6. Gupta, V.N.P, S.B. Karki, G.P. Rao and Y.N. Pandey 2000 A Text Book of  
Biology Part I & II, World Media.
7. Majupuria, T.C. and R. Kumar 1999.  
Concepts of Biology, publisher. M. Majupuria (For class XI & XII)
8. Majupuria, T.C. and M. Saquib 2000  
Practical Biology (Comprehensive Guide) for Class XI, Publisher. M. Majupuria
9. Saquib, M.K.C. Shrestha and T.C. Majupuria 2000, Practical Biology  
(Comprehensive guide) for class XII, Publisher, M. Majupuria.

# BIOLOGY

(Model Questions)

Full Marks: 35  
Pass Marks: 14  
Time: 90 Minutes

**1. Answer all the questions (Very Short Questions) (1x8 = 8)**

- i. Write the name of gland with dual functions.
- ii. What is transplantation?
- iii. Define aerial adaptation.
- iv. Which blood group is called universal donor?
- v. Name two bacteria involved in nitrogen fixation.
- vi. Name two plants used as green manure.
- vii. Define apical dominance.
- viii. Mention different components of phloem.

**2. Short questions (2x3.5=7)**

- i. Write anatomical differences between dicot and monocot stem.
- ii. Describe about the test tube baby.

**3. Long Questions (4x5 = 20)**

- i. Describe family Cruciferae or Solanaceae in semi technical terms with floral formula and floral diagrams.
- ii. Describe the structure of a mammalian ear.
- iii. Describe the given material (A) in semi technical terms with floral formula and floral diagram.
- iv. Describe the spotting: 2 bones; 2 Histological slides & 2 embryological slides.