S.S.D. Girls' College, Bathinda

Multidisciplinary Course Based On NEP-2020

B.Sc. / B.Sc. (Honours)

Session: 2026-27, 2027-28, 2028-29

SYLLABUS

B.Sc. (Med.) Part-III (SEMESTER-V)

SUBJECT: MAJOR ZOOLOGY – ECOLOGY AND CONSERVATION BIOLOGY

PAPER CODE: BM501

Max Marks: 70
Pass Marks: 35%
Theory Paper: 50
Internal Assessment: 20 marks

Total teaching hours: 3 Hrs/week
Time allowed: 3 hours
Paper Code: BM501
Credit: 03

INSTRUCTION FOR THE PAPER SETTER

The question paper will consist of three sections A, B and C, Section A and B will have four questions each from the respective section of syllabus and will carry 8 marks each. Section C will consist of 9 short-answer type questions (8-10 lines) which will cover the entire syllabus uniformly and will carry 2 marks in all.

INSTRUCTIONS FOR CANDIDATES

Candidates are required to attempt two questions from each section A and B and the entire section C, which is compulsory.

SECTION A

1. Introduction and scope of Ecology; Structure and function of ecosystem; Abiotic factors affecting survival and sustenance of organisms e.g., water, temperature, light, pH and salinity. Role of limiting factors. Introduction to Biome: Ecological features of Tundra, Desert, Savannah and Tropical Rain Forest Biomes.
2. Population: Attributes of population -Density, natality, mortality, life tables, fecundity tables, survivorship curves, age ratio, sex ratio and dispersal. Factors regulating population dispersal and growth: Exponential and logistic population growth, density dependent and independent factors; r and K strategies. Concept of carrying capacity, impact of human population growth on environment.
3. Biotic Community: General Characteristics- frequency, density, abundance, dominance, stratification. Food chain (Linear and Y-shaped), Food web, Flow of Energy, Ecological Pyramids. Niche: Niche Concept, Types of Niche- Spatial, Trophic, Multidimensional; Gause's Principle, Lotka-Volterra equation for competition, Ecotone and edge effect.

SECTION B

4. Biotic Interactions: Intra specific interactions and interspecific interactions (Antagonism: Competition, Predation, Parasitism, Amensalism; Beneficial: Commensalism, Proto cooperation and Mutualism).
5. Principles, characteristics and importance of conservation biology. Levels of biological diversity, measuring species diversity, threats to biodiversity, biodiversity conservation - in-situ and ex-situ, endemism and hotspots. Biodiversity of wetlands, mangroves and coral reefs- A general account.

6. Conservation and management strategies, International and National efforts to conserve biodiversity: Convention on biological diversity, CITES, Ramsar convention; National Biodiversity strategy and Action Plan (NBSAP), Biosphere Reserves.

Recommended readings:

1. Kormondy E.J., Concepts of Ecology, Englewood Cliffs, N.J. Prentice Hall Inc., 1975.
2. Kreb C.J., Ecology, Harper & Row, New York, 1982.
3. E.P. Odum, Fundamentals of Ecology, W.B. Saunders Co., Philadelphia, 1995.
4. Stiling, P. D. 2012 Ecology Companion Site: Global Insights and Investigations. McGraw Hill Education.
5. Chapman & Reiss, Ecology: Principles and Applications, Cambridge University Press (1999)
6. Rastogi, V. B., 2022. Animal Ecology and Distribution of Animals. MedTech Science Press.
7. Richard B. Primack. 2014 Essentials of conservation Biology 6th edition. Sinauer Associates Inc.
8. Kumar, P., & Mina, U. (2024). Fundamentals of ecology and environment (4th ed.). Pearson Education India

Course Outcomes

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

- Understand the basic concepts of ecology, ecosystems, biomes and environmental factors.
- Explain population characteristics, population growth and factors regulating population dynamics.
- Describe community structure, energy flow, food chains, food webs and ecological interactions.
- Understand biodiversity, its importance, threats and major conservation approaches.
- Explain in-situ and ex-situ conservation and major national and international biodiversity conservation programmes.
- Develop awareness about sustainable management and conservation of biodiversity and natural resources.

PRACTICAL

Multidisciplinary Course Based On NEP-2020
B.Sc. / B.Sc. (Honours)
B.Sc. (Med.) Part-III Semester-V Major Zoology
2026-27, 2027-28, 2028-29 Syllabus
Practical Paper: ECOLOGY AND CONSERVATION BIOLOGY
Practical Paper Code: BM501P

Total Marks: 30
Practical Marks: 20 marks
Internal Assessment: 10 marks
Pass marks: 35%

Time Allowed: 3 hours
Total Teaching hours: 2 hours/week
Credit: 1

1. Physico-chemical analysis of soil and water.
2. To measure microclimatic variables viz., temperature, humidity and light conditions in a microhabitat.
3. Analysis of food chain and food web - study of trophic levels and energy flow.
4. Study of beneficial and antagonistic ecological interactions.
5. Measurement of biodiversity by biodiversity indices.
6. Study of population growth through growth curves and survivorship curves.
7. Case studies regarding conservation biology.
8. Report on a visit to National Park/Biodiversity Park/Wild life sanctuary/Zoological Garden.

INSTRUCTIONS FOR PRACTICAL PAPER

1. Ecology experiments out of (1 and 2).
2. Ecology experiments out of (3 and 4).
3. Ecology experiments out of (5 and 6).
4. Field Report
5. Practical file
6. Viva voce

S.S.D. Girls' College, Bathinda

Multidisciplinary Course Based On NEP-2020

B.Sc. / B.Sc. (Honours)

Session: 2026-27, 2027-28, 2028-29

SYLLABUS

B.Sc. (Med.) Part-III (SEMESTER-VI)

SUBJECT: MAJOR ZOOLOGY – MEDICAL ZOOLOGY AND MEDICAL LAB TECHNÒLOGY

PAPER CODE: BM601A

Max Marks: 70 | **Total teaching hours: 3 Hrs/week**
Pass Marks: 35% | **Time allowed: 3 hours**
Theory Paper: 50 | **Paper Code: BM601A**
Internal Assessment: 20 marks | **Credit: 03**

INSTRUCTION FOR THE PAPER SETTER

The question paper will consist of three sections A, B and C, Section A and B will have four questions each from the respective section of syllabus and will carry 8 marks each. Section C will consist of 9 short-answer type questions (8-10 lines) which will cover the entire syllabus uniformly and will carry 2 marks in all.

INSTRUCTIONS FOR CANDIDATES

Candidates are required to attempt two questions from each section A and B and the entire section C, which is compulsory.

SECTION A

1. Introduction to Parasitology (pertaining to various terminologies in use).
2. Brief accounts of life history, mode of infection and pathogenicity of the following pathogens with reference to human being; prophylaxis and treatment:

a) Pathogenic protozoans: *Entamoeba, Trypansoma, Leishmania, Giardia, Trichomonas* and *Plasmodium.*

b) Pathogenic helminthes: *Fasciolopsis. Schistosoma, Echinococcus, Ancylostoma, Trichinella, Wuchereria, Dracunculus* and *Oxyuris*.

3. Life cycle and control measures of arthropod vectors of human diseases: Malaria (*Anopheles*) Yellow fever and Dengue, Haemorrhagic fever (*Aedes*); Filariasis and Japanese Encephalitis (*Culex*).

SECTION B

4. Laboratory techniques: Colorimetry, Microscopy, Autoclaving, Centrifugation and Spectrophotometry. Haematology: Collection of blood (Venous and Capillary), Anticoagulants (merits and demerits). Romanowsky's stains. Total RBC count, Erythrocyte sedimentation rate (ESR), TLC, DLC, Eosinophil count, Platelet count and Reticulocyte count.
5. Biochemistry: Protein estimation, estimation of blood urea, sugar and cholesterol, serum creatinine and uric acid, urine' analysis; estimation of protein, sugar, bile salts, bile pigments, ketone bodies; enzyme studies (serum transaminase, phosphatase, amylase and lipase), liver function test (LFT).
6. Histopathology: Common fixatives and staining techniques, Histochemistry: Principle and method: Staining of carbohydrates, proteins and fats with bromo phenol blue, Periodic acid Schiff, Sudan Black blue and Feulgen reaction.

SUGGESTED READINGS:

1. Baker F.J. and Silverton, R.E. Introduction to Medical Laboratory Technology, 6th edition. Butlerworth and Co. Ltd..1985.
2. Cheesborough, M. Medical Laboratory technology for Tropical countries, 2nd edition, Butlerworth and Co. Ltd., 1987.
3. Talib, V.H., Essential Laboratory Manual, Mehta Publishers, New Delhi, 1999.
4. Kube, J., Immunology, W.H. Freeman & Co., USA, 2000.
5. Chatterjee, K.D., Parasitology, Protozoology and helminthology, 12th edition,1995.
6. Garcia, L.S., Diagnostic Medical Parasitology, 4th edition, ASM Press Washington, 2001.

Course Outcomes

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

- Understand the basic concepts of parasitology and major human parasites, including their life cycles, modes of infection, pathogenicity and control.
- Explain the life cycles and role of major arthropod vectors in the transmission of human diseases.
- Develop knowledge and practical skills in basic laboratory techniques used in biological and medical investigations.
- Perform and interpret common haematological investigations such as RBC count, TLC, DLC, ESR, eosinophil, platelet and reticulocyte counts.
- Understand and perform basic biochemical analysis of blood and urine and interpret important clinical parameters.
- Explain the principles and applications of histopathological and histochemical techniques for the identification of major biomolecules.

PRACTICAL

Multidisciplinary Course Based On NEP-2020
B.Sc. / B.Sc. (Honours)
B.Sc. (Med.) Part-III Semester-VI Major Zoology
2026-27, 2027-28, 2028-29 Syllabus
Practical Paper: MEDICAL ZOOLOGY AND MEDICAL LAB TECHNÒLOGY
Practical Paper Code: BM601AP

Total Marks: 30
Practical Marks: 20 marks
Internal Assessment: 10 marks
Pass marks: 35%

Time Allowed: 3 hours
Total Teaching hours: 2 hours/week
Credit: 1

1. Good laboratory Practices: Demonstration of safety rules in laboratory like proper handling of patients, specimens and disposal of syringes, needles etc.
2. Demonstration of the use of autoclave, centrifuge and spectrophotometer.
3. Estimation of haemoglobin using Sahli's haemometer.
4. Counting of RBC.
5. Study of permanent slides and specimens of parasitc protozoans, helminthes and arthropods.
6. Analysis of blood group, A, B, AB, O alongwith Rh factor.
7. Erythrocyte sedimentation rate (ESR), bleeding time and coagulation time.
8. Field visit to medical diagnostic lab or hospital.

INSTRUCTIONS FOR PRACTICAL PAPER

1. To identify the pathogenic protozoans/ helminth and vectors. Write the disease caused or spread by each and two reasons for their identification.
2. To find out the blood groups, erythrocyte sedimentation rate/bleeding time/coagulation time/ RBC count/ Haemoglobin of the given sample and write the procedure adopted.
3. Write up of any one (Experiment no. 1-2)
4. Practical Note-book
5. Viva- voce
6. Project Work

S.S.D. Girls' College, Bathinda

Multidisciplinary Course Based On NEP-2020

B.Sc. / B.Sc. (Honours)

Session: 2026-27, 2027-28, 2028-29

SYLLABUS

B.Sc. (Med.) Part-III (SEMESTER-VI)

SUBJECT: MAJOR ZOOLOGY – IMMUNOLOGY

PAPER CODE: BM601B

Max Marks: 70 **Total teaching hours: 3 Hrs/week**
Pass Marks: 35% **Time allowed: 3 hours**
Theory Paper: 50 **Paper Code: BM601B**
Internal Assessment: 20 marks **Credit: 03**

INSTRUCTION FOR THE PAPER SETTER

The question paper will consist of three sections A, B and C, Section A and B will have four questions each from the respective section of syllabus and will carry 8 marks each. Section C will consist of 9 short-answer type questions (8-10 lines) which will cover the entire syllabus uniformly and will carry 2 marks in all.

INSTRUCTIONS FOR CANDIDATES

Candidates are required to attempt two questions from each section A and B and the entire section C, which is compulsory.

SECTION A

1. Immunity: Basic concept of Innate and adaptive Immunity; active and passive immunity. Overview of cells and organs of the immune system.
2. Immunoglobulins: Basic structure, structure and function of different classes of immunoglobulins.
3. Antigens: Antigen types and properties. Antigen- Antibody interaction. Immunoassays (IFA, ELISA and RIA).

SECTION B

4. Humoral and Cell Mediated Immune Response, Major Histocompatibility complex: General organization, structure of class I and class II MHC molecule. Cytokines: Properties and functions.
5. Complement System: Function, Complement activation: classical and alternative pathways. Hypersensitivity: Types and mechanism.
6. Autoimmunity: Definition and mechanisms. Vaccines: Active and passive immunization, vaccines (live, attenuated, inactivated and DNA vaccines).

SUGGESTED READINGS:

1. Talib, V.H., Essential Laboratory Manual, Mehta Publishers, New Delhi, 1999.
2. Kube, J., Immunology, W.H. Freeman & Co., USA, 2000.
3. Delves, P.J. et al. Roitt's Essential Immunology, 13th Edition, Wiley Blackwell Ltd., 2026.

Course Outcomes

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

- Understand the basic concepts of innate and adaptive immunity and the organization of immune cells and organs.
- Describe the structure, classes and functions of immunoglobulins and their role in immune responses.
- Explain antigens, antigen–antibody interactions and the principles of major immunoassays such as IFA, ELISA and RIA.
- Understand humoral and cell-mediated immunity, MHC molecules and the role of cytokines in immune regulation.
- Explain the complement system, its activation pathways and the mechanisms of different types of hypersensitivity.
- Understand the mechanisms of autoimmunity and the principles of active and passive immunization and different types of vaccines.

PRACTICAL

Multidisciplinary Course Based On NEP-2020
B.Sc. / B.Sc. (Honours)
B.Sc. (Med.) Part-III Semester-VI Major Zoology
2026-27, 2027-28, 2028-29 Syllabus
Practical Paper: MEDICAL ZOOLOGY AND MEDICAL LAB TECHNÒLOGY
Practical Paper Code: BM601BP

Total Marks: 30 | **Time Allowed: 3 hours**
Practical Marks: 20 marks | **Total Teaching hours: 2 hours/week**
Internal Assessment: 10 marks | **Credit: 1**
Pass marks: 35%

1. Cells of immune system- lymphocytes, macrophages and neutrophils.
2. Histological study of organs of Immune System-bone marrow, thymus, spleen and lymph nodes
3. Study of Immunoglobulin Structure (Chart-based): IgG, IgA, IgM, IgE and IgD
4. Counting of WBC- TLC/DLC.
5. Demonstration of Immunoprecipitation/agglutination.
6. Demonstration of ELISA
7. Study of autoimmune diseases through photographs.
8. Study of MHC structure (chart based).

INSTRUCTIONS FOR PRACTICAL PAPER

1. To find out the TLC/DLC of the given sample and write the procedure adopted.
2. To identify slides/photographs A, B and C and write points of identification (Cells/organs of immune system/ autoimmune disease).
3. To identify chart D and E (immunoglobulin structure/MHC structure).
4. Write a note on ELISA/Immunoprecipitation/Agglutination.
5. Viva voce
6. Practical notebook