

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF ZOOLOGY
COURSE CURRICULUM

PART-A: Introduction			
Program: Bachelor in Life Sciences (Honors / Honors with Research)		Semester -VII	Session: 2024-2025
1	Course Code	ZOSE – 06T	
2	Course Title	Immunology	
3	Course Type	Discipline Specific Elective	
4	Pre-requisite(if, any)	As per Program	
5	Course Learning Outcomes(CLO)	<p>After successfully completing this course, the students will be able to:</p> <ul style="list-style-type: none"> ➤ Understanding of fundamental concepts of immunology. ➤ Gain knowledge on various immune cells, antigens and cytokines. ➤ Understand the structure and functions of Immunoglobulins and antibodies. ➤ Students will be able to describe the processes involved in immune system. ➤ Students will analyse the pathogenesis, clinical manifestations, and therapeutic approaches of various immune disorders and diseases and experimental techniques in Immunology. 	
6	Credit Value	3 Credits	Credit = 15 Hours -learning & Observation
7	Total Marks	Max. Marks: 100	Min Passing Marks:40
PART -B: Content of the Course			
Total No. of Teaching–learning Periods(01 Hr. per period) - 45 Periods (45 Hours)			
Unit	Topics (Course contents)		No. of Period
I	Understanding of Immunological Concepts: Immune System: Brief history of Immunity, Concept & Types of Immunity (Innate and Acquired or Adaptive), Origin and Evolution of Immune System. Primary and Secondary lymphoid organs, lymphoid tissues. Thymic Selection: Self and non-self-recognition. Inflammation. Lymphocyte trafficking. Hematopoiesis.		10
II	Components of Immune System- I: Cells of Immune System: Structure and functions of macrophages, granulocytes, NK cells, T and B lymphocytes and Antigen presenting cells. T & B Cell receptors, maturation, activation and differentiation of T& B Cell. Antigen: Antigenicity v/s immunogenicity, Factors affecting Immunogenicity, immunogen, haptens, super antigen, epitope, paratope. Adjuvants: Freund's complete and incomplete. Processing and presentation of Ag. Major histocompatibility complex (MHC) and HLA. Cytokines.		12
III	Components of Immune System- II: Immunoglobulins: Nature, Primary structure of immunoglobulins. Enzymatic fragmentation of Ig. Domain structure of Ig and its significance. Types and subtypes of Ig and its characteristics. Membranous antibody. Antigenic determinants: isotype, allotype, idiotype. Abzymes. Theories of Antibody Formation: Instructive, selective, clonal selection theories and evidences; Immunological memory. Complement System. Hypersensitivity (Type I to IV with example) CMI & humoral immune response. Antigen-Antibody interaction: affinity & avidity.		13
IV	Immune disorders & Immuno-techniques: Auto-immunity: Auto-recognition, classes of auto-immuno diseases. (Hashimoto disease, Thyrotoxicosis, Systemic lupus erythematosus, Rheumatoid arthritis).Transplantation: Autograft, Isograft, Allograft, Xenograft, Immunological basis of transplantation reactions. Immune Deficiencies: Primary and secondary immune deficiencies. T-cell, B-cell and SCID, AIDS. Vaccination and types of vaccines (First, Second & Third generation vaccines). Immunological techniques: Precipitin curve, Immuno-diffusion, one and two dimensional, single radial immuno-diffusion, Double (Ouchterlony) immune-diffusion. Immuno-electrophoresis: Rocket immuno-electrophoresis; CIE, Graber and William technique.Radio-immunoassay: ELISA–Principle, Methodology and applications. Immuno-fluorescence: Direct, indirect and Sandwich, in situ localization by techniques:FISH and GISH. Hybridoma, Monoclonal antibodies.		10
Keywords	Immunity, lymphocytes, Antigens, Immunoglobulins, Auto-immunity, Vaccination &Immuno-techniques.		
Signature of Convener & Members (CBoS):			

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

- Pravash Sen. Gupta, Clinical Immunology. Oxford University Press. 2003.
- N Arumugam, Immunology, Saras Publication. 2014.
- Fatima D, Arumugam, Immunology, Saras Publication

Reference Books Recommended –

- Janis Kuby, Immunology, II edition. W. H. Freeman and Company, New York. 1993.
- Ivan M. Roitt, J. Brostoff and D. K. Male, Immunology, Gower Medical Publishing, London. 1993.

Online Resources–

- <https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=2rAs1Puvga4LW93zMe83aA==>
- http://ndl.iitkgp.ac.in/he_document/swayamprabha/swayam_prabha/hdc5c5m6hkq?e=1|immunology|||
- <https://xvivo.com/examples/the-innate-immune-system/>
- <https://xvivo.com/examples/the-adaptive-immune-system/>

PART-D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

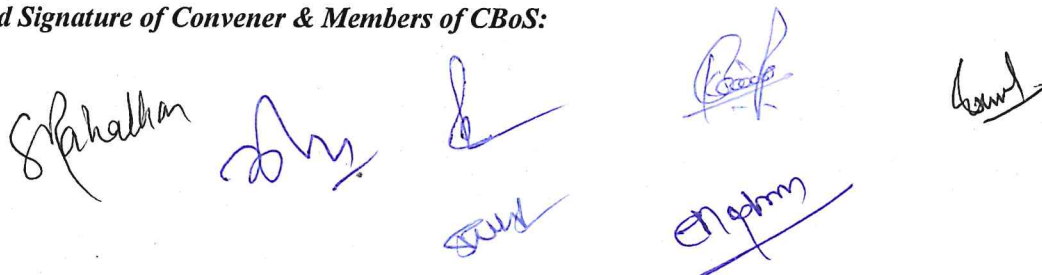
Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE): 70 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 20 +20 Assignment/Seminar- 10 Total Marks -30	Better marks out of the two Test / Quiz+ obtained marks in Assignment shall be considered against 30 Marks
End Semester Exam (ESE):	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20Marks Section B: Descriptive answer type qts., 1 out of 2 from each unit-4x10=40Marks	

Name and Signature of Convener & Members of CBoS:



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DEPARTMENT OF LIFE SCIENCE
COURSE CURRICULUM

PART- A: Introduction			
Program: Bachelor in Life Science <i>(Honors/ Honors with Research)</i>		Semester - VII	Session: 2024-2025
1	Course Code	ZOSE-06P	
2	Course Title	Immunology	
3	Course Type	Discipline Specific Elective Lab Course	
4	Pre-requisite (if, any)	<i>As per Program</i>	
5	Course Learning Outcomes (CLO)	<p style="text-align: center;">At the end of this course, the students will be able -</p> <ul style="list-style-type: none"> ➤ Gain practical knowledge on various immune cells, antigens and antibodies. ➤ Identify the major cellular and tissue components which comprise the innate and adaptive immune system. ➤ Students will experimental techniques in Immunology. ➤ Understand how does the immune system distinguish self from non-self. ➤ Gain experience at reading and evaluating the scientific literature in the area. 	
6	Credit Value	1 Credits	<i>Credit =30 Hours Laboratory or Field learning/Training</i>
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20
PART -B: Content of the Course			
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)			
Module	Topics (Course contents)		No. of Period
Lab./Field Training/ Experiment Contents of Course	<ul style="list-style-type: none"> • Study of permanent slides of organs of immune system • Enumeration of total leucocytes from human blood samples • Enumeration of differential leucocytes from human blood samples • Demonstration of agglutination reaction using human RBC • Demonstration of Ag-Ab precipitation by immunodiffusion technique • Antigen detection by radial immunodiffusion technique (RID) • Estimation of total serum protein • Estimation of serum gamma globulins/Separation of γ-globulin by salt precipitation. • Estimation of A/G ratio • Isolation of lymphocyte by using density gradient centrifugation • Paper and gel immuno-electrophoresis • Rocket immunoelectrophoresis • Counter current immunoelectrophoresis • ELISA • Group discussion/Quiz/ Seminar presentation on related topics. • Making of Practical record. 		30
Keywords	<i>Leucocytes, Rocket immunoelectrophoresis, ELISA, A/G ratio, RID</i>		
Signature of Convener & Members (CBoS) :			

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

- Talwar G.P. and Gupta S.K, A Handbook Of Practical And Clinical Immunology Volume 1, CBS Publication
- Zane, Immunology: Theoretical And Practical Concepts In Laboratory Medicine, ELSEVIER

Reference Books Recommended –

- Goldsby, R.A.; Kindt, T.J. and Kuby, J. (2006) Immunology (6th edition).
- Roitt, I.; Brostoff, J. and Male, D. (2012) Immunology (8th edition).

Online Resources–

- <https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=2rAs1Puvga4LW93zMe83aA==>
- <http://ndl.iitkgp.ac.in/he document/swayamprabha/swayam prabha/hdc5c5m6hkq?e=1immunology>
- <https://xvivo.com/examples/the-innate-immune-system/>
- <https://xvivo.com/examples/the-adaptive-immune-system/>

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

Continuous Internal Assessment (CIA): 15 Marks

End Semester Exam (ESE): 35 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
	Assignment/Seminar +Attendance - 05 Total Marks - 15	
End Semester Exam (ESE):	Laboratory / Field Skill Performance: On spot Assessment A. Performed the Task based on lab. work - 20 Marks B. Spotting based on tools & technology (written) – 10 Marks C. Viva-voce (based on principle/technology) - 05 Marks	Managed by Course teacher as per lab. status

Name and Signature of Convener & Members of CBoS:

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