



Gyanmanjari
Innovative University

Course Syllabus
Gyanmanjari Science College
Semester-5 (B.Sc.)

Subject: Fundamental of Immunology- BSCMB15316

Type of course: Major

Prerequisite: Basic knowledge of immunity, cell biology, biochemistry of blood and human physiology.

Rational : Introduces students to the fundamentals of the immune system, including innate and adaptive immunity, antigen-antibody interactions, immunological techniques, dysfunctional immunity and its applications. It provides a foundation for understanding disease mechanisms, diagnostics, and therapeutic interventions in immunology.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
CI	T	P	C	SEE		CCE			
				Theory	Practical	MSE	LWA/V	ALA	
3	0	2	4	75	25	30	20	50	200

Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; SEE - Semester End Evaluation; MSE- Mid Semester Examination; LWA - Lab Work Assessment; V – Viva voice; CCE- Continuous and Comprehensive Evaluation; ALA- Active Learning Activities

3 Credits * 25 Marks = 75 Marks (each credit carries 25 Marks) Theory

1 Credits * 25 Marks = 25 Marks (each credit carries 25 Marks) Practical

SEE 100 Marks will be converted in to 50 Marks

CCE 100 Marks will be converted in to 50 Marks

It is compulsory to pass in each individual component.



Course Content:

Unit No.	Course content	Hrs	% Weight age
1	Chapter-1: Introduction to Immunity, Immune Cells & Immune Organs <ul style="list-style-type: none"> • Introduction to Immune system • Characteristic of immune system: Specificity, Diversity, Memory Generation, Self/Non-self-recognition • Types of immunity: Innate and adaptive • Anatomical barrier, physiological barrier, Phagocytosis and inflammation • Hematopoiesis • Cells of immune system: Granulocytes, lymphocytes and Dendritic cells • Organs of immune System: Primary Lymphoid Organs: Bone marrow, Thymus, • Secondary Lymphoid Organs: Spleen, Lymph node, MALT and CALT 	15	25
2	Chapter-2: Antigens & Antibody <ul style="list-style-type: none"> • Antigens and Immunogens: Factors influencing immunogenicity • Concept of Epitope, Haptens and Adjuvants • Basic structure of Antibody and Classes of Immunoglobulins • Types of antibodies • Antibody mediated effectors functions • Hybridoma Technology and applications of Monoclonal Antibody 	10	25
3	Chapter-3: Introduction to Immune response, Cytokines & Complement System <ul style="list-style-type: none"> • Humoral immune response: Primary and secondary Immune response • Cell mediated immune response • MHC: Types, Properties and functions • Cytokines: IL, TNF and IFN • Overview of Complement System and pathways 	10	25



4	Chapter-4: Dysfunctional Immunity & In-vitro Antigen-Antibody Interaction <ul style="list-style-type: none"> Hypersensitivity: Types and Clinical importance Immunodeficiency: SCID and AIDS Autoimmunity: IDDM, Grave's Disease, SLE, Rheumatoid Arthritis Concept of Transplantation immunity: Graft rejection and Immune suppressive therapy In-Vitro Antigens-Antibody Interaction: Principle and application, Concept of Precipitation and Agglutination RIA, ELISA, complement fixation test, Western blot and Immunofluorescence 	10	25
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Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1	Virtual Lab experiment: Students will perform virtual experiment given by faculty on virtual lab platform and upload photographs on GMIU web portal	10
2	Immunological Project Faculty will assign the topic for research project and student (Group of Five) need to perform project and upload the report on GMIU web portal	10
3	Immunity awareness exercise: Students have to prepare a report on their own Immune system for fighting infectious disease and upload on GMIU web portal	10
4	Sci-toons Preparation: Students (Group of Five) have to prepare a Immunological model/cartoons/video on given topic and upload on GMIU web portal	10
5	Attendance	10
Total		50



Suggested Specification table with Marks (Theory):75

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	20%	40%	30%	10%	-	-

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcome:

After learning the course the students should be able to:	
CO1	Understand the fundamentals of immunity including types, immune cells and organs.
CO2	Explain Antigens & Antibody with its structure, immunogenicity factors, types and applications of monoclonal Antibody.
CO3	Describe immune responses and role of MHC, cytokines and complement proteins.
CO4	Analyze immune dysfunctions including hypersensitivity, immunodeficiency, autoimmunity, transplantation immunity, and immunodiagnostic techniques.

List of Practical:

Sr. No	Descriptions	Unit No	Hrs
1	Identification of Blood cells	1	2
2	Study of blood components by centrifugation	1	2
3	Total Count of RBC	2	3
4	Total Count of WBC	2	3



5	Differential Count of WBC	2	4
6	Detection of HIV by rapid kit test	3	3
7	Complement fixation test	3	4
8	Study of Agglutination by performing Determination of ABO and Rh blood group	4	4
9	Study of Agglutination by performing detection of typhoid by Widal Test	4	4
10	Understanding of Medical problem related to dysfunctional immunity	4	3
Total			32

Instructional Method :

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in the laboratory.

Reference Books :

- [1] Immunology (8th ed.). (2020). Kuby, J., Kindt, T. J., Goldsby, R. A., & Osborne, B. A. W. H. Freeman and Company.
- [2] Cellular and Molecular Immunology (10th ed.). (2022). Abbas, A. K., Lichtman, A. H., & Pillai, S. Elsevier.
- [3] Janeway's Immunobiology (9th ed.). (2016). Murphy, K., Weaver, C., & Ley, R. P. Garland Science.
- [4] Fundamental Immunology (7th ed.). (2012). Paul, W. E. Lippincott Williams & Wilkins.
- [5] Immunology: A Short Course (7th ed.). (2015). Coico, R., & Sunshine, G. Wiley-Blackwell.
- [6] Basic Immunology: Functions and Disorders of the Immune System (6th ed.). (2019). Abbas, A. K., & Lichtman, A. H. Elsevier.
- [7] Immunology: A Clinical Approach (2011). O'Grady, P. J. Wiley-Blackwell.

