

Master of Science
M. Sc. Biochemistry Semester II

Course Code	PS02CBIC53	Title of the Course	Immunology
Total Credits of the Course	04	Hours per Week	04

Course Objectives:	<ol style="list-style-type: none"> 1. To understand various components of immune system of host fighting against diseases and their structure, organization and function in the defense. 2. To make the students understand the underlying mechanisms leading to malfunctioning of the system and causes and treatment measures for conditions like allergy, autoimmunity and organ transplantation.
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Course Content		
Unit	Description	Weightage* (%)
1.	<p>Introduction to immune system: Fundamental concepts; Specificity, memory, diversity and discrimination of self from non-self</p> <p>Cells and organs of the immune system involved in innate and adaptive immunity: cells of the immune system, primary and secondary lymphoid organs – structure and function.</p> <p>Innate immunity: Barriers to entry of pathogens, receptors of the innate immunity (TLR and sensing of PAMPs, CLR, RLR and CLR); Phagocytosis; inflammatory responses.</p> <p>Antigens: antigenicity, immunogenicity and haptens. B and T cell epitopes.</p>	25%
2.	<p>Antibody: Structure of immunoglobulin; classes of immunoglobulins, Antibody mediated effector functions.</p> <p>The Organization and Expression of Lymphocyte Receptor Genes: Hozumi and Tonegawa's Experiment, Multigene organization of Ig Gene, Mechanism of V(D)J recombination, B cell receptor expression, allelic exclusion, B cell isotype switching and somatic hypermutation; expression of membrane bound and soluble immunoglobulin; T cell receptor genes and expression.</p> <p>Complement system: Classical, alternative and lectin pathways, role and regulation of complement system, complement deficiencies.</p> <p>Antigen-antibody interactions: Agglutination, precipitation, RIA and ELISA.</p>	25%
3.	The Major Histocompatibility Complex and Antigen Presentation: The	25%

	<p>structure and function of MHC molecules, general organization and inheritance of MHC, self – MHC restriction, endogenous and exogenous pathway of antigen processing and presentation; cross presentation of exogenous antigen, presentation of non peptide antigens</p> <p>Cytokines: Properties, receptors, associated diseases, therapeutic applications, cytokine signalling pathways: JAK-STAT and FAS-FASL signalling pathways.</p> <p>Tolerance and autoimmunity: Central and peripheral tolerance; Mechanism of autoimmunity; Autoimmune concepts of systemic and organ specific autoimmune diseases.</p>	
4.	<p>Cell mediated effector response (Generation of effector CTL's, Granzyme and Perforin Mediated Cytolysis, Fas-FasL Mediated Cytolysis, NK cell mediated cytolysis.</p> <p>Hypersensitivity and Transplantation: Comparative study of Type I-V hypersensitivities with examples. Grafts and graft rejection mechanism, prevention and control.</p> <p>Tumor immunology and vaccines: Tumor antigens, immune response to tumors and immunotherapy of tumors. Types of vaccines and recent developments.</p>	25%
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Teaching-Learning Methodology	<p>Topics will be taught and discussed in interactive sessions using conventional black board and chalk as well as ICT tools such as power point presentations and videos. Practical sessions will be conducted in a suitably equipped laboratory either individually or in groups depending on the nature of exercise as well as availability of infrastructure. Course materials will be provided from primary and secondary sources of information.</p>
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to

1.	To understand the fundamental basis of immune system and immune responses generated against pathogens.
2.	To understand the genetic organization for antibody molecules and role of various signalling processes in development and functioning of the immune system.
3.	To understand various disorders related to immune system resulting from genetic deficiencies or over response of the system.

Suggested References:

Sr. No.	References
1.	Owen, J. A., Punt, J., & Stranford, S. A. (2013). Kuby immunology (7 th Edn). New York: WH Freeman.
2.	Murphy, K., & Weaver, C. (2016). Janeway's Immunobiology (9 th Edn) Garland Science.
3.	Male, D., Brostoff, J., Roth, D., & Roitt, I. (2012). Immunology (8 th Edn) With STUDENT CONSULT Online Access. Elsevier Health Sciences.
4.	Abbas, A. K., Lichtman, A. H., & Pillai, S. (2014). Cellular and molecular immunology (6 th Edn) Elsevier Health Sciences.
5.	W. E. Paul (2013). Fundamental of Immunology (7 th Ed.) Lippincott Williams and Wilkins.

On-line resources to be used if available as reference material

Relevant review articles / research papers / handouts of latest development in the subject.