

## IMMUNOLOGY

Sem	Sub. Code	Category	Lecture		Theory		Practical		Credit
			Hrs/ week	Hrs/ sem.	Hrs/ week	Hrs/ sem.	Hrs/ week	Hrs/ sem.	
III	21CPBC3B	Core	4	60	4	60	-	-	4

### COURSE OBJECTIVE:

- An understanding of role of immune system in maintaining health and contributing to disease.
- An understanding of cellular and molecular basis of immune responsiveness.
- An understanding of the characteristics of antigens and antibodies and nature of antigen-antibody reactions

### COURSE OUTCOMES:

On the successful completion of the course, students will be able to -

CO Number	CO Statement	Knowledge Level (K <sub>1</sub> – K <sub>4</sub> )
CO1	Gain clear knowledge about the Cells and Organs of the Immune system and the role of complement system.	K1
CO2	Describe the types of Immunity, Immunological response and how it is triggered and regulated.	K2
CO3	Gain clear knowledge about principle and applications of various Immune Techniques	K2
CO4	Understand the concept of theories of Antibody formation and mechanisms contributing to Antibody diversity.	K3
CO5	Understand the types of Hypersensitivity and to gain knowledge on Tumor Immunology	K4

(\*CO – Course Outcomes

Knowledge Level: K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze).

### MAPPING WITH PROGRAMME OUTCOMES:

COS	PO1	PO2	PO3	PO5	PO6
CO1	S	M	S	S	S
CO2	M	M	S	S	M
CO3	S	S	M	M	S
CO4	S	S	M	S	M
CO5	S	M	M	S	S

(S- Strong; M-Medium; L – Low)

## **UNIT I**

### **Cells and Organs of the Immune system**

**15 Hours**

Central and Peripheral lymphoid organs - Bone marrow, Thymus, Bursa of fabricus, Lymph node, Spleen and Mucosal Associated Lymphoid Tissue. Cells of the Lymphoreticular system. Antigens - definition, antigenicity, antigenic determinants, Haptens and epitopes. Antibodies - structure, classification, Isotypes, Allotypes and Idiotypes.

Complement system - components, nomenclature, activation of complement. Complement pathway – classical and alternative pathway. Complement fixation test.

## **UNIT II**

### **Types of Immunity and Antigen- Antibody interactions**

**10 Hours**

Types of immunity - Innate and Acquired immunity. Antibacterial and immunity to virus (Corona Virus). Primary and Secondary Immune response. Humoral and Cell mediated immunity, Cytokines and its types. Antigen recognition, Antigen processing and Presentation. Interaction of T cell and B cell. Immunotolerance, Immuno deficiency disorder – Primary and Secondary Immunodeficiency diseases.

## **UNIT III**

### **Vaccines and Immunotechniques**

**10 Hours**

Immunization practices- Active and Passive immunization. Vaccines - killed and attenuated organisms, Toxoids, Recombinant vaccines, DNA vaccines, Multivalent subunit vaccines, Commonly available vaccines for Covid. Monoclonal and Polyclonal antibodies production.

Immune techniques - Immuno electrophoresis, Immunoprecipitation, RIA, ELISA, Immunoblotting, and Immunofluorescence.

## **UNIT IV**

### **Antibody biosynthesis and MHC complex.**

**15 Hours**

Antibody biosynthesis - Theories of antibody formation- Side chain and Clonal selection theory. Antibody diversity - Mechanisms contributing to diversity.Rearrangement and generation of antibody diversity.Class switching.

MHC complex - Gene organization, HLA genes, class I and II antigens, Structure and function.HLA Typing tests. Transplantation - Immunological basis, Mechanisms and Clinical manifestations of graft rejection, Immunosuppressive therapy.

## **UNIT V**

### **Immune disorders**

**10 Hours**

Hypersensitivity types, Autoimmunity - the spectrum of Autoimmune diseases, diagnostic aspects and treatment.

SARS CoV-2 : life cycle, pathogenesis,diagnosis (RT-PCR) and treatment.

Tumor immunology - Immune surveillance, Tumor antigens - Tumor specific and Tumor associated antigens. Immune response to tumors, Immuno diagnosis and approaches to cancer Immuno therapy.

**DISTRIBUTION OF MARKS:** Theory - 100% and Problems – Nil

### **TEACHING METHODOLOGY:**

- Black Board
- Power Point Presentations
- Assignments
- Models
- Demonstrations

**TEXT BOOKS:**

S.N O	AUTHOR	TITLE	PUBLISHER	YEAR OF PUBLICATION
1	N.Arumugam	Immunology	Saras Publication	2014
2	NandhiniShetty	Immunology	New age international (p) limited.	2 <sup>nd</sup> edition 2005
3	<a href="https://www.abebooks.com/servlet/SearchResults?an=joshi%20osama&amp;cm_sp=det_-bdp_-author">https://www.abebooks.com/servlet/SearchResults?an=joshi%20osama&amp;cm_sp=det_-bdp_-author</a> Joshi Kr/Osama	Immunology	Agrobios (India)	5 <sup>th</sup> edition 2012

**REFERENCE BOOKS:**

S.NO	AUTHOR	TITLE	PUBLISHER	YEAR OF PUBLICATION
1	Kuby	Immunology	W.H.Freeman and company	4 <sup>th</sup> edition 2000
2	Ivan M. Roitt	Essential Immunology	Wiley-Blackwell	9 <sup>th</sup> edition 1997
3	D. M. Weir and <u>John Stewart</u>	Immunology	Churchill Livingston	8 <sup>th</sup> edition 1997
4	Janeway's and <u>Kenneth Murphy</u>	Immunobiology	Garland Science	9 <sup>th</sup> edition 2016
5	<b>William E. Paul</b>	Fundamental Immunology	Lippincott Williams and Wilkins	7th edition 2012
6	Jeffrey K. Actor	Introductory Immunology	Academic Press	1 edition 2014
7	David Male	Immunology	Saunders	8 edition 2012
8	<u><b>Helen Chapel</b></u>	Essentials of Clinical Immunology	Wiley-Blackwell	5th Revised edition 2006

**WEB SOURCES:**

- [www.immunology.org](http://www.immunology.org)
- [https://en.wikibooks.org/wiki/Immunology/Organs of the Immune System](https://en.wikibooks.org/wiki/Immunology/Organs_of_the_Immune_System)
- <https://teachmephysiology.com/immune-system/adaptive-immune-system/antigen-processing-presentation/>
- [www.immunopaedia.org.za](http://www.immunopaedia.org.za)
- [www.microbiologybook.org/mobile/m.immuno-18.htm](http://www.microbiologybook.org/mobile/m.immuno-18.htm)
- [www.tusculum.edu/faculty/home/ivanlare/html/genetics/antibodies-master.html](http://www.tusculum.edu/faculty/home/ivanlare/html/genetics/antibodies-master.html)

**SYLLABUS DESIGNER:**

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