SRI VENKATESWARA COLLEGE OF ENGINEERING

COURSE DELIVERY PLAN - THEORY

Department of Biotechnology	LP: BT22602 Rev. No: 00 Date: 20-01-2025
~~B.E~~/B.Tech~~/M.E/M.Tech~~ : Biotechnology Regulation:2022 PG Specialisation : NA Sub. Code / Sub. Name : BT22602/Immunology Unit I: Introduction to Immunology and Immune Cell Function	

Unit I: Introduction to Immunology and Immune Cell Function **9 hrs**

Unit Syllabus: Introduction to Immunology: Historical perspectives and impact on human health. Cells and Tissues of the Immune System: the key players and their specialized functions. Innate Immunity: The body's first line of defense - barriers, inflammation, and immune cells. Immune System Development: Ontogeny and factors shaping immune competence. Techniques for studying immune cell function (flow cytometry, CRISPR-Cas9).

Objective: Acquire a fundamental understanding of the immune system's structure and function.

Session No *	Topics to be covered	Ref	Teaching Aids
1	Introduction to Immunology: Historical perspectives and impact on human health.	TB1: Pg.No.60-70	LCD/BB
2	Cells and tissues of the Immune System	TB1: Pg.No.111-170	LCD/BB
3	Innate Immunity: The body's first line of defense - barriers	TB2: Pg.No.37-70	LCD/BB
4	Innate Immunity: inflammation	TB3: Pg.No.3-50	LCD/BB
5	Immune System Development: Ontogeny	TB1: Pg.No 113-123	LCD/BB
6	Immune System Development: factors shaping immune competence	TB1: Pg.No 113-123	LCD/BB
7	Techniques for studying immune cell function	TB1: Pg.No.1420-1505	Experiential learning-multimode reader, Fluorescent Microscope
8	Flow cytometry	TB1: Pg.No.1468-1472	LCD/BB
9	CRISPR-Cas9	TB1: Pg.No.1491-1494	LCD/BB
Content beyond syllabus covered (if any):nil			

* Session duration: 50 minutes

SRI VENKATESWARA COLLEGE OF ENGINEERING

COURSE DELIVERY PLAN - THEORY

Sub. Code / Sub. Name: BT22602/Immunology

Unit : II: Cellular Immunology

Unit II: Cellular Immunology **9 hrs**

Unit Syllabus: Cellular components of the immune system: macrophages, neutrophils, dendritic cells, lymphocytes. Antigen presentation and processing. T-cell development, activation, and effector functions. B-cell development, activation, and antibody production.

Objective: Differentiate between innate and adaptive immunity, recognizing their roles in host defense

Session No *	Topics to be covered	Ref	Teaching Aids
10	Cellular components of the immune system: macrophages and neutrophils	RB1-Pg.No. 9-27	LCD/BB
11	Cellular components of the immune system: dendritic cells	RB1-Pg.No. 10-15	LCD/BB
12	Cellular components of the immune system: lymphocytes.	RB1-Pg.No. 16-27	LCD/BB
13	Antigen presentation and processing	RB1-Pg.No.117-140	LCD/BB
14	T-cell development	RB1-Pg.No.55-62	LCD/BB
15	T-cell activation	RB1-Pg.No.55-62	LCD/BB
16	Types of T-cells and its effector functions	RB1-Pg.No.55-62	LCD/BB
17	B-cell development	RB2-Pg.No.243-275	LCD/BB
18	B-cell activation, and antibody production.	RB2-Pg.No.243-275	LCD/BB
Content beyond syllabus covered (if any):nil			

* Session duration: 50 mins

Sub. Code / Sub. Name: BT22602/Immunology

Unit : III : Molecular Immunology

Unit III: Molecular Immunology **9 hrs**

Unit Syllabus: Antibody structure and function, B-cell receptor signaling, T-cell receptor structure and function, Cytokines and their role in immune regulation. Immunological memory and recall responses. Immune response to pathogens: viruses, bacteria, parasites. Transplantation - Genetics of transplantation and Laws of transplantation

Objective: Understand the concepts of antigen recognition, B and T cell responses, and immunological memory.

Session No *	Topics to be covered	Ref	Teaching Aids
19	Antibody structure and function	TB3-Pg.No.69-96	LCD/BB
20	B-cell receptor signaling	TB2-Pg.No.139-152	LCD/BB
21	T-cell receptor structure and function	TB2-Pg.No.153-197	LCD/BB
22	Cytokines and their role in immune regulation	TB4-Pg.No.176-194	LCD/BB
23	Immunological memory and recall responses	TB2-Pg.No.473-482	LCD/BB
24	Immune response to pathogens: viruses	TB4-Pg.No.330	LCD/BB
25	Immune response to pathogens: bacteria and parasites	TB4-Pg.No.331-332	LCD/BB
26	Transplantation - Genetics of transplantation	TB5-Pg.No.201-205	LCD/BB
27	Transplantation - Laws of transplantation	TB5-Pg.No.206-218	LCD/BB

Content beyond syllabus covered (if any):nil

* Session duration: 50 mins

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COURSE DELIVERY PLAN - THEORY

Sub. Code / Sub. Name: BT22602/Immunology

Unit: IV Autoimmune Diseases and Tumor Immunology

Unit: IV Autoimmune Diseases and Tumor Immunology **9 hrs**

Unit Syllabus: Hypersensitivity and allergic reactions. Autoimmune diseases: Mechanisms and potential therapies. Immunodeficiency disorders: Primary and secondary immunodeficiencies. Immune Checkpoints. Tumor immunology: The immune system's role in cancer development and therapy.

Objective: Analyze the immune system's involvement in various disease states, including allergies, autoimmune disorders, and immunodeficiency.

Session No *	Topics to be covered	Ref	Teaching Aids
28	Hypersensitivity and allergic reactions	TB3: Pg.No.407-430	LCD/BB
29	Autoimmune diseases: Mechanisms	TB3: Pg.No.500-509	LCD/BB
30	Autoimmune diseases	TB3: Pg.No.510-515	LCD/BB
31	Autoimmune diseases: potential therapies.	TB3: Pg.No.516-525	LCD/BB
32	Immunodeficiency disorders: Primary immunodeficiencies	RB3:Pg.No.252-255	LCD/BB
33	Immunodeficiency disorders: secondary immunodeficiencies	RB3:Pg.No.260-265	LCD/BB
34	Immune Checkpoints	RB3:Pg.No.279-282	LCD/BB
35	Tumor immunology: The immune system's role in cancer development	TB3:Pg.No.458-479	LCD/BB
36	Tumor immunology: The immune system's role in therapy	TB3:Pg.No.480-499	LCD/BB
Content beyond syllabus covered (if any):nil			

* Session duration: 50 mins

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COURSE DELIVERY PLAN - THEORY

Sub. Code / Sub. Name: BT22602/Immunology

Unit V: Vaccines and Precision Immunotherapy

Unit V: Vaccines and Precision Immunotherapy **9 hrs**

Unit Syllabus: Vaccines: Past, present, and future. Microbiome and Immunity. Personalized Immunotherapy. Ethical Considerations in Immunology Research and Applications.

Objective: Apply the potential of immunology in vaccine development and therapeutic interventions.

Session No *	Topics to be covered	Ref	Teaching Aids
37	Vaccines: Past, present, and future	RB1:Pg.No.	LCD/BB
38	The Origins and Evolution of Vaccination	RB1:Pg.No.1212-1214	LCD/BB
39	Modern Vaccination Strategies and Challenges	RB1:Pg.No.1214-1216	LCD/BB
40	Innovations and Emerging Trends in Vaccination	RB1:Pg.No.1216-1224	LCD/BB
41	Microbiome and Immunity	RB4-Pg.No.104-106	LCD/BB
42	Factors Influencing the Microbiome-Immune Relationship	RB4-Pg.No.106-110	LCD/BB
43	Personalized Immunotherapy	AR1	LCD/BB
44	Technologies and problems driving Personalized Immunotherapy	AR2	LCD/BB
45	Ethical Considerations in Immunology Research and Applications	AR3	LCD/BB

Content beyond syllabus covered (if any):nil

* Session duration: 50 mins

REFERENCES:

TEXTBOOKS:

1. Owen, Judy, Jenni Punt, and Sharon Stranford. "Kuby Immunology." 8th Edition, 2018.
2. Murphy, Kenneth, and Casey Weaver. "Janeway's Immunobiology." 9th Edition, 2016.
3. Roitt, Ivan, Peter Delves, Seamus Martin, and Dennis Burton. "Essential Immunology." 14th Edition, 2017.
4. Coico, Richard, and Geoffrey Sunshine. "Immunology: A Short Course." 7th Edition, 2015.
5. Abbas, Abul K., Andrew H. Lichtman, and Shiv Pillai. "Basic Immunology: Functions and Disorders of the Immune System." 6th Edition, 2020.

REFERENCE BOOKS:

1. Rich, Robert R., Thomas A. Fleisher, William T. Shearer, Harry Schroeder, Anthony J. Frew, and Cornelia M. Weyand. "Clinical Immunology: Principles and Practice." 5th Edition, 2019.
2. Abbas, Abul K., Andrew H. Lichtman, and Shiv Pillai. "Cellular and Molecular Immunology." 9th Edition, 2018.
3. Helbert, Matthew. "Immunology for Medical Students." 3rd Edition, 2018.
4. Delves, Peter J., Seamus J. Martin, Dennis R. Burton, and Ivan M. Roitt. "Roitt's Essential Immunology." 13th Edition, 2017.
5. Sompayrac, Lauren M. "How the Immune System Works." 6th Edition, 2019.

ADDITIONAL REFERENCES

1. Jain KK. Personalized Immuno-Oncology. *Med Princ Pract*. 2021;30(1):1-16. doi:10.1159/000511107
2. Ameratunga, M., Xu, W., & Lopez, J. (2018). Personalized cancer immunotherapy: today's challenge and tomorrow's promise. *Journal of Immunotherapy and Precision Oncology*, *1*(2), 56-67.
3. Kumar, A., Dixit, S., Srinivasan, K., & Vincent, P. D. R. (2024). Personalized cancer vaccine design using AI-powered technologies. *Frontiers in Immunology*, *15*, 1357217.

	Prepared by	Approved by
Signature		
Name	**Dr.J.Isaivani**	**Dr.E.Nakkeeran**
Designation	Assistant Professor	HOD/BIO
Date	20-01-2025	20-01-2025
Remarks *:		

* If the same lesson plan is followed in the subsequent semester/year it should be mentioned and signed by the Faculty and the HOD