**COURSE OUTLINE**

**DEPARTMENT OF PHARMACY**

**UNIT TITLE: IMMUNOLOGY**

**NAME OF LECTURER:** JAMES

**LEARNING OBJECTIVES**

The unit will equip the student with the necessary knowledge, skills and attitudes to be able to apply the concepts and principles of human immune mechanisms in provision of healthcare.

**EXPECTED LEARNING OUTCOMES**

**By the end of the course: -**

1. Describe the functional organization of the immune system.
2. Describe the structure and function of antibodies and antigens and their interactions.
3. Describe the immune effector and regulator mechanisms.
4. Explain immune responses found in healthy and disease states.
5. Outline the principles of vaccination
6. Describe laboratory methods in immunology

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| **WEEK** | **TOPIC** | **SUB –TOPICS** | **CONTACT HOURS** |
| Week 1 | **Introduction to immunology** | Historical background; definition of terms; basic principles of immunology. |  |
| Week 2 | **Immune system:** | Lymphatic and immune system- immune cells, tissues, organs, molecules; immunoglobulins- classification, structure, production, properties, functions; resistance and immunity. |  |
| Week 3 | **Mechanisms of immune response** | **Mechanisms of immune response:** humoral immunity; non-specific and specific immunity; complement system; proteins activation and biological properties; antigens and antibodies; antigen processing and presentation; antigen-antibody interactions; genetic basis of immune function- major histocompatibility complex; cytokines; immunity to infections; immune evasion mechanisms. |  |
| Week 4 | **Immune disorders**: | Definition; types- auto immunity, immune deficiencies; transplantation and rejection. |  |
| Week 5 | **Functional organization of the immune system**: | Innate and acquired immunity; active, passive and adaptive immunity; humoral and cellular immunity; diversity of immune response; damaging effects of the immune response; regulation of Immune response. Elements of immune response: Immune response cells; lymphatic system, Antibody structure and function, Activation and function of T and B cells: Biology of the T and B lymphocytes, super antigens, B-cell activation and function, T-B cooperation, T-independent immune responses. |  |
| Week 6 | CAT I | |  |
| Week 7 | **Immune effecter mechanisms** | Cytokines, actions and interactions in the immune responses; Compliment systems, biological activities of compliment fractions;  Cell mediated immunity: Effecter cells in CMI, effecter responses, assessment of cell mediated cytotoxicity. |  |
| Week 8 | **Hypersensitivity reactions** | Type I (IgE-mediated) hypersensitivity, Type II (Antibody mediated), Type III (Immune complex-mediated), Type IV (Delayed type) hypersensitivity |  |
| Week 9 | **Control mechanisms in the immune response** | Tolerance; immune regulation in the individual; immunologically privileged sites; immunosuppression by drugs and radiation  Host defense against pathogens, Major Immunohistocompatibility complex in the immune system: Variability of MHC; genes and genetic polymorphism; Structure and function of MHC class I and II molecules. |  |
| Week 10 | **Autoimmunity and autoimmune disorders**: | Etiology, examples of autoimmune disease autoimmune hemolytic anemia, myasthenia gravis, Graves' disease, systemic lupus erythematosus (SLE), multiple sclerosis, insulin-dependent diabetes mellitus, Hashimoto's thyroiditis, rheumatoid arthritis; Autoimmune diseases resulting from compliment deficiency. |  |
| Week 11 | CAT II | |  |
| Week 12 | **Transplantation immunology** | Allograft rejection - Hyperacute acute and chronic rejection; histocompatibility antigens; tests for histocompatibility Ag's; prolongation of allograft survival; bone marrow transplantation; graft-vs.-host reactions; fetal-maternal relationship  Tumors immunology: Tumors antigens categories; immunologic factors and cancer; effector mechanisms in tumor immunity; B-cell responses; cell-mediated responses; cytokines; limitations of tumour immune response; Immunodiagnosis; Tumor immunoprophylaxis; Immunotherapy |  |
| Week 13 | **Principles of immunization**: | Active immunizations; basic mechanisms of protection; precautions; Current methods of vaccine production - Recombinant DNA vaccines, conjugated polysaccharides, synthetic peptide vaccines, anti­idiotype vaccines, virus-carrier vaccine, toxoids; passive immunization; immunotherapy |  |
| Week 14 | **Immune assays and laboratory methods:** | Principles of antigen-antibody interactions; comparison of agglutination and precipitation reactions, direct binding and solid-phase immunoassays; Immunofluorescence, Fluorescence activated cell-sorting analysis; comparison of immunoadsorption and immunoabsorption, Monoclonal and genetically engineered antibodies |  |
| Week 15 | EXAMINATIONS | |  |
| Week 16 | EXAMINATIONS | |  |

Teaching methodologies

1. Lectures
2. Group discussion presentation
3. Tutorials etc

**Recommended text book**

1. Pradeu H. (2012). The limits of the Self Immunology and Biological Identity. New York Oxford University Press.
2. Roitt and Delves (2006), Roitt’s Essential Immunology; Blackwell Publishing, 11th Edition.
3. Clark W. (2008). *In defense of Self: How the immune system really works*. New York: Oxford University Press.

**Text books for further reading**

1. Pradeu T., Jaegar S., Vivier, E. (2013). The seed of change towards a discontinuity theory of immunity? *Nature Reviews Immunology*. 13(10): 764-769.
2. Greenswood, Slack, Peutherer and Barer (2007), Medical Microbiology: A guide to Microbial Infections, Churchill Livingstone, 11th Edition.

**Teaching and learning equipment**

1. White board makers
2. Chalk board
3. Projector
4. Drawing boards
5. Cameras
6. Computers e.t.c as may be appropriate