## Course contents for Advances in Immunology

1. **Faculty:** FLSB
2. **Course Code:** LSB506
3. **Course Title:** Advances in Immunology
4. **Number of Credits:** 5 (2L, 1T, 2P)
5. **Course objectives:**

   Immune system essentially provides defense against microbial infections and spontaneously arising tumors. In this course, various immune defense mechanisms will be discussed with a focus on humans and mammals. Students would develop a perspective of how these mechanisms operate at molecular, cellular and organ levels and how this understanding may be used for evolving preventive and therapeutic strategies for a healthy life.

6. **Minimum prerequisites for taking this course, if any:**

   Basic knowledge of biochemistry, cell biology, genetics and molecular biology would be assumed.

7. **Course structure with units, if applicable:**

   **Unit 1:** An overview of the Immune System, Hematopoietic stem cells and differentiation of granulocytes, macrophages and lymphocytes, Innate Immunity, Inflammation responses and mechanisms, Acute Phase reaction, Flow cytometry

   **Unit 2:** The antibody molecule and Immunoglobulin domain, Antigen-antibody reaction, Primary and secondary antibody responses, Immunoglobulin genes, Molecular mechanism of creation of antibody diversity, Monoclonal antibodies and immune-technology, Complement system

   **Unit 3.** The Major Histocompatibility Complex, Immunogenetics, Antigen Presentation, T-Cell / B-Cell Receptor, mitogens and superantigens, T-Cell and B-Cell activation and differentiation, immune-tolerance, Cytotoxic T cells and Natural Killer cells, Cytotoxic mechanisms

   **Unit 4:** Leukocyte Activation and Migration, Hypersensitive Reactions, Vaccines, Diseases of the Immune system

8. **Practicals:**

   a. WBC count in Haemocytometer by WBC diluting fluid.

   b. Differential WBC count using Leishman stain.

   c. Ouchterlony Double Diffusion (For Antibody Titration)

   d. ELISA (Sandwich )

   e. Isolation of Whole Mononuclear Cells from Peripheral Blood

   f. Western Blot

   # SDS PAGE gel preparation, Protein Extraction and Sonication

   # Protein Quantification by BCA and sample preparation

   # SDS-PAGE run, Transfer, Primary antibody incubation and Secondary antibody incubation

   # Blot development

**9. Reading suggestions:**

a. **Kuby Immunology** by Judith A. Owen and others
b. **Basic Immunology: Functions and Disorders of the Immune** System by Abul K. Abbas and others
c. **Cellular and Molecular Immunology** by Abul K. Abbas and others
d. **Janeway's Immunobiology** by Kenneth Murphy
e. **Trends in Immunology** (Journal)
f. **Nature** (Immunology) journal

**10. Evaluation:**

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| Theory: | Mid-semester Written Examination | : 40% Marks |
| | End-semester Written Examination | : 40% Marks |
| | Quiz / Assignment/Presentation (oral / poster)/other | : 20% Marks |