

**MANGALORE**



**UNIVERSITY**

**DEPARTMENT OF BIOSCIENCES**

**MSc BIOTECHNOLOGY**

**BTS 505 MEDICAL BIOTECHNOLOGY**

**Hours: 40**

**Course outcome**

This Course will enable students to:

- Get an overview of the immune system with particular reference to **diagnostics, therapy and transplantation.**
- Understand the genetics behind **genetic diseases and syndromes and techniques associated with diagnosis and gene therapy**
- Learn about cancer biology with particular reference to **carcinogenic agents, basis of cancer, treatment strategies and approaches, stem cells and applications**

**UNIT I (13 hrs)**

Immunology: Overview: concept of self and nonself, antigens, antibodies; immune response, evolution of immune response, immunological tolerance, hypersensitivity, humoral and cell-mediated immunity, active and passive immunization, antigen processing and MHC. Immunobiology: blood groups and transplantation antigens, HLA. **Immune deficiencies and disorders – AIDS. Allergy. Diagnostic tools: Antigen-antibody reaction, agglutination, immunoelectrophoresis, immunofluorescence, enzyme-linked immunosorbant assay (ELISA), radioimmunoassay (RIA). Immunization and vaccines – new types of vaccines, edible vaccines. Organ transplantation.**

**UNIT II (13 hrs)**

Genetics: Structure, organization and types of eukaryotic chromosomes, Heterochromatin, euchromatin, telomeres, types of chromosomes. Cell division. Molecular and cellular biology of fertilization *in-vitro* fertilization, assisted reproductive techniques, cloning. Karyotyping - heritable diseases and syndromes. Prenatal diagnosis (amniocentesis and chorionic villus sampling), **Diagnosis of genetic diseases, Gene therapy, PCR.**

### UNIT III (14hrs)

Cancer biology: Cell cycle and its regulation. Apoptosis. Carcinogenic agents and molecular biology of cancer, Abnormal cell growth: mechanism of transformation of cells. Genetic basis of Cancer, Physical and chemical carcinogenic agents; Viral and cellular oncogenes, tumor suppressor genes, Telomerases and their role in cancer. Recent advances in therapeutic approaches to disease treatment: Stem cells - types and applications. Cancer therapy – immunotoxins and gene therapy.

#### References

1. The Cell. A Molecular Approach. Cooper, G.M. Sunderland: Sinauer Associates, Inc., 2000
2. Basic Genetics. Hartl D.L. & Jones E.W. Jones & Bartlett Pub., 1998
3. Kuby Immunology. Kindt T.J. et al., W.H. Freeman & Co. 2007

