

Programme	BS Biotechnology	Course Code	BT. 204	Credit Hours	3-0
Course Title	Health Biotechnology				
Course Introduction					
This course will provide an in-depth understanding of the biotechnological advances in the field of human health and medicine. Undergraduate students majoring in biotechnology will learn about the recent diagnostic and therapeutic advances made possible by research on cellular and molecular aspects of human diseases					
Learning Outcomes					
By the end of this course, students will be able to:					
<ul style="list-style-type: none"> • Describe the role of biotechnology in the development of diagnostics and therapeutics. • Explain the principles of gene therapy and regenerative medicine. • Evaluate the ethical and regulatory issues in health biotechnology. 					
Course Content					
<ul style="list-style-type: none"> • Introduction to health biotechnology • Social acceptance of medical biotechnology; ethical issues related to the use of assisted reproductive technologies, prenatal diagnosis, genome sequencing, organ donation, end of life care, gene therapy and human enhancement • Molecular basis of disease; molecular and genetic markers; chromosomal disorders and gene mapping, single gene and polygenic disorders. • Detection of mutations and infectious agents; DNA sequencing, RFLP, allelic discrimination assay, PCR and quantitative real time PCR for detection of infectious agents. • Immunological approaches to detect protein biomarkers of disease, DNA based approaches to disease diagnosis, detecting RNA signatures of disease. • Next generation sequencing for health and diagnosis, consumer genomics, NGS platforms, sequencing whole genomes and exomes • Vaccines (live, killed, recombinant DNA vaccines, subunit vaccines, DNA vaccines, RNA vaccines, edible vaccines. Protein therapeutics, recombinant antibodies, RNA therapeutics. • Organ transplantation; blood transfusion and grafting techniques; Xenotransplants • Applications of transgenic animals (animal models of diseases, farming and enhancement of farm animals) • Development of genetically modified disease models, gene targeting, Cre Lox system • Genome editing technologies, CRSIPR Cas9, human genome editing for disease treatment, future prospects. • Pharmacogenetics; history of pharmacogenetics, Glucose 6 phosphate dehydrogenase deficiency, How genes influence responsiveness to drugs, cytochrome P450 system, pharmacogenetics in cancer treatment; examples of imatinib and Trastuzumab, use of whole genome sequencing for selection of cancer treatment. • Gene therapy; use of viral vectors, safety consideration, somatic and gremlin therapy, examples of FDA approved gene therapies. 					

- Tissue engineering and regenerative medicine; biomaterials and scaffolds, bioartificial organs
- Stem cell technology, hematopoietic stem cell transplantation, sources of human stem cells, iPS cells, research and future prospects.
- CAR-T cell therapy for cancer treatment

Textbooks and Reading Material

Textbooks.

- Bernard R. Glick, Terry L. Delovitch and Cheryl L. Patten 2014 medical biotechnology ASM Press
- Pongracz J. and Keen M. 2009. Medical Biotechnology. 1st Edition; Elsevier Health Sciences.
- Schacter B.Z. 2005. Biotechnology and Your Health: Pharmaceutical Applications. Chelsea House Publishers,
- Chetan D.M and Dinesh K.P, 2006. Health and Pharmaceutical Biotechnology. Firewall Media.
- Dogramatzis, 2010. Health care Biotechnology. 1st Edition; CRC Press

Teaching Learning Strategies

- Class lecture
- Class Discussions
- Class Tutorials

Assignments: Types and Number with Calendar

- 1st Quiz in 4th Week of 5 marks
- 2nd Quiz in 12th Week of 5 marks
- 1st Assignment in 8th Week of 15 marks

Assessment

Sr. No.	Elements	Weightage	Details
1	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2	Formative Assessment	25%	Continuous assessment includes: Classroom participation, assignments, presentations, viva voce, attitude and behavior, hands-on-activities, short tests, projects, practical, reflections, readings, quizzes etc.
3	Final Assessment	40%	Written Examination at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.