Semester	3		
Course Code:	MIBI 21514		
Course Name:	Microbial Biochemistry and Physiology, Bacterial Genetics and its applications		
Credit Value:	4		
Core/Optional	Core		
Hourly Breakdown	Theory	Practical	Independent Learning
	60 hrs	-	140 hrs

Course Aim/Intended Learning Outcomes:

Upon successful completion of this course student will be able to;

- Describe the different methods of carbohydrate metabolism present in bacteria.
- Discuss the production of various metabolic products via fermentation.
- Describe how genetic information is stored in bacterial cells.
- Explain DNA replication, gene expression in cells and different gene transfer mechanisms.
- Describe processes behind mutations and other genetic changes and DNA repair mechanisms.
- Discuss the use of genetic tools in the advance of medical, industrial, Agricultural and environmental prospects.

Course Content:

Microbial Biochemistry and Physiology:

Nutrition of bacteria: Major & minor bioelements, nutrients as energy source, growth factor requirements of bacteria. Carbohydrate metabolism in bacteria: EMP, HMP, ED & phosphoketolase pathways, Hetorotrophic generation of ATP in bacteria: fermentation, Autotrophic generation of ATP: Chemolithotrophy, bacterial photosynthesis. Transport of nutrients in microorganisms. Biosynthesis of macromolecules in microorganisms: Amphibolic pathways, biosynthesis of proteins and lipids, Calvin cycle. Biodegradation of macromolecules

Bacterial Genetics and its applications:

*Structure and function of prokaryotic genetic material***:** Chromosome structure, DNA replication, Transcription, Translation. *Molecular basis of inheritance***:** Regulation of bacterial gene expression: Induction, repression and Catabolic repression. *Mutations:* Types, detection and selection of mutations, Mutagens, Expression of mutations. *Genetic transfer and recombination:* Plasmids, Transposable elements, Transformation, Conjugation and Transduction. *Genetic manipulations:* recombinant DNA technology, DNA cloning and cloning vectors, Expression of foreign genes in bacteria. *Genetic engineering:* Industrial, Agricultural and Medical applications.

Teaching /Learning Methods: A combination of lectures and assignments.

Assessment Strategy: End of the course unit examination.

Continuous Assessment	**Final Assessment**		
0%	100%		
Details: N/A	Theory (%)	Practical (%)	Other (%)
	100%	-	-

Recommended Reading:

- Freifelder, D. (1998). *Molecular Biology.* Jones & Bartlett Publishers, Inc.
- Singer, M. and Berg, P. (1991). *Genes and Genome.* University Science Books, U.S.A.
- Synder, L. and Champness, W. (1997) *Molecular Genetics of Bacteria*. American Society for Microbiology
- Turner, P.C., McLennan, A.G., Bates, A.D. and White, M.R.S. (2005). *BIOS Instant Notes in Molecular Biology*. Taylor and Francis.
- Dale, J.W., Park, S.F., (2010). *Molecular Genetics of Bacteria*. John Wiley & Sons, Ltd.
- Moran, L.A., Horton, H. R., Scrimgeour, K.G. and Perry, M.D. (2012) *Principles of Biochemistry*. Pearson Education, Inc.