**EPIGENETICS CREDIT HOURS 2+1**

**LEARNING OUTCOME:**

**Students will be able to :**

1. Have an insight into the genetic regulation.
2. Learn heritable changes in gene expression and cellular phenotypes.
3. Learn about changes in phenotypes other than changes in underlying DNA sequences

**COURSE CONTENTS:**

Over view of epigenetics; Genome organization of eukaryotes; Heterochromatin and euchromatin; Levels of chromatin organization; Histone modifications, histone code hypothesis; Genetic modulation by CpG Island, DNA methylation and its implication on gene expression; Types of methylases, DNA/RNA and protein methylation, and its implication on gene expression; Types of acetylases and acetylation of histones; Book marking, cellular memory and Imprinting, Maternal effects, Paramutation, X- chromosome inactivation, Position effect variegation, Gene silencing, Transvection and Reprogramming; epigenetic regulation of gene expression, cellular differentiation and signal transduction; Role of epigenetics in various diseases

**PRACTICALS:**

1. Visualization of heterochromatin by different techniques
2. Detection of CpG motifs by restriction enzymes.
3. Detection of CpG motif by PCR. Bi sulphite PCR
4. Detection of methylated sites on DNA

**RECOMMENDED BOOKS:**

1. Allis, C. D., Caparros, M.-L., Jenuwein, T., & Reinberg, D. 2015. Epigenetics. New York: CSH Press, Cold Spring Harbor Laboratory Press
2. Benedikt, H. and Brian, K. H. 2011. Epigenetics: Linking Genotype and Phenotye
3. Development and Evolution. University of California Press.
4. Dincer, Y. 2016. Epigenetics: Mechanisms and clinical perspectives. New York: Nova Science Publisher's, Inc.
5. Nessa Carey. 2012. The Epigenetic Revolution. Columbia University Press.
6. Richard C. F. 2012. Epigenetics. W. W. Norton & Company.
7. Su, L. J., & Chiang, T.-C. 2015. Environmental epigenetics. Humnna Press. London.
8. Tollefbol, T.O., 2010. Handbook of Epigenetics. Academic Press.
9. Tollefsbol, T. O. 2015. Personalized epigenetics. Amsterdam: Elsevier Ltd.