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<b>IV Year B.Tech. Bioinformatics II - Semester</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>To</b>	<b>C</b>
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**BI 410 COMPARATIVE GENOMICS (ELECTIVE-VI)****Course Description and Objectives:**

*This course deals with genomes of various organisms and their comparisons. The main objective of this course is to find genomic information and resources also to provide students adequate knowledge in annotating genes*

**Course Outcomes :**

1. Student will be able to understand the basic concepts of Comparative genomics
2. Student will be acquire adequate insights into the human genome project
3. Student will be learn the utility of phylogenetic trees in evolutionary thinking
4. Student will be understand the fundamentals of bacterial and vertebrate evolution

**Unit I: Introduction to comparative genomics :**

What is “comparative genomics”? Timeline of comparative genomics developments. Databases for genomics resources: NCBI. The history of the Human Genome Project. Why, when, who and how. Why sequence the human genome?. Ethical and societal issues: Iceland’s Genomic Database as a case study

**Unit II: Obtaining and Assembling Sequences :**

Hierarchical shotgun sequencing, Large-scale sequencing methods: cloning and BAC library creation, Sequence quality scoring, vector screening (phred), Sequence assembly into contigs and skeleton frameworks (phrap), Introduction to evolutionary thinking: Phylogenetic analyses: tree terminology and parsimony, Concept of homology

**Unit III: Gene Identification and Annotation :**

Sequence alignment: global versus local Databases and tools for annotating sequence (FASTA, BLAST) Modifying search strategies; searching different databases, Inferring gene function from relatedness to other genes, Finding Open Reading Frames (ORFs) distinguishing introns from diverged exons.

**Unit IV: Genome Comparisons I: Organelles :**

Phylogenetic analyses: introduction to programs, Mitochondrial Genomes: size, content, and gene order, The minimal genome, Survey of bacterial genomes.

**Unit V : Genome Comparisons II: Bacteria and Vertebrates :**

Microbial genes in the human genome: lateral transfer or gene loss?. Phylogenetic analyses to determine relationships and interpret character evolution in Bacteria. Vertebrate evolution based on genome comparisons. Human and chimpanzee genome comparisons.

**Research Publications as source of information :**

1. Pennisi, E. 2001. The Human Genome. *Science* 291:1177-1180.
2. Roberts, L. 2001. Controversial from the start. *Science* 291:1182-1188.
3. Baltimore, D. 2001. Our genome unveiled. *Nature* 409:814-816.
4. Wolfsberg, T. G., J. McEntyre, and G. D. Schuler. 2001. Guide to the draft human genome. *Nature* 409:824-826.,
5. Birney, E., A. Bateman, M. E. Clamp, and T. J. Hubbard. 2001. Mining the draft human genome. *Nature* 409:827-828.
6. Rokas, A., B. L. Williams, N. King, and S. B. Carroll. 2003. Genome-scale approaches to resolving incongruence in molecular phylogenies. *Nature* 425:798-804