

BME 6762 Bioinformatics: Bioengineering Perspectives

Credits: 3 credits

Textbook, Title, Author, and Year: T. K. Attwood & D. J. Parry-Smith: *Introduction to Bioinformatics* (Prentice-Hall/Pearson Education Ltd.). ISBN 0582 327881 / 2.B. Bergeron: *Bioinformatics Computing* (Prentice-Hall/Pearson Education Ltd.). (Prentice-Hall). ISBN 0-13-100825-0

Reference Materials: Lecture Notes (in 6 Units) will be made available on the Black-Board periodically.

Specific Course Information

- **Catalog description:** Introduction to basics of bio- and genetic-engineering. Concepts and definitions of molecular biological terms. Bioinformatics – definition and applications. Information resources and databases: Proteins and genomes. Biological sequence analysis and applications. Sequence search/analyses tools and protocols. Bioinformatics *versus* modern information networks and WWW
- **Prerequisites:** Graduate level background in physical/biological sciences and/or engineering.

Specific Goals for the Course: This course is intended to impart the concepts and practical aspects of bioinformatics. Relevant biological considerations and computational aspects are bridged. Analyses of biological (genomic and proteomic) sequences will be indicated. Computational exercises are given as a term project on individual basis.

Brief List of Topics to be covered:

1. Definitions and concepts in molecular biology
Fundamentals of bio-and genetic-engineering and bioinformatics
2. Information resources: Biological databases –primary and secondary: Database searches
Heterogeneous database, object-oriented database and distributed databases
3. Biological sequences: Analyses considerations and sequence search protocols
Pairwise alignment & dynamic programming
Multiple sequence alignment
Hidden Markov Models (HMMs)
RNA analysis, gene prediction, genomic/comparative analysis
4. Phylogenetic analysis
5. Analysis packages
6. Information networks/WWW: Their role in bioinformatics