

What is Bioinformatics?

- *(Molecular)* **Bio - informatics**

- One idea for a definition?

Bioinformatics is conceptualizing **biology in terms of molecules** (in the sense of physical-chemistry) and then applying **“informatics” techniques** (derived from disciplines such as applied math, CS, and statistics) to understand and **organize the information associated** with these molecules, **on a large-scale.**

- Bioinformatics is a practical discipline with many **applications.**

Are They or Aren't They Bioinformatics? (#1)

- Digital Libraries
 - ◇ Automated Bibliographic Search of the biological literature and Textual Comparison
 - ◇ Knowledge bases for biological literature
- Motif Discovery Using Gibb's Sampling
- Methods for Structure Determination
 - ◇ Computational Crystallography
 - Refinement
 - ◇ NMR Structure Determination
 - Distance Geometry
- Metabolic Pathway Simulation
- The DNA Computer

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Are They or Aren't They Bioinformatics? (#2)

- Gene identification by sequence inspection
 - ◇ Prediction of splice sites
- DNA methods in forensics
- Modeling of Populations of Organisms
 - ◇ Ecological Modeling
- Genomic Sequencing Methods
 - ◇ Assembling Contigs
 - ◇ Physical and genetic mapping
- Linkage Analysis
 - ◇ Linking specific genes to various traits

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Are They or Aren't They Bioinformatics? (#3)

- RNA structure prediction
Identification in sequences
- Radiological Image Processing
 - ◇ Computational Representations for Human Anatomy (visible human)
- Artificial Life Simulations
 - ◇ Artificial Immunology / Computer Security
 - ◇ Genetic Algorithms in molecular biology
- Homology modeling
- Determination of Phylogenies Based on Non-molecular Organism Characteristics
- Computerized Diagnosis based on Genetic Analysis (Pedigrees)

Are They or Aren't They Bioinformatics? (#3, Answers)

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Some Further Boundary Examples....

- Char. drugs and other small molecules (cheminformatics or bioinformatics?) [YES]
- Molecular phenotype discovery – looking for gene expression signatures of cancer [YES]
 - ◇ What if it included non-molecular data such as age ?
- Use of whole genome sequences to create phylogenies [YES]
- Integration and organization of biological databases [YES]
- Processing of NextGen sequencing image files [NO]