**Course: Advanced Bioinformatics**

**Module title: Motivations**

**Module no. : 4**

Bioinformatics is a newly born and multidisciplinary domain that involves the major contribution of biological sciences, information sciences, and computer sciences. In order to make it capable of biological data processing, data management and data modeling issues, the research efforts in bioinformatics domain overlap to the research efforts in computational biology. In fact bioinformatics domain is entirely different from the domain of computational biology. The domain of bioinformatics deals to biological data, to achieve the objectives of storage, retrieval and manipulation of biological data, in Computer Laboratory (Computer Lab) only. On the other hand, computational biology tackles sequence alignment, genome assembly, prediction and finding new genes/Protein structures, the development of various tools and techniques for statistical analysis and curation of biological data in Wet Laboratory (Wet Lab) and to some extent Dry Laboratory (Dry Lab). The difference between wet labs, dry labs and computer labs is shown as following.

Biological Data Acquisition, Processing and Analysis

In Figure, rectangles denote processes, and arrows denote input/output of the processes. The figure shows the biological data acquisition, processing and analysis functions. (3) Workingphases/stages; they are Wet Laboratory (Wet Lab), Dry Laboratory (Dry Lab) and Computer Laboratory (Computer Lab). A Wet Lab is the Laboratory where biologists perform their physical experiments by using different samples, chemicals, drugs and other materials. In this lab, biologists gather data and information by helding experiments on the samples of living organisms or by directly examining the living organisms under certain precautionary measures. This data that is gathered during experiment is referred to as the raw data. Note that in the wet lab, experiments are performed in the physically housed laboratories, which are designed for these specific purposes. Biologists bring raw data (which is also referred to as the uncured data) of their experiments which they did in the wet lab to the dry lab. This uncured data is still in biological form; therefore it is further processed for future analysis. The process of cleanliness of uncured data is termed as data curation and it is performed in dry lab by biologists and robots. In dry labs, the experimental work is performed through semi-experiments. There are little chances of error due to the automatic instruments. Dry Lab produces the data as output; it is in a purified form and can be used by computer scientists/ bioinformaticians in Computer Lab for analysis and other computing purposes.

This type of experimental data is very much costly and is obtained from raw data, through a process of annotation, also called annotated data. The annotated data is used for the derivation of various kinds of structure and function annotation, sequence determining and other structure predictions