Course Title: Next Generation Sequence Analysis
Course Code: BI-832
Course Objective:
Primary focus of the program under which the proposed course will be conducted is
- Analysis and interpretation of NGS data using different techniques.
- Computational techniques and algorithms designed for the NGS analysis.
- Be able to conduct NGS data analyses.
- Biological interpretation of data

Course Outcomes:
After the course the students will be able to apply different concepts of NGS analysis on various practical problems.

Course Contents
- Introduction to NGS and its comparison with Microarrays
- RNA-seq analysis
  - Introduction to RNA-seq
  - RNA seq study design
  - RNA seq data analysis
- Single-cell RNA-Seq
  - Introduction
  - Analytical approaches using published pipelines (e.g. Sincera)
- ChIP-seq analysis
  - Introduction to ChIP -seq
  - ChIP-seq study design
  - ChIP-seq data analysis
- Whole genome and Exome Sequencing and its application in mutation analysis.
- ATAC-seq analysis (Assay for Transposase-Accessible Chromatin with high-throughput sequencing)
  - Introduction to ATAC-seq
  - ATAC-seq study design
  - ATAC-seq data analysis
- Next generation sequencing based approaches to epigenomics.
- Different platforms for the analysis of next generation sequencing data.
- Development of pipelines for the next generation sequencing analysis in python and R programming languages

Recommended / Reference Books:
- Dr. Steven R. Head Dr. Phillip Ordoukhanian Dr. Daniel R. Salomon.
  Springer Next Generation Sequencing Methods and Protocols. 2018
- Jianping Xu, Next-generation Sequencing: Current Technologies and Applications.
  Caister Academic Press, 2014
- Demkow, Urszula, and Rafal Ploski, eds. Clinical applications for next-generation sequencing. Academic Press, 2015.

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