



School of Interdisciplinary Engineering & Sciences (SINES)
National University of Sciences & Technology

Course Title: Translational Bioinformatics Applications

Course Code CSE-896

Course Objectives:

This course introduces a hands-on computer experience of analyzing real world high throughput genomic data using computational tools and programming languages. The main educational objectives are:

- Identify real world clinical/translational genomic data and problems from literature and online databases.
- Understand the power of statistical methods and tools in analyzing data in this field.
- Gaining research experience and writing skills in translational bioinformatics

Course Outcomes:

Students will be able to:

- Apply knowledge of bioinformatics data exploration and storage using public and private databases
- Justify the application of bioinformatics research methodologies to visualize translational bioinformatics data
- Analyze, interpret and appraise bioinformatics research data by applying appropriate bioinformatics research methodologies in translational and clinical research

Course Contents

Introduction

- Overview of Translational Bioinformatics
 - Areas of research
- Literature search and paper selection
 - Selection of high impact journal papers with data publicly available
- Databases: GEO, TCGA, NCBI others
 - Exploring publicly available data
- Statistical tools and applications
 - Identifying statistical tools and algorithms used for analysis
- Individual presentations
- Advance Data Manipulation and interpretation on microarray /sequencing data
 - Regression / multiple regression / mixed effects / logistic models
 - Hierarchical clustering, WCGNA
 - Functional Analysis using DAVID, GATHER, GSEA software's
 - Connectivity Map
- Project selection
 - Applying above knowledge to real clinical data
- NGS and mutations Drug discovery

Recommended / Reference Books:

- Translational Bioinformatics, Wang, Xiangdong, ISSN: 2213-2775