Mel and Enid Zuckerman College of Public Health
University of Arizona

BIOS 511 Healthcare Data Science

Catalog Description: This course introduces you new tools and techniques used in healthcare related data sciences. Topics include: Basic knowledge of large clinical databases focusing on medical records, Cohort definition and extraction, Intro to SQL, Linux basic, Collaborative research using Git/GitHub, High performance computing and cloud computing, Shiny, Docker, TidyVerse, Basic predictive modeling, Select tool from data science for example spark (distributed analysis), TensorFlow. (3 units)

Course Topics:
- Large Clinical Databases
- Cohort Definition and Extraction
- SQL
- Linux Basic
- Collaborative Research using Git/GitHub
- High Performance Computing and Cloud Computing
- Docker
- TidyVerse
- Basic Predictive Modeling

Course Objectives: During this course, students will:

- Communicate with healthcare stakeholders and understand whether their problem is one that can be solved by healthcare Data Science and determine how it might be best solved.
- Apply various tools and techniques to acquire, clean and store data for analysis.
- Identify various analytical problems and the appropriate modeling techniques (statistical and machine learning).
- Communicate results to healthcare stakeholders.
- Ensure analytical results reproducibility.

Learning Outcomes (Competencies Obtained): Upon completion of this course students will be able to:

1. Describe the roles biostatistics serves in the discipline of public health
2. Apply basic informatics techniques and vital statistics and public health records in the description of public health characteristics and in public health research and evaluation
3. Communicate understanding of the assumptions necessary for a given statistical and analytical procedure as well as the ability to determine if the assumptions are met for a given data set
4. Suggest preferred methodological alternatives to commonly used statistical methods when assumptions are not met
5. Recognize strengths and weaknesses of proposed approaches, including alternative designs, data sources, and analytical methods
6. Apply descriptive and inferential methodologies according to the type of study design for answering a particular research question
7. Communicate effectively both in writing and orally (unless a handicap precludes one of those forms of communication)
8. Interpret and present accurately and effectively demographic, statistical, and scientific information for professional and lay audiences adapting and translating public health concepts to individuals and communities
9. Lead and participate in groups to address specific issues, including ability to work in teams, span organizational boundaries and cross systems