

# GRADUATE CERTIFICATE IN CLINICAL BIOINFORMATICS

Code	Title	Hours
BIPG 5100	Fund Bioinformatics Proteomics	3
or BIPG 5200	Statistical Methods in Bioinformatics	
BIPG 6400	Applications of Bioinformatics	3
or BIPG 6200	Advanced Programming in Bioinformatics	
or BIPG 6500	Applied Statistics for Bioinformatics	
BIPG 5120	Clinical Bioinformatics	3
or BIPG 7120	Clinical Bioinformatics	

**Total Hours** 9

## First Year

First Term	Hours
BIPG 5100 Fund Bioinformatics Proteomics	3
<b>Hours</b>	<b>3</b>

## Second Term

BIPG 6400 Applications of Bioinformatics	3
or BIPG 6200 or Advanced Programming in Bioinformatics	
or BIPG 6500 or Applied Statistics for Bioinformatics	
<b>Hours</b>	<b>3</b>

## Third Term

BIPG 5120 Clinical Bioinformatics	3
or BIPG 7120 or Clinical Bioinformatics	
<b>Hours</b>	<b>3</b>
<b>Total Hours</b>	<b>9</b>

- Students completing the certificate program will be prepared to do the following:
  - 1) Apply clinical bioinformatics theories, methods and tools related to personal health, health care, public health, and biomedical research (for example)
    - a) Work with and evaluate electronic health records
    - b) Work with and evaluate national health databases
    - c) Work with and evaluate omics repositories
    - d) Integrate clinical and omics data
  - 2) Describe analytic tools associated with systems/bioinformatic approaches, including (for example):
    - a) Transcriptomics – microarray analysis vs. deep sequencing
    - b) Proteomic mass spectroscopic methods (identification and abundance)
    - c) Determination and structure of interaction networks
    - d) Functional network maps
  - 3) Apply Intelligent Data Analysis Techniques including (for example):
    - a) Dimension reduction techniques
    - b) Heuristic search techniques
    - c) Intelligent interfacing techniques
  - 4) Describe application of bioinformatic methods to clinical problems, by demonstrating understanding of:
    - a) Biomarker discovery and validation
    - b) Major diseases such as cancer, diabetes, cardiovascular, and autoimmunity