BIOINFORMATICS AND DATA ANALYSIS (UNDERGRADUATE CERTIFICATE)

This certificate program utilizes existing course structure in Biological Sciences and Mathematics to provide the basic computational skills and biological framework for students to pursue careers in the broad area of Bioinformatics and Data Analysis. Students who receive this certificate will have completed a strong undergraduate program in statistics, statistical programing, cell biology and genetics, and will have hands-on experience in analyzing large biological data sets. Graduates will be well placed to compete for employment in entry level positions in the growing field of computer-based data analysis, including careers in personalized medicine, pharmaceuticals, medical diagnostics, and environmental impact and restoration, to name a few.

The Bioinformatics Certificate will be a joint effort of the Department of Mathematics and the Department of Biological Sciences. It is primarily designed to utilize the academic backgrounds of students from the two disciplines or parallel disciplines such as Neuroscience, and to fill in what would be the complementary missing background. We have identified courses that together would give students the exposure and competency to be awarded a Certificate in Bioinformatics. These are as follows:

MAT 2020 Calculus II (4 s.h.)

STA 2210 Probability and Statistics (4 s.h.)

MAT 2250 Elementary Linear Algebra (3 s.h.)

STA 5030 Statistical Computing and Data Analysis (3 s.h.) or BIO 5040 Biometry (4 s.h.)

BIO 2600 Introduction to Cell Biology (4 s.h.) or BIO 2550 Fundamentals of Cell Biology for Neuroscience (4 s.h.)

BIO 3070 Genetics 4 (s.h.)

BIO 5150 Genomics (3 s.h.) or BIO 5280 Bioinformatics (3 s.h.)

The two tables below show the course track for either majors in Biological Science (1) or Statistics (2).   The listing includes 25-26 credits of course work encompassing prerequisite courses taken as part of the major (11-12 credits) as well as the **14 credits of courses unique** to the certificate program. Importantly, BIO 5150, BIO 5280 and BIO 5040 as well as STA 5030 include significant hands-on experience with large sets of biological data, and a student takes two of these as capstones for this Certificate in BioInformatics and Data Analysis.

1. Course list for Biological Sciences major: Top 3 are part of the major while bottom 4 are specific to the Certificate.

Code	Title	Credits
BIO 2600	Introduction to Cell Biology (OR BIO 2550)	4
BIO 3070	Genetics	4
STA 2210	Probability and Statistics	4
BIO 5040	Biometry (OR STA 5030 (3 hrs))	4
BIO 5150	Genomics (OR BIO 5280)	3
MAT 2020	Calculus II	4
MAT 2250	Elementary Linear Algebra	3

2. Course list for Statistics major: Top 3 are part of the major while bottom 4 are specific to the Certificate.

Code	Title	Credits
MAT 2020	Calculus II	4
MAT 2150	Differential Equations and Matrix Algebra	4
STA 2210	Probability and Statistics	4
BIO 2600	Introduction to Cell Biology (OR BIO 2550))	4
BIO 3070	Genetics	4
STA 5030	Statistical Computing and Data Analysis	3
BIO 5150	Genomics (OR BIO 5280)	3