Join us this August for four great courses that will sharpen your quantitative research skills and give you methods and tools to deepen your understanding in biostatistics and bioinformatics. In the past, many participants have enrolled in multiple courses offered by the Summer Institute. This option is once again possible and is highly encouraged.

**Bioinformatics: Big Data in Biomedical Research**  
**August 6-10**  
9 AM – 12 PM  
Introduction of statistical, bioinformatics, and computational methods and tools for analyzing big Omics data in biomedical research.  
Instruction led by Drs. Yu Shyr and Qi Liu.

**Machine Learning in Python and Tensorflow**  
**August 6-10**  
1 PM – 4 PM  
develop proficiency in the following: Data transformation and manipulation; Regularized regression models; Decision trees and random forests; Gaussian processes; Gradient boosted trees; Neural networks  
Instruction led by Dr. Chris Fonnesbeck.

**Data Science in Biomedical Research**  
**August 13-17**  
9 AM – 12 PM  
This course focuses on the use of computational biology tools for advanced, discovery-oriented data science in biomedical research. This CQS Summer Institute will have a biological applications emphasis.  
Instruction led by Drs. Jonathan Irish and Ken Lau.

**Machine Learning & Statistics using R**  
**August 13-17**  
1 PM – 4 PM  
This course provides an introduction and overview of the most powerful and common machine learning methods and statistical inference techniques using R (The R Project for Statistical Computing: https://www.r-project.org).  
Instruction led by Dr. Matt Shotwell.

For more information visit [www.vumc.org/cqs/cqs-summer-institute](http://www.vumc.org/cqs/cqs-summer-institute)