REFRESHER COURSE IN MATHEMATICS, PROBABILITY, AND STATISTICS
12 – 16 September 2016

COURSE OUTLINE

Day 1: Linear Algebra
- Matrices and vectors
- Basic matrix operations
- Transposes, inverses, and determinants of matrices
- Systems of linear equations
- Eigenvalues, eigenvectors, and diagonalisation
- Quadratic forms

Day 2: Calculus
- Differentiation and partial differentiation
- Exponential and logarithmic functions
- Integration

Day 3: Optimization
- First- and second order conditions
- Unconstrained optimization
- Constrained optimization

Day 4: Probability
- Discrete and continuous random variables
- Probability distributions
- Moments of a distribution
- Important distributions: normal, chi-square, student’s t, and F
- Distributions of several random variables
- Distribution of sample statistics
- Large sample approximation to sampling distributions

Day 5: Descriptive and inferential statistics
- Population and sample
- Properties of estimators
- Hypothesis testing
- Confidence intervals
- Comparing means
- Linear Regression Basics
References for the course:


Additional online material and resources:

- *Math Is Fun* by Rod Pierce, URL: <http://www.mathsisfun.com/> [Basic mathematics for grades 1 to 12 (including matrix operations and probability)]
- *Paul's Online Math Notes* by Paul Dawkins, URL: <http://tutorial.math.lamar.edu/> [Linear Algebra and Calculus (basic to advanced)]