

# *MET CS544 - Foundations of Analytics*

## *Instructor*

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## *Course Description*

The goal of this course is to provide students with the mathematical and practical background required in the field of data analytics. Starting with an introduction to probability and statistics, the R tool is introduced for statistical computing and graphics. Different types of data are investigated along with data summarization techniques and plotting. Data populations using discrete, continuous, and multivariate distributions are explored. Errors during measurements and computations are analyzed in the course. Confidence intervals and hypothesis testing topics are also examined. The concepts covered in the course are demonstrated using R. Laboratory Course.

## *Course Prerequisites*

MET CS 546 - Quantitative methods for Information Systems, or equivalent

## *Course Grading Policy*

The course grade will be based on active class participation (10%), in-class quizzes (20%), mid term exam (25%), final project (20%), and a final exam (25%).

## *Course Web Site*

- <https://learn.bu.edu>

## *References*

### Reference Books

- "Using R for Introductory Statistics, 2nd edition", by John Verzani, CRC Press, 2014. ISBN13: 978-1466590731. **(Reference book)**
- "Introduction to Probability and Statistics Using R", by G. Jay Kerns, 2010. ISBN13: 978-0-557-24979-4. **(Reference book)**  
<http://cran.r-project.org/web/packages/IPSUR/vignettes/IPSUR.pdf>

## *Student Conduct Code*

[Please review the academic conduct code](#)

## *Tentative Course Schedule*

- Module 1 -- Introduction
  - Introduction to Statistics and Probability
  - Basic Concepts of R -- Data Types and Structures
  - Big Data Analytics -- Apache Spark
- Module 2 -- Probability
  - Probability
  - Conditional Probability
  - Random Variables
  - Basic Concepts of R -- Programming Constructs
  - Big Data Analytics -- Apache Spark
- Module 3 -- Data Description
  - Univariate Data
  - Bivariate Data
  - Multivariate Data
- **Mid Term Exam**
- Module 4 -- Distributions
  - Discrete Distributions
  - Continuous Distributions
  - Central Limit Theorem
- Module 5 -- Sampling and Errors
  - Sampling Methods
  - Errors, Measurement of Errors
  - Biases, Noise, Data dredging
- Module 6 -- Estimation of Performance
  - Confidence Intervals for Population Mean
  - Hypothesis Tests, Type-I and Type-II errors
  - Resampling Methods
- **Final Project Presentations**
- **Final Exam**