

## **Course 2 - Statistical Analysis and Data Visualization**

### **Course Description**

This course will focus on the aspects of exploratory data analysis, data visualization, and storytelling. You will learn how to present business insights to stakeholders and end users with visualizations using Python and Tableau. You will learn how to build narratives around these visualizations. You will also learn how to perform statistical analyses, build confidence intervals, and hypothesis testing. You will focus on systematic methods for conducting business experiments at the of the course.

**Tools:** Python, Tableau

**Language of Instruction:** English

**Duration:** 9 weeks

**Learner Hours:** 95 hours

## TEACHING MEMBERS



**Kislaya Prasad**  
Research Professor  
University of Maryland

Kislaya Prasad is a Research Professor at the Robert H. Smith School of Business, University of Maryland. He received his PhD in Economics and a master's degree in Computer Science from Syracuse University. He has worked as a Professor of Economics at Florida State University and a Research Officer at the University of Cambridge. His principal research focuses on the computability and complexity of individual decisions and economic equilibrium, innovation and diffusion of technology, and social influences on economic behavior. His research has been published in leading economic journals such as the Journal of Monetary Economics, the Journal of Mathematical Economics, the International Journal of Game Theory, and the Journal of Economic Dynamics and Control. He is currently working on medical treatment variations and diffusion of technologies in medicine, the complexity of choice under uncertainty, and experimental testing of contract theory. His research has been funded by grants from the National Science Foundation and the U.S. Department of Education.



**Lauren Rhue**  
Assistant Professor of Information  
Systems at the Robert H. Smith School  
of Business, University of Maryland

Her research uses econometrics, machine learning, and analytics techniques to explore the ethical, economic, and social implications of technology and electronic markets. Her research has been published in MIS Quarterly and Social Networks as well as American Law Review and Journal of Science and Technology Law. Her work has been presented at numerous conferences, including the International Conference on Information Systems (ICIS), INFORMS, Workshop on Information Systems and Economics (WISE), and Statistical Challenges in E-Commerce Research (SCECR). She received her Ph.D. in Information Systems from the New York University Stern School of Business and graduated from Stanford University with a BS in Management Science and Engineering.



**P. K. Kannan**

Associate Dean of Strategic Initiatives  
at the Robert H. Smith School of  
Business, University of Maryland

P. K. Kannan is the Dean's Chair in Marketing Science at the Robert H. Smith School of Business at the University of Maryland. His research expertise is in marketing modeling: applying statistical, econometric, machine learning, and AI methods to marketing data. His current research stream focuses on digital marketing - mobile marketing, attribution modeling, media mix modeling, new product/service development, and customer relationship management (CRM). His teaching interests include marketing modeling, digital marketing, customer relationship management, and pricing. He has corporate experience with Tata Engineering and Ingersoll-Rand and has consulted for companies such as Frito-Lay, Pepsi Co, Giant Food, Black and Decker, SAIC, Fannie Mae, and IBM.

## **COURSE DETAILS**

**Prerequisite:** Data science toolkit Course

### **Learning Outcomes:**

The following are the learning outcomes expected from this course:

- Understand how to use visualizations to explore and explain data.
- Understand how to generate insights using multiple variables through a variety of charts and how to modify these charts to make them aesthetically polished and professional
- Appreciate the benefits of Tableau, create basic charts with Tableau and integrate charts into cohesive dashboards
- Explore the principles of data storytelling
- Apply the concepts of visualisation in an assignment, reinforcing the learnings
- Understand the basics of probability. Learn discrete and continuous random variables, mean and variance for a random variable, central limit theorem, and sampling methods

- Develop confidence intervals and learn to test the hypotheses. Apply hypothesis testing in Python
- Compare observational studies and experiments. Explore how to choose control and treatment groups for experiments and interpret the results of experiments and detect the differences among the control and treatment groups
- Apply the concepts learned in this course to a rigorous project where you use exploratory data analysis and statistics to derive meaningful insights for the given project

## COURSE CONTENT

### Contents

1. Exploratory Data Analysis I
  - 1.1 Introduction to Data Visualization and EDA
  - 1.2 Univariate Analysis – I
  - 1.3 Univariate Analysis – II
2. Exploratory Data Analysis II
  - 2.1 Multivariate Data Analysis – I
  - 2.2 Multivariate Data Analysis – II
3. Visualization using Tableau
  - 3.1 Visualizing and Analyzing Data With Tableau - I
  - 3.2 Visualizing and Analyzing Data With Tableau - II
4. Data Storytelling
  - 4.1 Data Storytelling - I
  - 4.2 Data Storytelling - II
5. Visualisation and Storytelling Assignment
6. Inferential Statistics

- 6.1 Probability and Random Variables
- 6.2 Discrete Random Variables
- 6.3 Continuous Random Variables
- 6.4 Central Limit Theorem
- 7. Hypothesis Testing
  - 7.1 Confidence Intervals
  - 7.2 Hypothesis Testing
  - 7.3 Dealing with Two or More Populations
- 8. Designing Business Experiments
  - 8.1 Introduction to Business Experiments
  - 8.2 Designing Business Experiments
  - 8.3 Designing Business Experiments - II
  - 8.4 A-B Testing: Detailed Example
- 9. Course Project: Mobile App Efficacy

## STUDY FORMAT

<b>Course Type</b> Online Lecture
<b>Course Evaluation Information</b> <ul style="list-style-type: none"> <li>● Graded Assessments (40%)</li> <li>● Assignment + Project (60%)</li> </ul>
<b>Student Workload</b> <ul style="list-style-type: none"> <li>● Online Lectures + Self Study (70 hours)</li> <li>● Project Deliverables (25 hours)</li> </ul>
<b>Instructional Method</b> <ul style="list-style-type: none"> <li>● Online Lectures</li> <li>● Platform Notes</li> <li>● Project</li> <li>● Live Sessions               <ul style="list-style-type: none"> <li>○ Professor Hours/Coaching/Interaction</li> </ul> </li> </ul>

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