



## Hankuk University of Foreign Studies

### 2024 Summer Session

### STAT 450 Applied Probability

### Course Outline

**Course Code: STAT 450**

**Instructor: Byung-Joo Lee, Visiting Professor of Economics**

**Home Institution: University of Notre Dame, Notre Dame, IN 46556 U.S.A.**

**Contact: [bjleend@gmail.com](mailto:bjleend@gmail.com)**

**Office Hours: TBA**

**Credit:4**

**Class Hours:**

This course will have 52 class hours, including 32 lecture hours, professor 8 office hours, 8-hour TA discussion sessions, 4-hour review sessions.

#### **Course Description:**

This course introduces basic probability and statistical concept applied to data analysis. This course emphasizes the understanding of probability distribution and statistics and how they are used to solve business and engineering applications. Modern applied probability analysis requires rigorous probability and statistical analysis to draw meaningful empirical conclusions.

This course consists of 4 sessions of 120 minutes each per week for 4 weeks.

We will use Microsoft Excel to do various probability and statistical analyses. Microsoft Excel is designed for spreadsheet program, but it also has good probability and statistical data analysis functions. I will teach various Excel functions in class for the statistical analysis.

**Learning Objective:** Students learn the following subjects in this class:

- Data Description: Population and Random Sample
- Definition of random variables
- Axioms of probabilities
- Conditional and Marginal probability distribution and Independence.
- Bayes Theorem
- Probability distributions:



- Discrete Probability: Uniform, Bivariate and Poisson distributions
- Continuous Probability: Uniform, Normal, Exponential distributions
- Moments of various probability distributions: Mean, Variance, and Expectations
- Sampling Distribution and Large Sample Theory
- Simple Hypothesis Testing:  $t$ -distribution,  $F$ - and  $\chi^2$ -distribution
- Analysis of Variance (ANOVA)

**Textbook:**

1. Essentials of Statistics for Business and Economics, 8th ed., Anderson, Sweeney, Williams, Camm and Cochran, CENGAGE Learning, 2018
2. Lecture slides will be provided in the class.

**Prerequisite:**

1. Calculus

**Attendance:**

Students should attend class regularly, arrive on time and not leave early. While you are in class, show the proper respect to your instructor and to your classmates. When you must miss a class, it is your responsibility to get the class material from me or your classmates. Class attendance will be checked. You will earn maximum 15 points for attendance for the final grade. Late arrival and excused absence will cost 0.5 point. Excessive absence may result in the course grade of "F". Grading scale is as following with appropriate curve:

**Grading System (1 ~ 100)**

A+ : 96 - 100	A : 91 - 95
B+ : 86 - 90	B : 81 - 85
C+ : 76 - 80	C : 71 - 75
D+ : 66 - 70	D : 60 - 65
F : 0 - 59	
Pa : Pass	Fa : Fail

**Academic Honor Code:**

The Code of Honor will be strictly applied. Honor Code pledges "I will not participate in or tolerate academic dishonesty." Students will not give or receive aid on exams. This includes, but is not limited to, viewing the exams of others, sharing answers with others, and using books or notes while taking the exam. You can collaborate to study your homework, but you have to submit your own completed homework to receive appropriate credit. Copying solutions from others, whether they are current or past, constitutes plagiarism.



## **Computer Program:**

We will use Microsoft Excel to do various statistical analyses. Microsoft Excel is designed for spreadsheet program, but it also has good statistical data analysis functions. I will teach various Excel functions in class for the statistical analysis. Microsoft Office Excel and Power Points are required for the class.

## **Tentative Course Schedule**

### **Week 1: Descriptive Statistics**

Session 1: Chapter 1: Introduction: Data and Statistics

Session 2: Chapter 2: Descriptive Statistics: Tabular and Graphical Presentations

Session 3: Chapter 3: Descriptive Statistics: Numerical Measures

### **Week 2: Probability Distributions**

Session 4: Chapter 4: Introduction to Probability

Axiom of Probability, Conditional & Marginal Probability distributions, Statistical Independence. Bayes Theorem

Session 5: Chapter 5: Discrete Probability Distribution

Uniform, Bivariate, Poisson distributions

Session 6: Chapter 6: Continuous Probability Distribution

Uniform, Normal, Exponential distributions

Session 7: Midterm Exam: Chapters 1-6

### **Week 3: Sampling Distribution**

Session 8: Chapter 7: Sampling Distribution: *Normal dist., Central Limit Theorem*

Central Limit Theorem

Session 9: Chapter 8: Interval Estimation

Statistical inferences

Session 10: Chapter 9: Hypothesis Testing: *z-test, t-test*

### **Week 4: Statistical Inferences on Population Variances**

Session 11: Chapter 10: Inference About Means and Proportions

Session 12: Chapter 11: Inference About Population Variances:  $\chi^2$  - test



Session 13: Chapter 14: Simple Linear Regression

Session 14: **Final Exam: Chapters 7-11, 14**

