

457.212 Statistics for Civil & Environmental Engineers
Fall 2018

Instructor: Junho Song (junhosong@snu.ac.kr, <http://systemreliability.wordpress.com>, 35-403)

Teaching Assistants: Seungmin Yoo (smyoo94731@snu.ac.kr) & Seonghyun Lim (euler1707@snu.ac.kr) - <https://systemreliability.wordpress.com/people/>

Lectures: 11:00am-12:15 pm, Tuesdays & Thursdays, 35-223 (in English)

Office Hours: Junho Song: Q&A after each class, emails or CampusQ (<https://www.campusq.co>)
Seungmin Yoo & Seonghyun Lim: emails or Campus Q

Important Dates:

Classes begin: September 4

Thanksgiving holiday (September 25) & Hangul Day (October 9): No Class

MIDTERM1, in class, October 18

MIDTERM2, in class, November 20

Last Day of Class: December 13

FINAL: Tuesday, December 18 (3 hrs)

Catalog Description:

Identification and modeling of non-deterministic problems in civil and environmental engineering design and decision making. Development of stochastic concepts and simulation models and their relevance to real design and decision problems in various areas of civil and environmental engineering.

Course Objectives:

The students can describe/use the concepts and methods of probability and statistics that are crucial for solving civil and environmental engineering problems. The students are introduced to a variety of CEE problems through statistical/probabilistic analysis.

Prerequisites: Credits in Calculus I (or an equivalent course) required.

Credit: 3 semester hours

Textbooks:

[Required] Ang, A. H-S., and Wilson, H. Tang, *Probability Concepts in Engineering: Emphasis on Applications to Civil and Environmental Engineering*, 2nd edition, Wiley, New York, 2006.

[Optional] Härdle, W., Okhrin, O., and Okhrin, Y, *Basic Elements of Computational Statistics*, Springer, Switzerland, 2017.

Course Website: eTLCourse website (<http://etl.snu.ac.kr/>)

Homework:

Weekly assignments and solutions will be posted on the course website at least one week prior to the due date. See the course schedule for the due dates. Turn them in BEFORE the class starts. The homework sets submitted after the class are considered "late" (penalty at least 20%).

Grading: Attendance: 5%, Homework: 25%, Midterm I: 15%, Midterm II: 25%,
Final Exam: 30%; Bonus points for students with active attitudes in class.

* Your attendance will be checked by using your designated seat location in the classroom, which will be determined by your location in the first class of the semester

Class Schedule

Class No	Contents
1	Introduction to the Course and “R” Software Environment
2	Graphical Representation of Data
3	Numerical Descriptors of Data
4	Elements of Set Theory – Part I
5	Elements of Set Theory – Part II
6	Elements of Probability Theory – Part I
7	Elements of Probability Theory – Part II
8	Total Probability Theorem & Bayes Rule
9	Random Variable and Probability Distribution Functions
10	Probability Distribution Functions and Partial Descriptors
11	Useful Distribution Models – Part I
12	Useful Distribution Models – Part II
13	Extreme Value Distribution Models
14	Multiple Random Variables – Part I
15	Multiple Random Variables – Part II
16	Function of Random Variables
17	Mathematical Expectations of Linear Functions
18	Mathematical Expectations of Nonlinear Functions
19	Monte Carlo Simulations; Propagation of Uncertainty; and Central Limit Theorem
20	Statistical Inference (1): Point Estimation
21	Statistical Inference (2): Interval Estimation
22	Statistical Inference (3): Hypothesis Testing
23	Testing Validity of Distributions: (1) Probability Papers
24	Testing Validity of Distributions: (2) Goodness-of-Fit Tests
25	Regression Analysis & Correlation Analysis
26	Introduction to Bayesian Approach