

Department of Engineering Sciences
ES 303 Statistical Methods for Engineers

Spring 2020

Section 01 (Aee, Geoe, Pete, Fde, Mine, Mete)

- Instructor** : Assoc. Prof. Dr. Ferhat Akgül
Office: MM 506
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- Course web page** : metuclass.metu.edu.tr
- Weekly Schedule** : Monday 13:40-15:30 GR302
Wednesday 13:40-14:30 GR302
- Exams and Grading** : Midterm 1 Mar. 10, 2020 30 %
Midterm 2 Apr. 14, 2020 30 %
Attendance 5 %
Final Exam 35 %
First Day of Classes: Feb. 3, 2020, Mon.
Last Day of Classes: May 8, 2020, Fri.
Final Exams; May. 9-22, 2020 (Final exam dates will be announced by the Student Affairs Department)
- Mak-eup Exam** : There will be only one make-up exam after the final exam. Students will only be allowed to make-up exam if an official medical report is submitted to course instructor before the exam date.
- Course Assistant** : Engin Pazarçeviren
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- Objectives** : The course is designed to give undergraduates the engineering relevance and practical significance of probability concepts in their fields through essential mathematical principles and applications.
- Catalog Description** : ES 303 Statistical Methods for Engineers. (3-0) 3.
Descriptive Statistics, Histograms, Central Tendency, Dispersion and Correlation Measures. Basic Probability Concepts, Random Variables, Probability Density and Mass Functions. Confidence Intervals, Hypothesis testing, Law of large numbers and Central Limit Theorem, Regression analysis. Applications in Engineering.
- Textbooks** : 1. Ang, A.H.S. and Tang, W.H., Probability Concepts in Engineering Planning and Design, Vol. 1- Basic Principles, John Wiley & Sons.
The latest Edition is 2007. 1975 version, is still a classical well-known reference. (Both editions are available in the Library's Reserve Section).
2. Montgomery D.C. and G.C. Runger, Applied Statistics and Probability for Engineers, John Wiley & Sons, 1999.
- Reference Books:**
1. Walpole, R.E., Essentials of probability and statistics for engineers and scientists, Pearson Education Ltd, 2014.
 2. Benjamin, J.R. and Cornell, A. Probability, statistics, and decision for civil engineers, Mineola, New York, Dover Publications, 2014.
 3. Neter, John., William Wasserman, G.A..Applied statistics and the Sciences, Boston : Allyn and Bacon, 1992.

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Course Outline:

1. Introduction to Probability and Statistical Concepts: Uncertainties and Randomness in Engineering. Histograms, Frequency Diagrams. (Weeks: 1).
2. Basic Probability Concepts: Events, Sets, and Probability, Axioms of Probability, Conditional Probability, Statistical Independence, Theorem of Total Probability, Bayes Theorem. (Weeks: 2-3).
3. Random Variables and Probability Distributions: Probability Mass, Density and Cumulative Distribution Functions; Descriptors of a Random Variable, Common Probability Distributions: Normal, Lognormal, Poisson, Binomial, Negative Binomial, Geometric, Hypergeometric, Exponential. (Weeks: 3-5).
4. Multivariate Distributions: Joint Mass, Density and Cumulative Distributions, Marginal Distributions. Independence, Covariance, Correlation, Conditional Mean and Variance, Curve of Regression. (Weeks: 6-7).
5. Statistical Inference: Estimation of Parameters, Properties of Estimators, Central Limit Theorem, Interval Estimation for the Mean and Variance. (Weeks: 8).
6. Hypothesis testing for the mean and variance; testing validity of assumed distribution: goodness of fit. (Weeks: 9-10).
7. Introduction to regression and correlation analyses (least square estimation, lack of fit, residual analysis, residual plots). (Weeks: 11-12).
8. One way Analysis of Variance (ANOVA). (Weeks: 13-14).