IE 227 INTRODUCTION TO PROBABILITY (3 2 4) (ECTS: 6)

Fall 2021 - Tentative Syllabus

This is an introductory course and forms the basis for several other industrial engineering courses in both the undergraduate and the graduate curriculums of the department.

Catalog Description. Basic probability concepts, counting techniques, conditional probability and independence, random variable concept, types and probability distributions of random variables, special probability distributions (discrete and continuous), jointly distributed random variables, expectation, variance, conditional expectation and variance, functions of random variables and their distributions, sampling distributions of means and sums.

Prerequisite. MATH 158 Calculus for Engineering II (former code MATH 156).

Course Objectives. This course aims to:

- introduce the concepts of probability, randomness, random variable, and probability distributions,
- develop an understanding of probabilistic thinking,
- introduce examples of randomness in real-life applications,
- show how to use probability to model real-life problems.

Learning Outcomes. On successful completion of the course, all students will have developed:

1. an understanding of basic probability- and random variable-related concepts,
2. awareness of uncertainties in real-life problems and the use of random variables in modeling them.

On successful completion of the course, all students will be:

3. involved in teamwork,
4. aware of ethical issues.

Instructor. Gonca Yıldırım, Office: L-320, Email: goncayildirim@cankaya.edu.tr
Office Hour: Monday (16:20-17:10), online
Send me an email beforehand if you would like to attend my office hour.

Teaching Assistant. Hasan Kavlak, Office: L-309, Email: hkavlak@cankaya.edu.tr
Office Hour: Thursday (11:20-12:10), online
Send TA an email beforehand if you would like to attend his office hour.

Class Meeting Times and Locations.

Section 1: Monday (13:20–16:10), in B-11 Hukuk-Mimarlık Amfi
Section 2: Tuesday (13:20–16:10), in B-11 Hukuk-Mimarlık Amfi

Recitation Sessions and Locations.

Section 1: Thursday (09:20–11:10), in N-A01
Section 2: Thursday (13:20–15:10), in B-11 Hukuk-Mimarlık Amfi

Textbook. Navidi, W. (2019). *Statistics for Engineers and Scientists with Connect Code*. 5th Ed. McGraw-Hill.

Supplementary Texts.

1. Walpole, R. E., Myers, R. H., Myers, S. L., and Ye, K. (2017). *Probability and Statistics for Engineers and Scientists*. 9th edition. Pearson.
2. Montgomery, D. C., and Runger, G. C. (2020). *Applied Statistics and Probability for Engineers*. 7th edition. Wiley.

Class Website. Moodle on `http://webonline.cankaya.edu.tr/`

Honesty Policy. Academic integrity is expected of all students of Çankaya University at all times, whether in the presence or absence of members of the faculty. All students should declare their understanding and belief in the Honor Code for the examinations and assignments. This statement is a reminder to uphold your obligation as a student and to be honest in all work submitted and exams taken in this course and all others.

If you conduct any dishonest act during an examination or for the completion of an assignment (i.e., cheating on an exam, using any extra material that you are not allowed to use during an exam, copying material off of someone else's homework or assignment, using solution keys from previous years, copying material from published and electronic sources without paraphrasing and/or citing appropriately), you will get a credit of zero on that particular exam or assignment. Necessary disciplinary action, as dictated by the rules of the University, will also be taken.

Class Policies.

- **Please come to class on time.** Remember to turn off cellular telephones, tablets or any device that beeps or disturbs the class before you come to class.
- You are responsible for all announcements made in class and on class web page, as well as for printing the lecture notes and other materials from the class web page.

Attendance requirements. Attendance will be taken during class and recitation sessions. It is best if you fully attend every hour. If you miss even a single hour, you may find it hard to understand the course material since the topics are interrelated. It is your responsibility to follow attendance and make sure you are marked correctly by the instructor or the TA.

Course Requirements and Grading. All exams will be closed book and closed notes. Formula sheet(s) and/or statistical table(s) will be provided as seen appropriate by the instructor. Midterm and final exams will be held according to the university policies. Please follow university web page for any update/change on how exams will be held.

- **30% Homework.*** There will be three homework assignments (group work), each is 10%.
- **30% Midterm Exam.** There will be one midterm exam (individual).
- **40% Final Exam.** There will be a *comprehensive* final exam (individual).

* **Each student in homework groups needs to fill in a professionalism evaluation form before the due date and time of each assignment to evaluate every student in the team. Those who fail to submit the form in any assignment will receive zero from that particular assignment.**

Grading Policy. Letter grades will be *mainly* based on the standard scale (i.e., catalog grading system) described in Çankaya University regulations. However, if your collected total weighted average is close to the higher cut-off point and depending on the gaps between the totals collected, a higher letter grade *may* be considered.

Conditions leading to the letter grade NA. *Any* of the following will lead to letter grade NA.

- If you fail to take the midterm exam (or its makeup), you will NOT be able to take the final exam and you will receive the letter grade NA.
- If you are eligible to take the final exam but fail to take it (or its makeup), you will receive the letter grade NA.

Make-up Policy. Makeup *may* only be considered for Midterm Exam and the Final Exam, with valid, verifiable, documented excuses ONLY.

Course Topics. A tentative outline and tentative assignment/exam schedule are given below and the instructor reserves the right to make changes as she sees necessary. Please read the lecture notes prior to class and textbook after the class.

Week	**Topics**	**Textbook**	**Assignment** (Tentative)
1	1. Introduction to Probability: *Random Experiments, Sample Space, Events*	2.1	
2	1. Introduction to Probability: *Set Theory, Probability & Its Properties* 2. Combinatorial Probability: *Addition and Multiplication Rules*	2.1 2.2	
3	2. Combinatorial Probability: *Permutation, Combination, Applications*	2.2	
4	3. Conditional Probability & Independence: *Law of Total Probability, Conditional Probability, Independence, Bayes' Theorem* 4. Random Variables, Their Distributions and Characteristics	2.3 2.4	HW1 assigned
5	4. Random Variables, Distributions and Characteristics: *Discrete & Continuous Random Variables*	2.4	HW1 due
6	4. Random Variables, Distributions and Characteristics: *Expectation, Variance*	2.4	
7	5. Some Important Discrete Random Variables: *Bernoulli, Binomial, Hypergeometric, Negative Binomial, Geometric*	4.1–4.4	Midterm Exam
8	5. Some Important Discrete Random Variables: *Poisson, Uniform* 6. Some Important Continuous RVs: *Uniform, Exponential*	4.1–4.4 4.8, 4.7	
9	6. Some Important Continuous RVs: *Exponential, Gamma, Weibull*	4.7, 4.8	HW2 assigned
10	6. Some Important Continuous RVs: *Normal, Normal Approximation to Binomial*	4.5	
11	6. Some Important Continuous RVs: *Beta, Triangular* 7. Jointly Distributed Random Variables: *Joint Distributions*	 2.6	HW2 due
12	7. Jointly Distributed Random Variables: *Joint Distributions, Marginal Distributions, Expectation, Conditional Probability*	2.6	HW3 assigned
13	7. Jointly Distributed Random Variables: *Conditional Expectation, Conditional Variance, Independence*	2.6	
14	8. Functions of Random Variables 9. Sampling Distribution of Means and Sums	2.6 1.1, 2.5 2.6, 4.11	HW3 due

NOTE THAT EVERYTHING ON THIS SYLLABUS IS SUBJECT TO CHANGE. STUDENTS WILL BE NOTED ABOUT SIGNIFICANT CHANGES.