

COURSE TITLE: Introduction to Probability and Statistics. **Prerequisite:** MATH 201.

INSTRUCTORS:

OFFICE HOURS:

TEXTBOOK: *Probability and Statistics for Engineering and the Sciences*, by Jay Devore, 8th Edition, ISBN 0-8400-6827-1

COURSE SUMMARY: This is a first course in Probability and Statistics. We will begin by considering some graphical displays to summarize data. We will then introduce some fundamental concepts necessary for the study of probability, such as the sample space, random variables and expectations. We will introduce counting techniques for simple sample spaces and discuss conditional probability and the Bayes' Theorem. We will study probability distributions of both discrete and continuous random variables; the concepts of sampling distributions and asymptotic limiting distribution (the central limit theorem); statistical (point) estimations, confidence intervals, hypothesis testing for one and two samples. Detailed syllabus and suggested problems are given in the table below.

COURSE CONTENT: (Problems marked with an asterisk will be discussed in class)

Weeks	Section	Topics	(Recommended Problems)
1	1.1	Populations, Samples, and Procedures	
	1.2	Pictorial and Tabular Methods	(11*, 22*)
	1.3	Measures of location/central tendency	(33*, 41,42,43*)
	1.4	Measures of variability	(45,46, 49, 51*,52, 55*,58*, 61)
	2.1	Sample spaces and events	(1, 2*, 4, 5, 6, 7, 9*)
	2.2	Axioms and properties of probability	(11, 12, 13, 15*, 16, 17, 18*, 19,20, 21, 22, 24*, 26, 27, 28)
	2.3	Counting techniques	(29*, 30, 31, 32, 33, 34*,35, 36,38,39,42,43,44)
	2.4	Conditional probability	(45, 46, 48, 49,50, 51*,52, 53,56, 57,58,59*, 60, 61, 62, 63*, 67*,69)
2	2.5	Independence of events	(71, 73*, 74, 77, 78, 80*,82,84,89*) Supplementary problems (90, 92, 98, 112, 113)
	3.1	Random variables	(1, 2, 4, 6*, 7, 8*, 9, 10)
	3.2	Discrete probability distributions	(11, 12*, 13,14,15,17*,18, 21, 27, 28*)
	3.3	Expected values	(29, 30, 31*, 32, 33, 34, 35*, 36, 42*, 44(a,b), 45)
	3.4	Binomial probability distribution	(47, 48, 50, 51, 55, 57*, 61*, 62, 65, 66, 67)
	3.5	Hypergeometric and negative binomial distributions	(68, 70, 72, 73*, 75*, 76,77)
3	3.6	The Poisson distribution and the Poisson process	(80*, 81, 82, 83, 84, 86, 87*, 88, 89*, 90, 92) Supplementary problems (93, 94, 96, 99, 101, 104, 105, 119)
	4.1	Probability density functions	(2,3,4*,5,6,7,8,9,10)
	4.2	Cumulative dist. functions and expected values	(11,12*, 13, 15*(except (d)), 18*, 19,21, 22, 24, 26)

	4.3	The normal distribution	(28--31, 33, 35, 36, 37,38, 39*, 40,41, 43*, 44, 47*, 51*(Chebyshev), 53, 54)
	4.4	Exponential, chi-squared and gamma distributions	(59, 60*, 61, 63*, 64, 66*, 67, 69, 70,71*) Supplementary problems (106, 117, 118, 126)
4	5.1	Jointly distributed random variables	(3,4, 6,7, 8,10*,14,15*,17, 21*)
	5.2	Expected values, covariance, correlation	(22,24,25, 26, 27, 28,30,31*,33,35*,36)
	5.3	Statistics and their distributions	(37*, 38, 41)
	5.4	The distribution of the sample mean	(46 , 47, 49, 51*, 52, 53,54, 56*, 57)
	5.5	Linear combinations of independent normal random variables	(58, 59*, 62, 61,64,65*, 67, 68*, 73) Supplementary problems (77, 81,84,96*)

EXAM

5	6.1	Point estimation	(1*,2,3,8,9,10,12*,13*,15,17)
	6.2	Method of Moments	(21*, 22*)
	7.1	Confidence intervals (C.I.)	(1,2,3,4*,5,6,7*,11)
	7.2	Large sample C.I. for a population mean and proportion	(12, 13*, 14, 21,22,23*)
6	7.3	C.I. based on normal population distribution	(28, 29, 30*,31, 33*,34*)
	7.4	C.I. for the variance and standard deviation of a normal population	(42, 43*, 44, 45* 55)
	8.1	Hypothesis testing procedures	(1,2,6,7*,9*,11*,12,14)
7	8.2	Tests about a population mean	(15,16,18*,19,20,21,29,30,31)
	8.3	Tests concerning a population proportion	(37,38*,40,41,43,44*)
	8.4	P-values	(48, 49,50, 51*, 53,55,60*) Supplementary problems (81, 83)
	9.1	Z-tests and C.I. for a difference between two population means	(1, 2,3*,5, 6,12, 16*)
	9.2	The two-sample t-tests and CI	(17, 18, 19*, 24)

GRADING POLICY: There will be two closed-book exams. If a student is absent for an exam, he or she must submit a valid reason (such as a medical report from the AUBMC) to avoid a zero on that exam. The course score will be determined based on the following weights:

Attendance	5%
Mid-Term Exam	45%
Final Exam	50%