SYLLABUS – MATH 334 and STAT 434
Professor Wei-Min Huang
Fall 2001 Lehigh University

Text: Statistics (Theory and Methods) by D.A. Berry and B.W. Lindgren

August version - There might be small changes and additional problems during the semester. Other topics may be added during the semester. You are encouraged to read the topics listed under "reading assignment". These topics will not be tested. Study Guide is available at the university bookstore. It consists of two parts: additional problems with solutions and solutions to the "Review Problems" that appear at the end of each chapter of the text.

Part I. Review Chapters (Most of the topics in these chapters will be briefly reviewed. There are some relatively advanced topics (e.g., moment generating function, Section 5.12) will be studied carefully since there are important applications in Part II.)

Section	Topic	Homework Problems
Chapter 1	Probability	
1.1-2	Sample spaces and events	4,6(d,e,h) (p.13)
1.3	Probability for experiments and symmetries	11,12,13 (p.17)
1.4	Composition of Experiments	17,19,23,24,28,32 (p.25)
1.5	Sampling at random	36,37,43,45,46 (p. 29)
1.6	Binomial and multinomial coefficients	
1.7	Discrete probability distributions	51,52,55,56 (p.38)
1.8	Reading assignment	
Chapter 2	Discrete Random Variables	
2.1	Probability functions	
2.2	Joint distributions	3,6,10 (p.50)
2.3	Conditional probability	13,16,19,20,24 (p.57)
2.4	Bayes' Theorem	25,26,27 (p.65)
2.5	Independent and Exchangeable variables	34,35,39,43,51 (p.73)
Chapter 3	Averages	
3.1	The mean and expected value	
3.2	Expected value of a function of random variables	6,7 (p.90)
3.3	Variability	18,21 (p.96)
3.4	Covariance and Correlation Coefficient	
3.5	Sum of random variables	23,25,26 (p.106)
3.6	Reading assignment	

Section	Topic	Homework Problems
Chapter 4	Some Useful Discrete Random Variables	
4.1-2	Bernoulli and binomial distributions	2,7,8 (p.124)
4.3	Hypergeometric distribution	11,13,18,20 (p.134)
4.4	Inverse sampling	21 (p.135)
4.5	Approximating binomial probabilities	23,26,28,29 (p.140)
4.6	Poisson distribution	36,37 (p.146)
4.7	Sample proportions and the law of averages	
4.8	Multinomial distributions	40,41 (p.151)
4.9	Reading assignment	
Chapter 5	Continuous Random Variables	
5.1	Cumulative distribution function	7,10 (p.168)
5.2	Density and the probability element	14,16,21 (p.178)
5.3	Median and percentiles	26,28 (p.188)
5.4	Expected value	31,32 (p.189)
5.6	Average deviations	36,41 (p.193)
5.7-8	Multivariate distribution	43,45,49 (p.205)
5.9	Covariance and Correlation	52,55 (p.213)
5.10	Independence	58,61 (p.213)
5.11	Conditional distribution	63,68 (p.218)
5.12	Moment generating function	69,72,75,76 (p.225)
Chapter 6	Some Useful Continuous Distributions	
6.1	Normal distributions	3,5,7,9,13 (p.235)
6.2-3	Exponential and gamma distributions	15,21,22 (p.245)
6.4	Chi-Square distributions	24,26,27 (p.252)
6.5	Reading assignment	
Chapter 7	Organizing and Describing Data	Problems are easy.
7.1	Frequency distributions	
7.2	Dada on continuous variables	
7.3	Order statistics	
7.4	Data analysis	
7.5	Sample mean	
7.6	Measures of dispersion	
7.7	Sample correlation coefficient	

Section	Topic	Homework Problems
Part II Major Chapters		
Chapter 8	Statistics and Sampling Distributions	
8.1-2	Random sample and likelihood	2,3,4,6 (p.317)
8.3	Sufficient statistics	9,10,12,13,14,15,16 (p.323)
8.4-5	Sampling distributions and simulation	18,19,20,22,23,24,25 (p.329)
8.6	Order statistics	27,28,29,31 (p.335)
8.7-10	Moments of statistics, C.L. Theorem Sampling dists derived from normal	35,37,39,40,42,45,46 (p.351)
8.11-13	Reading assignment	
Chapter 9	Estimation	
9.1-2	Error in estimation and sample size	2,4,5,7,8,10,11 (p.377)
9.3-4	Consistency and Large-sample C.I.	12,13,14,15,16,17,19,21 (p.384)
9.5-7	Small-sample C.I. and t Distribution	24,25,26,28 (p.390)
9.8	Reading assignment	
9.9	Estimating variability	36,37,38,39 (p.396)
9.10	Deriving estimators	40,41,42,44,46,47,48 (p.405)
9.11	Reading assignment	
9.12	Efficiency	57,58,59,60 (p.415)
Review	Solutions in Study Guide	9R4-10
Chapter 10	Significance Testing	
10.1-2	Hypotheses	1,3,4,5,6,7 (p.428)
10.3	One-sample Z tests	8,9,14,15 (p.433)
10.4	One-sample t tests	17,18 (p.437)
10.5	Some nonparametric tests	23,24,27 (p.444)
10.6	Reading assignment	
Chapter 11	Tests as Decision Rules	
11.1	Rejection regions and errors	2,3,4,6,7 (p.456)
11.2-3	Power function and sample size	9,10,11,12 (p.462)
11.4	Omit	
11.5-7	Most powerful tests	18,19,20,22 (p.475)
11.8	Likelihood ratio tests	23-30 (all 8 problems)(p.479)
11.9	Reading assignment	
Chapter 12	Omit	
Chapter 13	Goodness of Fit	
13.1-2	Fitting categories and chi-square test	1,2,5,6 (p.527)
13.3-4	Tests based on sample distribution	9,10,11,12 (p.541)
11.5	Test of independence	17,19,24 (p.547)
11.6	A likelihood ratio test for goodness of fit	26,29,30 (p.557)
Chapters 14 and 15	Omit most of them Selected topics may be studied.	