

DEPARTMENT OF MATHEMATICS, NORTHEASTERN UNIVERSITY

MTH U481: Probability and Statistics.

Summer1 2005

Class: M,Tu,W,Th 9:50 - 11:30 am in 425 SH

Instructor: Prof. Mike Malioutov

Office: 545 Lake; phone: 373-5650; email: m.malioutov@neu.edu

Office hours: M,W 12:30 pm – 1:30 pm

Text: “Introduction to Probability and Statistics for Engineers and Scientists”, S. Ross, third edition. (published by Elsevier).

Grading:

There will be regular (almost daily) short in-class quizzes, one in-class midterm test, and the two-hour departmental final.

Homework problems will be assigned and graded each week.

In addition there will be two computer labs. You are encouraged to work together in small groups (no more than three) on these labs.

Your grade will consist of:

Final: 40% MidTerm: 20% Homework: 20%, quizzes: 10 %, Computer labs 10 %

Grades: A: 85% – 100% B: 70% – 85% C: 55% – 70%

Preliminary Syllabus (subject to corrections):

week 1. descriptive statistics: Ch. 2

sample space, events, probability assignments and axioms: 3.1 – 3.5

week 2. conditional probability and independence: 3.6 – 3.8

random variables, distributions: 4.1 – 4.3

week 3. expected value and variance: 4.4 – 4.7

special random variables: Ch. 5

weeks 4. distribution of sampling statistics: Ch. 6

weeks 5. estimation, maximum likelihood, interval estimates: Ch. 7

week 6. hypothesis testing: Ch. 8

week 7. regression: Ch. 9

IMPORTANT:

1. The best way to learn this material is to do the homework problems every week. Please ask me questions about things you don't understand, either in class or at my office.

DON'T wait until you feel completely lost!

2. It is your responsibility to be aware of any changes the instructor may make to the syllabus as they are announced in class. Students are responsible for all information given when they are absent.

3. The grade I (Incomplete) will be given only if you have a good attendance record, have missed the Final for a good reason, and otherwise you are doing passing work. Makeup exams are not given unless you have missed the exam for a valid reason and can prove it. Both makeups and incomplete are given at discretion of instructor.

4. If you have a concern about the course or the instructor that is not or cannot be resolved by speaking with the instructor, please contact Professor D. King (the vice chair), 447 LA, x5679, donking@neu.edu.
5. It is University policy that no grade, including an incomplete, can be changed after one year. Exceptions must be authorized by the Academic Standing Committee.
6. **All students without legitimate conflicts (approved by the instructor) will take the final exam at the scheduled time. Do not make travel plans that conflict with the final exam.**

Assignment 1

Due date: Monday, May 9.

Reading: Ch. 2, 3.1-3.5.

Problems:

1. p. 41: #6, #16.
2. p. 80: #2, #3, #5, #6, #12, #13, #18, #19.
3. You construct a random number generator by putting four cards numbered $\{1, 2, 3, 4\}$ in a box, and drawing out cards at random. This will produce the four outcomes $\{1, 2, 3, 4\}$ with equal probabilities. By adding more cards to the box, construct a random number generator which produces the outcomes $\{1, 2, 3, 4\}$ with the following probabilities:

$$P(1) = P(2) = \frac{1}{3}; \quad P(3) = \frac{2}{9}; \quad P(4) = \frac{1}{9}$$

4. Using the same method of cards in a box, can you construct a random number generator which produces the numbers $\{1, 2, 3, 4\}$ so that the probability of getting card #1 is $\frac{1}{\sqrt{2}}$? Explain your answer.
5. Work out the formula for $P(A \cup B \cup C)$ in terms of the probabilities of A, B, C and their intersections.
[Hint: write it $P((A \cup B) \cup C)$ and apply the two-set formula twice].
6. A gambler places two bets. She knows her chances of success are 70% for the first, and 40% for the second. She estimates a 75% probability that at least one of her bets will fail. What is the probability that at least one of her bets is successful?
[Hint: let A be the event that the first bet succeeds, and B the event that the second bet succeeds. Figure out what you are told in terms of these events, and what you are asked to find.]
7. Three fair dice are rolled. Let A_i be the event that a 6 shows on the i^{th} die. Describe in words the event $A_1 \cup A_2 \cup A_3$, and calculate its probability.
8. Three fair dice are rolled, one red, one blue and one green. Find the probability that all faces are different, and that the blue die equals the sum of the red and the green.