

## DEPARTMENT OF MATHEMATICS, NORTHEASTERN UNIVERSITY

### MTH U481: Probability and Statistics.

Fall 2005

**Class:** M,W, 2:50 - 4:30 pm in 124 Ryder Hall

**Instructor:** Prof. Mike Malioutov

**Office:** 545 Lake; phone 617-373-5650; email m.malioutov@neu.edu

**Office hours:** M,W 11:45 am – 1:15 pm excluding rare Dept. or College Council meetings

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

### Grading:

There will be daily 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 and on voluntary projects worth additional 10% of grade.

Your grade will be:

**Midterm:** 20%    **Final:** 40%    **Homework and Computer labs:** 15% each, **quizzes:** 10%

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

### Syllabus:

week 1. descriptive statistics: Ch. 2

week 2. sample space, events, probability assignments and axioms: 3.1 – 3.5

week 3. conditional probability and independence: 3.6 – 3.8

weeks 4/5. random variables, distributions: 4.1 – 4.3

week 6. expected value and variance: 4.4 – 4.7

week 7. special random variables: Ch. 5

weeks 8/9. distribution of sampling statistics: Ch. 6

weeks 10/11. estimation, maximum likelihood, interval estimates: Ch. 7

week 12/13. hypothesis testing: Ch. 8

week 14. regression: Ch. 9 unless unforeseen delays prevent this study.

### 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. **DONT** 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, the next step is to speak with the course coordinator. If the course coordinator does not settle the matter, please contact Professor S. Eigen (the vice chair), 527 LA, x5647, eigen@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:** Wednesday, September 14.

**Reading:** Ch. 2.

#### **Problems:**

1. p. 41: #6, #16.

2. p. 80: #2, #3, #5, #6, #12, #13, #18.

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].