CONCORDIA UNIVERSITY
Department of Computer Science and Software Engineering
COMP 233 - Probability and Statistics for Computer Science
Winter 2016

Course Outline

Objective: This course introduces probability and statistics for computer science students, including combinatorics, axioms of probability, conditional probability, discrete and continuous probability distributions, expectation, the method of moments, hypothesis testing, parameter estimation, least squares approximation, random number generation, and applications.

Instructors:

Section N	Dr. Eusebius Doedel		
Lecture	Monday-Wednesday	13:15 – 14:30	H535
Office Hour	Monday	15:00 – 16:00	EV3.285
Tutorial NA	Wednesday	14:45 – 16:35	MB2.445
Tutorial NB	Wednesday	14:45 – 16:35	H540
Section DD	Dr. Adam Krzyżak		
Lecture	Tuesday	17:45 – 20:15	H820
Office Hour	Tuesday	20:30 – 21:30	EV3.279
Tutorial DA	Thursday	11:45 – 13:35	H540
Tutorial DB	Tuesday	11:45 – 13:35	H537

Course Material: Students are responsible for all material covered in class and in the Lecture Notes, which are available on the web page of the individual sections DD and N. The Lecture Notes contain in a concise form the basic material covered in the course. Students are expected to thoroughly understand the Lecture Notes, and to be able to apply the material to basic problems.

Textbook: Introduction to Probability and Statistics for Engineers and Scientists, by S.M. Ross, Academic Press; 5th edition, 2014.

Tentative Schedule (with reference to corresponding sections in Ross):

Week 01: Introduction to statistics, probability axioms, sample spaces, events.	Ch 1, 3.1-3.5
Week 02: Conditional probability, Bayes' formula, independent events.	3.6-3.8
Week 03: Random variables, jointly distributed random variables.	4.1-4.3
Week 04: Expectation, variance, covariance, moments, Chebyshev inequality.	4.4-4.9
Week 05: The Bernoulli, binomial, and Poisson random variables.	5.1-5.2
Week 06: The uniform, and exponential distributions.	5.4, 5.6
Week 07: The normal, Chi-square, and t-distributions.	5.5, 5.8
Week 08: Distribution of sampling statistics.	2.3.1, 2.3.3
Week 09: Sample mean, -variance, and -distribution; central limit theorem.	2.3.1-2.3.2, 2.4-2.6, 6.1-6.5
Week 10: Parameter and interval estimation, maximum likelihood estimators.	7.1-7.3
Week 11: Hypothesis testing.	8.1-8.3, 8.5
Week 12: Least squares approximation.	9.1-9.7, 9.9
Week 13: Random number generation.	15.2, 15.5-15.6

Course Web Pages: The common course web page `http://users.encs.concordia.ca/~c233_4/` is for announcements, assignments, etc., for both sections. The web pages for the individual sections are

Section N: `http://users.encs.concordia.ca/~doedel/courses/comp-233/`

Section DD: `http://users.encs.concordia.ca/~c233_4d/`

Tutorials: Tutorials are used to discuss problems related to the lectures and assignments.

Clickers: This is a response system available from the Concordia Bookstore for in-class participation, that allows students to respond to questions that the instructor poses during class.

Assessment: There will be four assignments, a term test, and a final exam. The course letter grade is determined using the following weighting scheme: Term Test 30%, Assignments 10%, Clicker Participation 10%, Final Examination 50%. If the mark for the final exam (as a percentage out of 100) is higher than the term test mark (as a percentage out of 100) then the weight of the term test will be shifted to the final exam. Thus students will benefit from better performance on the final exam.

There is no standard relationship between numerical percentages and letter grades.

Assignments: For Section N the assignments must be placed by the announced due date in the instructor's assignment box, which can be found near (but not inside) the Computer Science reception area. In Section DD the assignments must be submitted electronically.

Discussing the assignments with other students is encouraged, but it is important that students do the actual work themselves, as it constitutes an essential learning experience without which it will be difficult to pass the examinations.

Students should be aware of the University's Code of Conduct (Section 17.10.3 of the Undergraduate Calendar) concerning cheating and plagiarism, and the possible consequences of violating this code. A signed *Expectations of Originality* form, available from the common course website, must be completed, signed, and submitted to the instructor no later than the second week of classes. This form must be submitted only once, and it should not be attached to an assignment. Note that using another student's clicker during class is also considered to be a violation of the Code of Conduct.

Solutions to assignments must start with the student's name and Concordia ID number, the course number and the section number, the instructor's name, the assignment number, and the date of submission. Furthermore, on each submitted assignment you must write the following statement:

"*I certify that this submission is my original work and meets the Faculty's Expectations of Originality*",

together with your signature.

Assignment problems will be graded on the following basis: a correct answer gets 100%, a reasonable attempt gets 50%, and no attempt or a very poor attempt gets 0%.

Graduate attributes: As part of either the Computer Science or Software Engineering program curriculum, the content of this course includes material and exercises related to the teaching and evaluation of graduate attributes. Graduate attributes are skills that have been identified by the Canadian Engineering Accreditation Board (CEAB) and the Canadian Information Processing Society (CIPS) as being central to the formation of Engineers, computer scientists and information technology professionals. As such, the accreditation criteria for the Software Engineering and Computer Science programs dictate that graduate attributes are taught and evaluated as part of the courses. The following is the list of graduate attributes covered in this course, along with a description of how these attributes are incorporated in the course.

Graduate attributes for COMP233 are:

Attribute 1: Knowledge-base: Knowledge of combinatorics, axioms of probability, conditional probability, discrete and continuous probability distributions, expectation and moments, hypothesis testing, parameter estimation, correlation and linear regression, with applications to computer science.

Indicator 1.1: Knowledge base of mathematics.

Attribute 2: Problem analysis: The assignments and examinations in this course require the students to analyze the problem at hand before and determine for themselves exactly what needs to be done, and then determine how and with the help of what mathematical formulae and statistics tables a solution can be defined. The course covers probabilistic and statistical analysis including hypothesis testing.

Indicator 2.1: Problem identification and formulation.

Indicator 2.2: Modeling.