

# MET CS546 C1: QUANTITATIVE METHODS FOR INFORMATION SYSTEMS

## Spring 2009

Instructor:	Nathan Kohn, MA		
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Office:	CELOP 890 Commonwealth Ave, Rm 245		
Office Hours:	By appointment		
Class Time:	Wednesdays, 6:00 PM - 9:00 PM		
Location:	PSY (64-86 Cummington St, Rm B55)		
Prerequisites:	High School Algebra		
Grading:	Bi-weekly Homework Assignments:	35%	
	Midterm Exam:	30%	
	Final Exam:	30%	
	Participation:	5%	
Text Books (optional):	<i>Forgotten Calculus</i> by Barbara Bleau Publisher: Barron's Educational Series Edition: 3rd (December 8, 2001) ISBN-10: 0764119982 ISBN-13: 978-0764119989		
	<i>Probability and Statistics</i> by Ronald Rothenberg Publisher: Harcourt Edition: October 1991 ISBN-10: 0156016761 ISBN-13: 978-0156016766		

### Course Description

The first part of this course lays down the mathematical foundation for the study of Probability Theory and Statistics; it will cover Functions, Combinatorial Mathematics, Differentiation and Integration fundamentals. The second part of the course concentrates on the study of Discrete and Continuous Distributions. The following are some of the topics covered in this course:

- Elements of Discrete Mathematics (sets, one-to-one and onto functions, graphs of functions)
- Elements of Calculus (limit of sequences, continuous functions, derivative of functions, anti-derivatives, and definite integrals)
- Elements of Combinatorics (permutations and combinations)
- Elements of the Probability Theory and Statistics (discrete and continuous distributions, Binomial, Poisson, Geometric, Normal distributions, expectations and variances, Strong Law of Large Numbers, The Central Limit Theorem)

### Course Learning Objectives

Upon successful completion of this course, you will be able to:

- Differentiate functions, take anti-derivatives, and find areas under curves.
- Apply combinatorial methods to analyzing problems.
- Apply methods from the Probability Theory and Statistics to analyzing events of random nature.

## Schedule (Tentative):

January	19	Unit 1: Functions, images and pre-images, one-to-one functions, limit of a function, continuous functions, derivatives of functions, rules of differentiation, points of local maximum and minimum, and graphs of functions
	26	
February	2	Unit 2: Horizontal and vertical asymptotes, Inflection points, the anti-derivative of a function, the definite integral of a function, and the fundamental theorem of calculus.
	9	
	16	Unit 3: K-samples, permutations, combinations, sample space, events, and the classical and statistical definitions of probability.
	19	
	23	Unit 4: Independent events, discrete random variables, binomial distribution, and the approximation of the binomial distribution.
March	9	Midterm Exam (Units 1 -3)
	16	No class, Spring Break
	19	Unit 4 (cont'd)
	23	Unit 5: Geometric distribution, the math expectation and the variance of a random variable, independent random variables, strong law of large numbers, and the properties of distribution functions.
April	2	
	9	Unit 6: Continuous distribution functions, density functions, the math expectation, the variance and the standard deviation of a continuous random variable, Normal distribution and the central limit theorem.
	16	
	23	Special Topics
	30	Special Topics
May	4	Review, Q&A
	11	Final Exam (Units 4-6)

## Course Requirements

Students are required to complete 6 homework assignments corresponding to Units 1-6. These assignments will be distributed at the beginning of each unit and will be due the class period following the conclusion of the unit. Given the tentative schedule above, Unit 1 homework will be distributed on January 15<sup>th</sup> and will be due on January 29<sup>th</sup>. Unit 2 homework will be distributed on the 29<sup>th</sup> and will be due on February 12<sup>th</sup>. The remaining assignments for Units 3-6 will be due on February 26<sup>th</sup>, March 26<sup>th</sup>, April 9<sup>th</sup>, and April 23<sup>rd</sup>, respectively.

Each homework assignment, consisting of approximately 10-15 problems, is graded on a 100-point scale. Late assignments (not submitted at the beginning of class on the due date) will lose 10 points. Solutions to the homework assignments will be provided. Once the solutions are released (approximately 2-3 days after the homework is due), homework will not be accepted.

Students are required to have a scientific calculator. Graphing calculators are not required or necessary, but can be used on homeworks and exams. Students not wishing to purchase a graphing calculator should make use (for homeworks) of online graphing tools, such as [http://my.hrw.com/math06\\_07/nsmedia/tools/Graph\\_Calculator/graphCalc.html](http://my.hrw.com/math06_07/nsmedia/tools/Graph_Calculator/graphCalc.html)

## Course References

Course materials were provided by Dr. Anatoly Temkin. The following books were used in the preparation of this course:

- Discrete and Combinatorial Mathematics by Ralph Grimaldi, Pearson publications, 5th Edition ISBN# 0-201-72634-3

- Probability and Statistics by William Mendenhall, Robert Beaver, Barbara Beaver, Thomson Publishing, 11th edition. ISBN # 0-534-39519-8
- The Theory of Probability and Statistics by V. Gmurman, 5th Edition, 1977
- Probability and Statistics by Ronald Rothenberg, ISBN # 0-1-5601676-1

## Course Grading Structure

For any graded learning activity (assignments, exams, etc.), you will be assigned a numeric grade. The conversion to a letter grade is based on the following distribution:

100-93	A	79-77	C+
92-90	A-	76-73	C
89-87	B+	72-70	C-
86-83	B	69-60	D
82-80	B-	Below 60	F

Your final grade for this course will be derived from the following:

Bi-weekly Homework Assignments	35%
Midterm Exam	30%
Final Exam	30%
Participation	5%

The midterm and final exam will follow a similar format as the homework assignment and will take place in class. Participation will be measured by the student's **willingness** to answer questions in class, join in class discussions, ask meaningful questions, etc. This will not be a reflection of attendance as each student is expected to attend all class meetings. Beyond the 1<sup>st</sup> absence, students must obtain permission from the instructor prior to missing class. Make-up exams will only be given when prior permission is granted.

## Course Web Site

Course materials related to CS534 will be placed on the BU CourseInfo server. Background material about the course, the tentative schedule of topics to be covered, and homework assignments are available there.

To access to these materials, you will need to use a web browser (Netscape, or Microsoft explorer). To get there, navigate to: <http://courseinfo.bu.edu>. Search for CS534 in the search field. Then click on the name *CS534 D1 Quantitative Methods IS (Spring 2009)* from the listing resulting from your search. This will bring up a pop-up window requesting your username and password. This should be set up to work with your BU login name, i.e. the first part of your e-mail address, (without the @bu.edu), and your BU Kerberos password. Auditors can sign into the web site using their BU login names and Kerberos passwords (should these exist) after having checked first with the course faculty.

## Academic Conduct Policy

*For the full text of the academic conduct code, please go to*  
[http://www.bu.edu/met/metropolitan\\_college\\_people/student/resources/conduct/code.html](http://www.bu.edu/met/metropolitan_college_people/student/resources/conduct/code.html)

A Definition of Plagiarism:

"The academic counterpart of the bank embezzler and of the manufacturer who mislabels products is the plagiarist: the student or scholar who leads readers to believe that what they are reading is the original work of the writer when it is not. If it could be assumed that the distinction between plagiarism and honest use of sources is perfectly clear in everyone's mind, there would be no need for the explanation that follows; merely the warning with which this definition concludes would be enough. But it is apparent that sometimes people of goodwill draw the suspicion of guilt upon themselves (and, indeed, are guilty) simply because they are not aware of the illegitimacy of certain kinds of "borrowing" and of the procedures for correct identification of materials other than those gained through independent research and reflection."

"The spectrum is a wide one. At one end there is a word-for-word copying of another's writing without enclosing the copied passage in quotation marks and identifying it in a footnote, both of which are necessary. (This includes, of course, the copying of all or any part of another student's paper.) It hardly seems possible that anyone of college age or more could do that without clear intent to deceive. At the other end there is the almost casual slipping in of a particularly apt term which one has come across in reading and which so aptly expresses one's opinion that one is tempted to make it personal property.

Between these poles there are degrees and degrees, but they may be roughly placed in two groups. Close to outright and blatant deceit-but more the result, perhaps, of laziness than of bad intent-is the patching together of random jottings made in the course of reading, generally without careful identification of their source, and then woven into the text, so that the result is a mosaic of other people's ideas and words, the writer's sole contribution being the cement to hold the pieces together. Indicative of more effort and, for that reason, somewhat closer to honest, though still dishonest, is the paraphrase, and abbreviated (and often skillfully prepared) restatement of someone else's analysis or conclusion, without acknowledgment that another person's text has been the basis for the recapitulation."

{The paragraphs above are from H. Martin and R. Ohmann, *The Logic and Rhetoric of Exposition*, Revised Edition. Copyright 1963, Holt, Rinehart and Winston.}

## **Academic Conduct Code**

I. Philosophy of Discipline The objective of Metropolitan College in enforcing academic rules is to promote the kind of community atmosphere in which learning can best take place. This atmosphere can be maintained only so long as every student believes that his or her academic competence is being judged fairly and that he or she will not be put at a disadvantage because of the dishonesty of someone else. Penalties imposed should be carefully determined so as to be no more or no less than required to maintain the desired atmosphere. In defining violation of this code the intent is to protect the integrity of the educational process.

II. Academic Misconduct Academic misconduct is conduct by which a student misrepresents his or her academic accomplishments or impedes other students' chances of being judged fairly for their academic work. Knowingly allowing others to represent your work as theirs is as serious an offense as submitting another's work as your own.

III. Violations of this Code Violations of this code are acts that constitute an attempt to be dishonest or deceptive in the performance of academic work in or out of the classroom. To alter academic records, or to collaborate with another student or students in an act of academic misconduct. Violations include but are not limited to:

A. Cheating on examinations. Any attempt by a student to alter his or her performance on an examination in violation of that examination's stated or commonly understood ground rules.

B. Plagiarism. Any attempt by a student to represent the work of another as his or her own. Plagiarism includes each of the following: copying the answers of another student on an examination, copying or substantially restating the work of another person or persons in any oral or written work without citing the appropriate source, and collaboration with someone else in an academic endeavor without acknowledging his or her contribution (see below for a more detailed definition of plagiarism).

C. Misrepresentation or falsification of data presented for surveys, experiments, etc.

D. Theft of an examination. Stealing or otherwise discovering and/or making known to others the contents of an examination that has not yet been administered.

E. Unauthorized conversation is not allowed during examinations. Any unauthorized conversation may be considered prima facie evidence of cheating.

F. Knowingly allowing another student to represent your work as his or her own.

G. Forgery, alteration, or knowing misuse of graded examinations, grade lists, or official University records or documents, including but not limited to transcripts, letters of recommendation, degree certificates, alteration of examinations or other work after submission.

H. Theft or destruction of examinations or papers after submission including purposefully altering possible poor performance.

I. Submitting the same work in more than one course without the consent of the instructors involved.

J. Altering or destroying another student's work or records, altering records of any kind, removing materials from libraries or offices without consent, or in any way interfering with the work of others so as to impede their academic performance.

K. Failure to comply with the sanctions imposed under the authority of this code.