

Analytics for Environmental Science

MPA Environmental Science & Policy

Columbia University, SIPA

Summer 2016

Quantitative Review Class Sessions (Room 407 IAB)

Tuesday, July 5th, 6:10pm-7:40pm: **Diagnostic Test - Optional**

Wednesday, July 6th: 4:10pm-6pm

Monday, July 11th: 4:10pm-6pm

Wednesday, July 13th: 4:10pm-6pm

Monday, July 18th: 4:10pm-6pm.

Wednesday, July 27th: 4:10pm-6pm: **Final Exam**

Instructor:

Eyal Frank

eyal.frank@columbia.edu

Office Hours (at Lehman Library Group Study Area):

Office hours will take place between classes to allow you to work on the problem sets and come with questions. Please do not let any gaps open up, as soon as something is unclear come and see me.

Friday, July 7th, 6pm-7pm.

Tuesday, July 12th, 6pm-7pm.

Friday, July 15th, 6pm-7pm.

Friday, July 22nd, 6pm-7pm.

Textbooks:

There are no required textbooks for this course. Handouts will be provided. Skim through the handout before class to acquaint yourself with the material. Mark down concepts that are relatively more challenging than other concepts in the handout.

Course Overview & Objectives:

This section will present the mathematical foundations and basic quantitative skills required to effectively master the environmental science, economics, and statistical and quantitative analysis coursework in the Environmental Science and Policy MPA program. Students will learn basic algebra, functions and equations, slopes and derivatives, and multivariate calculus.

The role of math in economic analysis is significant. Linear and nonlinear functions are needed to model economic behavior. Math, especially calculus, simplifies the analysis of these functions. In preparation for courses in the Fall and Spring semesters, this review will expose all students to a minimum quantitative functioning.

Math Diagnostics Exam:

Students will be allowed to take a math and quantitative skills diagnostic test prior to the start of the Summer term. Students with passing scores (80% or above) on the diagnostic test will automatically be given a passing score **for the quantitative half** of this course and do not need to attend the class sessions (This **does not impact** their required attendance nor grading for the GIS portion of the course). Students whose grades fall below a 60% on the diagnostic exam will be required to attend all four math sessions outlined below, and pass the math final exam. Students who fall between a 60% and an 80% on the diagnostic test are required to attend the final two sessions on calculus.

Problem Sets:

You will have a short problem set after each class. The goal of each problem set is to provide you with some exercises so you can practice the material covered in class. You are expected to work through all of the exercises even if you do not succeed solving them all. Grading is on a pass/fail scale. You pass if you attempted solving each and every question, and fail otherwise. You are allowed to work in groups but each one must submit their own copy of the solution. If you choose to work in a group write down the names of the people you worked with at the top right corner of the page.

Requirements and Grading:

1. This course is a pass/fail course. The GIS section of the course is worth **50%** of the total grade, and the math/quantitative review is worth **50%** of the total grade.
2. Students are expected to have done the readings in advance and be prepared to apply them in class.

Grading for the entire course:

GIS	50%
Math	
Math homework	20%
<u>Math Final Exam</u>	<u>30%</u>
Total	100%

QUANTITATIVE REVIEW

Wednesday, July 6th

Lecture: Introduction to Algebra, Functions & Equations

1. Algebraic Expressions
 - a. Simplifying Algebraic Expressions
 - b. Solutions of Algebraic Expressions
 - c. Addition Principle
 - d. Multiplication Principle
2. Review of Graphing
3. Linear Functions
 - a. Slope of a linear function

- b. Equations with Linear Functions
4. Systems of Linear Equations

Monday, July 11th

Lecture: Introduction to Non-Linear Equations

1. Nonlinear Functions
2. Logarithmic Functions
3. Inverse Functions
4. Implicit Functions

Wednesday, July 13th

Lecture: Introduction to Nonlinear functions & Calculus

1. Univariate Calculus
 - a. Slope of a Nonlinear Function
 - b. First and Second Derivative
 - c. Concavity and Convexity
 - d. Rules of Differentiation
 - e. Maximization and Minimization

Monday, July 18th

Lecture: Review of univariate calculus and extensions

1. Multivariate Calculus
 - a. Multivariate Functions
 - b. Partial Differentiation

Academic Integrity Statement:

The School of International & Public Affairs does not tolerate cheating and/or plagiarism in any form. Those students who violate the Code of Academic & Professional Conduct will be subject to the Dean's Disciplinary Procedures. Cut and paste the following link into your browser to view the Code of Academic & Professional Conduct online.

http://sipa.columbia.edu/resources_services/student_affairs/academic_policies/deans_discipline_policy.html

Please familiarize yourself with the proper methods of citation and attribution. The School provides some useful resources online; we strongly encourage you to familiarize yourself with these various styles before conducting your research:

http://sipa.columbia.edu/resources_services/student_affairs/academic_policies/code_of_conduct.html

Violations of the Code of Academic & Professional Conduct should be reported to the Associate Dean for Student Affairs.