Faculty: Kerrie Nelson  Faculty Assistant: Sally Makacynas
Office: Littauer 238  Office: Littauer 350
Phone: 617-495-8614  Phone: 617-495-1197
E-mail: kerrie_nelson@hks.harvard.edu  E-mail: sally_makacynas@harvard.edu

Key People:
Teaching Fellow: Ariel Stern  E-mail: ariel_dora_stern@hksphd.harvard.edu
Course Assistant: Matt Dover  E-mail: matt_dover@hks11.harvard.edu

Class Meetings:
Classes: Tuesday and Thursday 10:10am – 11:30am  LAND
Review Session: Friday 10:10am – 11:30am  L130

Review Session:
The teaching fellow will hold the review session on Friday afternoon. Attendance at these sessions is strongly recommended. There will be no review sessions held on the Fridays in which the midterms are held (October 1 and November 5).

Office Hours:
Kerrie Nelson: Tuesday 1 - 3:00pm
Ariel Stern: Monday 2 - 4:00pm;  Friday 11:30am – 12 noon.
Matt Dover: Monday 6 - 8:00pm

Laptops and Cellphones in Class:
Use of laptops is not permitted during class except under special circumstances – please check with professor if you believe you have a special need. Cell phones and other technological devices are to be turned off and silenced during class.

Class Attendance:
It is expected that you will arrive on time to class and attend every class. If you need to miss a class due to an emergency, it will be your responsibility to obtain missed notes and course announcements from another student.
OVERVIEW

API-201 introduces a range of quantitative tools that are commonly used to inform public policy issues. It provides an introduction to descriptive statistics, probability theory, statistical inference, and decision analysis, with an emphasis on the ways in which they are applied to practical policy questions.

Our goal is that by the end of this course you will be able to:

1. Take a data set and a broad descriptive policy question (such as “what has happened to incomes in the US in the last 30 years?”), figure out what statistical analysis would be most appropriate to answer the question, conduct such an analysis, identify what are the most salient findings/patterns that emerge from the data, and present the findings in a way that is accessible to policymakers.

2. Identify real world policy situations in which the tools of probability can be used, identify which tools are most relevant to inform courses of action in those real world situations, and critically consume policy analysis in which probability is used.

3. Critically consume policy studies/papers/reports in which statistical analysis based on a sample is used

4. Use the decision analysis framework as one tool to make decisions in your job and to think about policy problems.

Specific topics include descriptive statistics, basic probability, conditional probability, Bayes’ rule, decision making under uncertainty, expected utility theory, sampling design, statistical inference, and hypothesis testing. The course also provides you with an opportunity to become proficient in the use of excel, as a tool to analyze quantitative data.

API-201 is open to all Kennedy School students and is required for first-year MPPs. Students from other graduate programs may enroll with the permission of an instructor.

HOW DOES SECTION A DIFFER FROM SECTIONS B, C AND D?

Section A will follow a similar syllabus to Sections B, C, and D, but will proceed somewhat faster than the other sections, allowing more time for applications, in-depth discussions, and a number of advanced topics. Assignments will be due and exams will be held at the same times as for Sections B, C, and D. Students are encouraged to talk with the course faculty members in order to determine whether section A is a better fit.

First-year MPP students with prior coursework in statistics are strongly encouraged to place out of the course entirely by taking an exemption exam during orientation week.
TEXTS AND MATERIALS:

Two textbooks will be required for this course:

(1) *Introduction to the Practice of Statistics* by Moore, McCabe and Craig. W.H. Freeman, 6th Edition. You have two options for acquiring the textbook:

   a. Hard Copy of Textbook and Access Card to StatsPortal
   b. Electronic Copy of Textbook and Access Card to StatsPortal

*Note: You will need StatsPortal to complete the online exercises and access additional resources, so it is required that you purchase the access card. Note that if you buy a used copy of the book, you will still need to buy an access card under option b, which may make your overall purchase more expensive than option a.

* Please see instructions at the end of syllabus

(2) *Open Intro Statistics*, David Diez, Christopher Barr, Mine Çetinkaya. Electronic version of the textbook is available for free at www.openintro.org. Paperback copies may also be purchased for under $7 on CreateSpace or Amazon.

Recommended textbooks for background and further reading:


Feel free to acquire any of these books from your favorite bookstore or on-line retailer. Copies will also be on reserve at the HKS library.
Excel:

- One of the objectives of the course is to help you gain proficiency using spreadsheets, which are often used to conduct policy analysis. Problem sets will contain exercises designed to get you to practice the basics of Microsoft Excel. If you have had no prior experience with Excel, we strongly encourage you to attend the Excel review sessions that will be offered by the API-201 Teaching Fellows at the beginning of the semester.

- The data sets used in the course will be available on the course web page in Microsoft Excel 2003 format. Most other spreadsheet programs, and later versions of Excel, can read these files. You may use other software packages, but the course will provide support only for Excel.

Handouts:

Handouts will be distributed throughout the course. The main objective of the handouts is to facilitate the process of taking notes so that students can fully engage in class. They are not meant to substitute for class attendance or for studying the assigned reading material. Handouts will contain blank spaces for you to fill in during class, usually in response to questions.

GRADING

The class grade will be based on the following criteria:

- 10% - Problem sets
- 15% - Class participation and engagement
- 15% - Final Exercise
- 15% - Midterm #1
- 15% - Midterm #2
- 30% - Final exam

Problem Sets (10%)

Problem sets will be assigned almost every week. They will give you hands-on experience with the analytic techniques introduced in class. You should plan to spend approximately 6-8 hours on each problem set. Problem sets will be posted on the course website, as will suggested answers. They will be graded on check-plus/check/check-minus basis.

Problem sets not received before the deadline will be considered late. There will be no credit for late assignments. The lowest problem set grade will be dropped when calculating the average grade for the problem sets.

Under the Kennedy School Academic Code, the problem sets for this course are “Type II” assignments. You are encouraged to work in a study group, but must submit your own hand- or type-written solutions. Examples of assignments that are not in accordance with the HKS academic code include photocopies or reprints of substantially identical assignments, printouts of substantially identical Excel tables or graphs, and copies of solutions from previous years. The Kennedy School Academic Code is available at:

http://www.hks.harvard.edu/var/ezp_site/storage/fckeditor/file/pdfs/degree-programs/registrar/academic_code.pdf
**Instructions for submitting problem sets:**
- Place them in a specially designated pile located near one of the entrances (near the CA)
- Submit them before class begins. Assignments handed in 20 or more minutes after class begins will be considered late.
- Indicate on the top right corner of the first page the names of the students you worked with

**Class participation and engagement (15%)**

We strongly believe that student participation can substantially enrich the learning experience for both the students and the instructor. In this spirit, class participation is encouraged. Effective class participation requires that you do the assigned readings before coming to class. You are encouraged to ask questions and to share with the class any relevant insights you may have from your work experience or from previous exposure to these topics. We only ask that the questions and comments be brief and related to the topic at hand. Given that this is a large class, we will sometimes need to defer questions for a future class or office hours.

For a select number of classes, we will ask that you complete an online exercise, typically about the assigned reading(s). The online exercises are designed to help you prepare for class so you can learn optimally in each class session. There are two types of on-line exercises: (1) on-line quizzes, and (2) posting of a brief comment (no longer than 150 words) on the class website. Grades on the on-line quizzes are meant to help you and us assess your understanding of the relevant topic prior to class, and will not be counted towards your participation grade. However, the completion of the quizzes and the quality of your effort will count towards your grade.

Online exercises are due by 4:00 AM the morning of class.

The class participation and engagement grade will depend on three things: (1) your participation in class, (2) your engagement with the course outside class, (3) your completion of the on-line exercises. For all of these, quantity and quality will both count.

**Final Exercise (15%)**

The final exercise will require applying some of the statistical tools learned in class using a real data set. It will be due on December 2nd. More details will be provided later in the course.

**Exams (60%)**

There will be two midterms, and a final exam. These will be closed book/notes and a formula sheet will be provided. Calculators may be used, but statistical functions on them may not. Calculators that allow text storage are not permitted.

**Note:** The two midterms will be given on FRIDAY, Oct 1 and Nov 5. Exact time and location will be announced later. There will be no review sessions on those days. You should plan your schedule accordingly.

All students are expected to be present on exam days. We will adhere to the Registrar’s policy regarding rescheduling of exams (i.e. only to be done in case of documented health-related or personal emergencies).
Regrade Policy

Requests for reconsideration of grades on exams are not encouraged, and will be accepted only in writing, with a clear statement of what has been mis-graded, and within one week of receiving your graded exam. Please submit your full exam so grading on all questions can be reconsidered.

All course activities, including class meetings, homework assignments, and exams are subject to the HKS Academic Code and Code of Conduct.

Final Letter Grades

Grades for each exam and for each component of the course (problem sets, final exercise, and class participation and engagement) will be standardized (i.e. curved) and then an overall score for the course will be calculated for each student. This overall score will be translated into a final course letter grade using the Dean’s Recommended Grade Distribution (available at http://www.hks.harvard.edu/degrees/registrar/faculty/exams-and-grading/grades)
## Course Schedule

This outline is preliminary and subject to change. Please see course website for updates.

*Moore, McCabe, and Craig* | **Open Intro (Barr, Diez, and Çetinkaya)**

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<td>p1-5, §2.1</td>
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### II. Probability

| 3 09/09 Basic Probability | PS#1 | §4.1, 4.2, 4.5 | §2.1 |
| 4 09/14 Conditional Probability | PS#2 | §4.5 (p297-end) | §2.3 |
| 5 09/16 Bayes’ Rule | |
| 6 09/21 Application | PS#3 |
| 7 09/23 Probability Distributions | §4.3 (to p262), 4.4, 5.1 (to p320) | §2.5, 3.3 |
| 8 09/28 Continuous Distributions | PS#4 | 1.3, 4.3 (p263-end) | §2.2, 3.1, 3.3 |
| 9 09/30 TBD | |
| 10 10/01 MIDTERM #1 at 8:40 am | |

### III. Statistical Inference

| 10 10/05 Introduction to Statistical Inference | §5.1 (p321-end) | §4.1, 4.4 |
| 11 10/07 Inference for Proportions #1 | p493-496 | §4.3, 5.3 |
| 12 10/12 Inference for Proportions #2 | PS#5 | §8.1, p372-383 | §4.2, 5.3 |
| 13 10/14 Inference for Proportions #3 | §8.2, p356-359 | §5.4 |
| 14 10/19 Application | PS#6 | |
| 15 10/21 Inference for Means #1 | §5.2, 6.1 (p360-end), 6.2 (p384-end), 7.1 | §4 |
| 16 10/26 Inference for Means #2 | PS#7 | §6.3, 7.2 | §5.2 |
| 17 10/28 Chi-Square | §2.5, 9.1-9.3 | |
| 18 11/02 Significance, Power, and other concepts | PS#8 | §6.4 |
| 19 11/04 TBD | | |
| 20 11/05 MIDTERM #2 | | |

### IV. Sampling and Survey Design

| 20 11/09 Sampling | §3.1 | |
| 21 11/11 No Class (Veterans Day) | |
| 21 11/16 Survey Design | PS#9 | §3.2 |

### V. Decision Analysis

| 22 11/18 Decision Analysis #1 | TBA |
| 23 11/23 Decision Analysis #2 | PS#10 |
| 24 11/30 Decision Analysis #3 | PS#11 |
| 25 12/02 Final Review | Final Exercise |
| TBD | FINAL EXAM |
Stats Portal Instructions:

If you need help with StatPortal, and the online website (registration, content, or forget your username and password) you can contact technical support at (800) 936-6899 and email at techsupport@bfwpub.com.

To register for API-201 Section A students should:


2. Click on the link "REGISTER AN ACTIVATION CODE."

3. You will be prompted to follow the on-screen instructions to find your course. You will start by selecting the school's state/province, the school name, then your instructor, course, and/or section.

4. You will enter the activation code that came with the textbook or that was purchased from us. You will also be asked to enter your email address, choose a password and you will be ready to go!

5. Students can also purchase access on the website by clicking on the “PURCHASE” link.