

*University of Houston*  
**QUANTITATIVE METHODS I**  
**PUBL 6410**  
**Dr. YUASA**  
**Fall 2020**  
**Monday 5:30 – 8:30pm**  
**M117**

*Version 1.2 (subject for change)*

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The subject of this course is quantitative methods in public affairs. It includes learning the concepts of probability, statistics, and application of those concepts. Students will come to understand the ways in which one can carry out critical assessment or evaluation of proposed/published arguments, interpretations, beliefs, solutions, policies, programs, or theories. This course provides students with skills to perform applied statistical analyses and to generate an argument with solid reasoning backed up with quantitative evidence. In practice, the scientific base reasoning can help many public administrators and policymakers to convince the stakeholders about his or her policy recommendations with care.

### **Textbooks**

#### ***Required***

Nishishiba, Masami, Matthew Jones, and Mariah Kraner. 2014. *Research Methods and Statistics for Public and Nonprofit Administrators: A Practice Guide*. Sage: Los Angeles

Fox, John. 2017. *Using the R Commander: A Point-and-Click Interface for R*, Chapman & Hall: New York

#### ***Recommended***

Moore, D. S., et al. 2016. *The Practice of Statistics for Business and Economics, 4<sup>th</sup> edition*. W.H.Freeman: New York

*You can consult any introductory statistics textbook.*

Other required readings are available at the course Dropbox.

## Software

R (R Commander)

## University Policies

### Important Dates

- **Monday, August 30th:** Last day to add a class for regular session courses.
- **Wednesday, September 8th:** Official Reporting Day (ORD), the last day to drop a course without a grade.
- **Tuesday, November 4th:** Last day to drop a class or withdraw with a “W.”

### Face Covering Policy (required for courses with a face-to-face component)

To reduce the spread of COVID-19, the University [requires face coverings](#) on campus including classrooms for both faculty and students. **Face coverings must cover your mouth and nose and be worn throughout the class session.** A mask with a valve is not considered an adequate face covering and should not be used, as it can expel exhaled air, increasing the risk to others. **Eating or drinking during class is discouraged and is not an excuse for removing the face covering for any extended length of time.** For additional information on the use of face coverings, please see [Face Covering FAQs](#). Failure to comply with the requirement to wear a face covering in class will result in your being asked to leave the classroom immediately and a disciplinary referral through the Dean of Students Office. Requests for accommodations relating to the face covering policy may be directed to the [Center for Students with DisABILITIES \(CSD\)](#).

### Required Daily Health Self-Assessment (required for courses with a face-to-face component)

Your presence in class each session means that you have completed a daily self-assessment of your health/exposure and you:

- Are NOT exhibiting any [Coronavirus Symptoms](#)
- Have NOT tested positive for COVID-19
- Have NOT knowingly been exposed to someone with COVID-19 or suspected/presumed COVID-19

If you are experiencing any COVID-19 symptoms that are not clearly related to a pre-existing medical condition, do not come to class. Please see [COVID-19 Diagnosis/Symptoms Protocols](#) for what to do if you experience symptoms and [Potential Exposure to Coronavirus](#) for what to do if you have potentially been exposed to COVID-

19. Consult the (select: [Undergraduate Excused Absence Policy](#) or [Graduate Excused Absence Policy](#)) for information regarding excused absences due to medical reasons.

### **Excused Absence Policy** (required for all courses)

Regular class attendance, participation, and engagement in coursework are important contributors to student success. Absences may be excused as provided in the University of Houston [Undergraduate Excused Absence Policy](#) and [Graduate Excused Absence Policy](#) for reasons including: medical illness of student or close relative, death of a close family member, legal or government proceeding that a student is obligated to attend, recognized professional and educational activities where the student is presenting, and University-sponsored activity or athletic competition. Additional policies address absences related to [military service](#), [religious holy days](#), [pregnancy and related conditions](#), and [disability](#).

### **Recording of Class** (required for all courses)

**Students may not record all or part of class, livestream all or part of class, or make/distribute screen captures**, without advanced written consent of the instructor. If you have or think you may have a disability such that you need to record class-related activities, please contact the [Center for Students with DisABILITIES](#). If you have an accommodation to record class-related activities, those recordings may not be shared with any other student, whether in this course or not, or with any other person or on any other platform. Classes may be recorded by the instructor. Students may use instructor's recordings for their own studying and notetaking. Instructor's recordings are not authorized to be shared with *anyone* without the prior written approval of the instructor. Failure to comply with requirements regarding recordings will result in a disciplinary referral to the Dean of Students Office and may result in disciplinary action.

### **Syllabus Changes** (required for all courses)

Due to the changing nature of the COVID-19 pandemic, **please note that the instructor may need to make modifications to the course syllabus and may do so at any time**. Notice of such changes will be announced as quickly as possible through (*specify how students will be notified of changes*).

## **Recommended Language**

### **Resources for Online Learning**

The University of Houston is committed to student success, and provides information to optimize the online learning experience through our [Power-On](#) website. Please visit this website for a comprehensive set of resources, tools, and tips including: obtaining access to the internet, AccessUH, and Blackboard; requesting a laptop through the Laptop Loaner

Program; using your smartphone as a webcam; and downloading Microsoft Office 365 at no cost. For questions or assistance contact [UHOnline@uh.edu](mailto:UHOnline@uh.edu).

## **UH Email**

Email communications related to this course will be sent to your **Exchange email account** which each University of Houston student receives. The Exchange mail server can be accessed via Outlook, which provides a single location for organizing and managing day-to-day information, from email and calendars to contacts and task lists. Exchange email accounts can be accessed by logging into Office 365 with your Cougarnet credentials or through Access UH. They can also be configured on [IOS](#) and [Android](#) mobile devices. Additional assistance can be found at the [Get Help](#) page.

## **Webcams**

**Access to a webcam is required for students participating remotely in this course.** Webcams must be turned on (*state when webcams are required to be on and the academic basis for requiring them to be on*). (Example: Webcams must be turned on during exams to ensure the academic integrity of exam administration.)

## **Honor Code Statement**

**Students may be asked to sign an honor code statement as part of their submission of any graded work including but not limited to projects, quizzes, and exams:** *"I understand and agree to abide by the provisions in the [University of Houston Graduate Academic Honesty Policy](#). I understand that academic honesty is taken very seriously and, in the cases of violations, penalties may include suspension or expulsion from the University of Houston."*

### **Academic Honesty Policy**

([http://www.uh.edu/provost/policies/uhhonesty\\_policy.html](http://www.uh.edu/provost/policies/uhhonesty_policy.html))

## **Helpful Information**

**COVID-19 Updates:** <https://uh.edu/covid-19/>

**COVID-19 Updates and Resources:** <https://uh.edu/provost/policies-resources/covid19/>

**Coogs Care:** <https://www.uh.edu/dsaes/coogscare/>

**Laptop Checkout Requests:** <https://www.uh.edu/infotech/about/planning/off-campus/index.php#do-you-need-a-laptop>

**Health FAQs:** <https://uh.edu/covid-19/faq/health-wellness-prevention-faqs/>

**Student Health Center:** <https://uh.edu/class/english/lcc/current-students/student-health-center/index.php>

***Academic Accommodations for Students with Disability***

([http://www.uh.edu/provost/fac/Policy\\_disab.html](http://www.uh.edu/provost/fac/Policy_disab.html))

\*If you need special accommodation to meet any of the requirements of this course, please contact me by the second class session.

**Counseling and Psychological Services (CAPS)**

CAPS can help students who are having difficulties managing stress, adjusting to the demands of a professional program, or feeling sad and hopeless. You can reach CAPS ([www.uh.edu/caps](http://www.uh.edu/caps)) by calling 713-743-5454 during and after business hours for routine appointments or if you or someone you know is in crisis. No appointment is necessary for the “Let's Talk” program, a drop-in consultation service at convenient locations and hours around campus. [http://www.uh.edu/caps/outreach/lets\\_talk.html](http://www.uh.edu/caps/outreach/lets_talk.html)

**Graduate Excused Absence Policy** (<https://uh.edu/provost/policies-resources/student/excused-absence-policy/>).

**Additional policies address absences related to**  
military service,

(<http://publications.uh.edu/content.php?catoid=34&navoid=12714>)

religious holy days,

(<http://publications.uh.edu/content.php?catoid=34&navoid=12495>)

pregnancy and related conditions (Search UH website)

disability (Search UH website)

**Grades and Grading Policy**

Final Grades will be comprised of the following components:

1. Midterm Exam: 20% of the total grade
2. Assignments: 30% of the total grade
3. Term Paper: 20% of the total grade
4. Final Exam: 20% of the total grade
5. Quiz: 10% of the total grade

**End of the Interim Grade Policy:** Please be aware, the Interim Grade Policy ended with

the spring 2021 semester and the university has returned to our standard grading policies. You can find more information on UH Grade Policy here: <http://publications.uh.edu/content.php?catoid=36&navoid=12929>

### Quiz

There will be few online quizzes. The purpose of the quizzes is to encourage students to read the course materials. The Quiz schedule and Blackboard settings are provided in the document file (**PUBL6410 Quiz Schedule Fall 2021.pdf**) uploaded to the Course OneDrive.

### Examinations

There will be two exams during the semester. Exam questions will be based on information covered in the assigned reading materials as well as materials learned in each course session and data exercises.

Students must provide sufficient justification for missing an exam (it must be a documented emergency) to be entitled to qualify for a makeup exam. It is the responsibility of the student to contact the instructor on or before the date of the missed exam to arrange for a make-up.

**The midterm exam** may consist of two parts: multiple-choice question blackboard online portion and take-home portion involving data analysis. **The question document will be posted by midnight on October 12<sup>th</sup> (Tuesday) The submission due date of your take-home exam answers is October 25<sup>th</sup> (Monday) before the class time (5:30 PM).**

**The final exam** is a multiple-choice format only on Blackboard.

#### *Exam Date (Midterm Online portion)*

##### ***Blackboard***

***2 hours***

***Access Period: October 18<sup>th</sup> (6:00 PM to 8:00 PM)***

##### ***Take home***

***Exam document will be posted on OneDrive Course folder October 12<sup>th</sup>(11:59PM).***

***Due: October 25<sup>th</sup> (5:30 PM)***

#### *Final Exam (Final Online portion)*

##### ***Blackboard***

***Date: December 13<sup>th</sup> (6:00 PM to 8:30 PM)***

## Assignments

There will be several assignments over the semester. For data analyses, students are using the assigned statistical tool(s) and to provide a written report of their findings. Both assignment documents and data sets are available from the **OneDrive Course Folder**.

**Assignments must be turned in to *Blackboard Turnitin* at the beginning of class on the day they are due (Submit by 5:30 PM). Late homework will not be graded.**

## Term Paper

Each student picks a dataset (a cross-sectional dataset) relating his or her area of interest. There are various publicly available datasets. The MD. Anderson UH library subscribes to numerous data services. Of course, you can use the dataset collected by your organization. Throughout the course, I assign an analysis report on your data set as a part of weekly assignments. At the end of the semester, you can put together your data analysis reports to complete your term paper (15 ~ 30 pages).

*The style of reference:*

Use your preferred reference style such as MLA, Chicago, etc.

**The due date for your term paper submission (Submit the document file to *Blackboard Turnitin*)**

**December 13<sup>th</sup>**

## Schedule of Lectures and the Corresponding Readings

- August 23

### **Lecture 0 (f2f)**

#### **Introduction**

#### **Critical thinking**

Lecture Outline:

[PUBL6410 QM Lec 0 critical thinking.pdf](#)

Reading Guide (ReadmeLec0.pdf)

Tittle, Peg. 2011. *Critical Thinking: An Appeal to Reason*. Miltonpark: Routledge. Chapters 2, 4, 6, and 8.

Ennis, Robert. 1991. "Critical thinking." *Teaching philosophy* **14**(1): 5-24.

Sowell, Thomas. 2007. *Conflict of Visions: Ideological Origins of Political Struggles*. New York: Basic Book. Chapter 1 & 2.

Sowell, Thomas. 2011. *Economic Facts and Fallacies, Second edition*. New York: Basic Book. Chapter 1 & 2.

- August 30

### Lecture 1 (MSTeam)

Lecture Outline:

*PUBL6410 QM Lec 1.0 Concept&Variable.pdf*

*Variables*

*Concepts*

*Operationalizing Concepts*

*Reliability & Vaidity*

*PUBL6410 QM Lec 1.1 Concept of Association & Causation*

*Hypothesis*

### **Readings:**

Hoover, Kenneth, and Todd Donovan. 2011. *The Elements of Social Scientific Thinking, 10<sup>th</sup> edition*. Wadsworth. **Chapter 2 & 4**

Neuman, W. Lawrence. 2014. *Social Research Methods: Qualitative and Quantitative Approaches, Seventh Edition*. Essex: Pearson. **Chapter 7**.

**September 6 (Labor Day Holiday)**

- September 13

### Lecture 2 (f2f)

Lecture Outline:

*PUBL6410 QM Lec2.1 Mickey mouse Equation I.pdf*



## DATA MANAGEMENT with R

Fox , John. Chapter 3 & 4

R Documents

*PUBL6410 Mac R manual 1 R & R Commander packages  
Installation Guide.pdf*

*PUBL6410 Win R manual 1 R & R Commander packages  
Installation Guide.pdf*

*1 R Data Management Retrieving Data File.pdf*

*2 R data management Creating a new data.pdf*

*4 R Data Management Converting Factor to Numeric or Num to  
Fac.pdf*

*5 R Data Management RECODE.pdf*

## Basic Statistics

### a. Frequency

#### ***Graph basics***

More, David S. and William I. Notz. 2003. *Statistics: Concepts and  
Controversies*. New York: W.H.Freeman.

*Chapter 10 Graphs, Good and Bad;*

*Chapter 11 Describing distribution with Numbers*

Fox, John Chapter 5 (page 81-96)

### b. Moments

i. Central tendency

ii. Variance

iii. Skewness

iv. Kurtosis

Nishishiba, Masami, Matthew Jones, and Mariah Kraner. 2014. *Research  
Methods and Statistics for Public and Nonprofit Administrators: A  
Practice Guide*. Los Angeles, Sage Publication

Chapter 7

### c. Data Analysis

- i. Emily: HR Director at a City page 2
- ii. Consult *Quantitative Data Preparation and Descriptive Statistics* (Nishishiba et al., Chapter 7, 116 ~)
- iii. Perform descriptive data analysis on Emily's Survey Data
  1. Appendix B (Emily's Survey Form)

R Document:

*1 R Univariate Descriptive Analyses.pdf*

### Conceptual Understanding

#### d. Correlation

Nishishiba et al., Chapter 11

#### e. Causation

- September 20

### Lecture 3 (MSTeam)

#### Multipledimensional Concept

#### Scale/Index construction

Reliability Test

Cronbach's alpha

Factor Analysis

Lecture Outline:

*PUBL6410 QM Lec 3.0 Concept&Measurement.pdf*

*PUBL6410 QM Lec 3.2 Scale&Index.pdf*

Readings:

Tavakol, Mohsen, and Reg Dennick. 2011. Making Sense of Cronbach's alpha. *International Journal of Medical Education*: 52-55.

R documents:

2.0 R Cronbach alpha Reliability Test.pdf

2.1 R Factor Analysis.pdf

- September 27

## Lecture 4 (f2f)

### Survey

#### a. Building questionnaire

Lecture Outline:

*PUBL6410 QM Lec 4.1 Questionnaire Survey Instruments.pdf*

Readings:

1. Nishishiba et al., Chapter 6
2. Asher, Herbert. 2001. *Polling and The Public Opinion: What Every Citizen Should Know, the fifth edition*. Washington D.C.: CQ Press.

*Chapter 2 Problem of Nonattitudes;*

*Chapter 3 Wording and Context of Questions;*

*Chapter 4 Sampling Techniques;*

*Chapter 5 Interviewing and Data Collection Procedures*

3. Emily: HR Director at a City page 2  
Emily's Survey Questionnaires  
Appendix B (Emily's Survey Form) page 339-341

- October 4

## Lecture 5 (MS Team)

### Sampling

Nishishiba et al., Chapter 5

Dorofeev, Sergey, and Peter Grant. 2006. *Statistics for Real-Life Sample Survey: Non-Simple-Random Samples and Weighted Data*. New York: Cambridge.

## Chapter 1 Sampling methods

Lowry, Richard. 1989. *The Architecture of Chance: An Introduction to the Logic and Arithmetic of Probability*. New York: Oxford University Press.

### Lecture Outline:

[PUBL6410 QM Lec 5.0 Sampling.pdf](#)

### Probability Theory

Law of Large Number  
Central Limit Theorem

### **Sample Weight**

Dorofeev, Sergey, and Peter Grant. 2006. *Statistics for Real-Life Sample Survey: Non-Simple-Random Samples and Weighted Data*. New York: Cambridge. *Chapter 2 Weighting*

### R documents

[4.0 R Z distribution & t-distribution.pdf](#)

[4.1 R Sampling Distribution & Confidence Interval.pdf](#)

- October 11

### Lecture 6 (f2)

#### Lecture Outline:

[PUBL6410 QM Lec 6.0 Experiment.pdf](#)

[PUBL6410 QM Lec 6.1 Propensity Score Matching.pdf](#)

### Research Design

Nishishiba et al., Chapter 4

### Controlling

- a. An experimental and quasi-experimental design

Fife-Schaw, Chris. 2012. "Quasi-Experimental Designs." In *Research Methods in Psychology*, eds. Glynis. Breakwell, Jonathan A. Smith, and Daniel B. Wright. New York: Sage. 75-91.

b. Propensity score matching

Leite, Walter. 2017. *Practical Propensity Score Methods Using R*. Los Angeles: Sage. **Chapter 1**

Rubin, D. B. (1974). "Estimating causal effects of treatments in randomized and nonrandomized studies." *Journal of Educational Psychology* **66**(5): 688-701.

c. Contingency Table (Crostabulation)

Nishishiba et al., Chapter 12

• *October 18*

*Midterm Exam Blackboard (6:00 PM to 8:00 PM)*

*Midterm Takehome:*

*Post the question document on October 12<sup>th</sup>;*

*Submission Due [Turnitin] Oct 25<sup>th</sup> (5:30 PM)*

• October 25

**Lecture 7 (f2f)**

**Inference statistics**

**Fox, John. Chapter 6**

Lecture Outline:

*PUBL6410 QM Lec 7.1 Statistical Inference Confidence Interval.pdf*

*PUBL6410 QM Lec 7.2 Statistical Inference Test of Significance.pdf*

Hypothesis testing

Nishishiba et al., Chapter 8

Nishishiba et al., Chapter 9

Mean difference test

t-test

Contingency Table

$\chi^2$  test

R Documents:

4.2 R Visualizing Hypothesis test

5.0 R Compare Means t-test.pdf

5.1 R Contingency Table.pdf

- November 1

### **Lecture 8 (MS Team)**

#### **ANOVA & ANCOVA**

Lecture Outline:

*PUBL6410 QM Lec 8.0 ANOVA.pdf*

Nishishiba et al., Chapter 10

R Document

6.0 R Compare Means ANOVA.doc

- November 8

### **Lecture 9 (f2f)**

#### **Bivariate Correlation & Simple Regression**

Lecture Outline:

Revisit PUBL6410 QM Lec 1.0 Correlation v Causation.pdf

PUBL6410 QM Lec 9 Mickeymouse Equation II.pdf

Nishishiba et al., Chapter 11

Nishishiba et al., Chapter 13

Heckman, James J. 2005. "The Scientific Model of Causality." *Sociological Methodology* 35: 1-97.

Fox, John **Chapter 7 (7.1 to 7.4)**

[R documents](#)

[6.1 R Correlation&SimpleRegression.pdf](#)

- November 15

### **Lecture 10 (MS Team)**

#### **Regression Diagnostics**

Fox, John

#### **Linear Regression Diagnostics (7.8)**

R Document:

[R 14 R\\_ Regression Diagnostics](#)

- November 22

### **Lecture 11 (f2f)**

#### **Multiple Regression**

Berman, Evan M. 2007. *Essential Statistics for Public Managers and Policy Analysts*, Second Edition. Washington D.C.: QC Press. **Chapter 13**

Lecture Outline:

[PUBL6410 QM Lec 7.2 Multiple Regression.pdf](#)

Fox, John

Linear Regression **Chapter 7 (7.1 to 7.4)**

**Comparing models Chapter 7 (7.7.3, 7.7.4)**

**Linear Regression Diagnostics (7.8)**

### **R Document:**

[R 7.0 Implement Multiple Regression Analysis.pdf](#)

[R 7.1 OLS Using Dummy IV.pdf](#)

[R 14 Regression Diagnostics](#)

### ***Multiple Regression PA Application readings:***

Meier, Kenneth J., and Joseph Stewart, Jr. 1992. "The Impact of Representative Bureaucracies: Educational Systems and Public Policies." *American Review of Public Administration* 22(3):157-171.

Hay, David A. 1999. "A Multivariate Regression Analysis of Adolescent Multiple Drug Use in Two Western Canadian Provinces." *Canadian Journal of Public Health* 90 (5): 304-308.

### ***Multiple Regression Using Dummy Variable (Mixed Model)***

Pollock, Philip H. III. 2003. *The Essentials of Political Analysis*. Washington D.C.: CQ Press. Page 155-158: Dummy Variable

### ***Multiple Regression Using Interaction effect***

Brambor, T., W. R. Clark, et al. (2006). "Understanding Interaction Models: Improving Empirical Analyses." *Political Analysis* 14(1): 63-82.

- November 29 (**Last class day**)

## **Lecture 12 (MS Team)**

### **Logistic Regression**

#### **Readings:**

Hosmer, David W., Scott Taber, and Stanley Lemeshow. 1999. "The Importance of Assessing the Fit of Logistic Regression Models: A Case Study." *American Journal of Public Health*, Vol.81. No.12:1630-1635.

Pollock, Philip H. III. 2012. *The Essentials of Political Analysis, Fourth Edition*. Washington D.C.: CQ press. **Chapter 9**.

#### **R Document**



15 R Logistic Regression.pdf

- *December 13*

*Final Exam*

- *December 13*

*Term paper Due*