Introduction to Quantitative Research Methods
Trinity College Dublin 2023/24

Tom Paskhalis
tom.paskhalis@tcd.ie

• Module Code: POP88164
• Module Website: tinyurl.com/POP88164
• ECTS Weighting: 10
• Semester/Term Taught: Semester 2 (Hillary Term)
• Contact Hours:
  One 2-hour lecture - Tuesday 12:00-14:00 in 5052 Arts Building
  One 1-hour workshop - Tuesday 14:00-15:00 in 5039 Arts Building
  One 2-hour tutorial:
    – Group 1 - Thursday 09:00-11:00 in 1014 Arts Building
    – Group 2 - Friday 16:00-18:00 in AP0.12 Aras an Phiarsaigh
  per week (11 weeks)
• Module Coordinator: Dr Tom Paskhalis (tom.paskhalis@tcd.ie)
• Office Hours: Thursday 11:00-13:00 in-person or online (booking required)
• Teaching Assistants:
  – Hannah Frank (frankh@tcd.ie)
  – Lucas Da Silva (ldasilva@tcd.ie)
Learning Aims

The goal of this module is to introduce students to the practice of data analysis at an elementary postgraduate level. More than ever before, political science research relies upon data — information about people, firms, nations, etc. that can be compiled, compared, and analyzed en masse. Political scientists analyze data with an eye to explaining the social world. Not all political scientists perform quantitative data analysis, but as empirical quantitative studies provide so much of our knowledge about politics and society, every student of the subject must now know at least a little about how it works.

Learning Outcomes

On successful completion of this module students should be able to:

- recognise different types of data;
- specify populations of observations and samples selected from such populations;
- develop statistical models of the social world;
- identify and summarise data useful for testing such models;
- carry out statistical hypothesis testing;
- interpret and critique quantitative results found in the political science literature;

Module Details

This module will consist of 3 parts: 2-hour lecture where we discuss approaches to empirical quantitative research and statistical methods, 1-hour workshop where we talk about using R for data analysis and 2-hour tutorial where you have a chance to have hands-on experience working with data using R and RStudio.

In the course of this module students will submit 3 assignments that are designed to test their knowledge of R and understanding of key statistical methods. Even more importantly than just being comfortable with working in R, the purpose of this course is to make you comfortable with design and execution of a quantitative study that answers a well-defined research question and is situated within some broader political science literature. To this end, you will be asked to write a research design and a final research paper.

Reading List

We will primarily be relying on the following core texts for this module:

For more thorough treatment of causal inference and econometric models broadly refer to:


Some alternative textbooks on quantitative methods in social sciences using R that you might find useful:


If you would like to consult additional texts on R and data analysis in R, you might find these books helpful:


A classic book on research design (in its new edition), which introduces a lot of the general language and logic of inference that we will be using throughout this module:


If you need a mathematics refresher or want to know more about the mathematical foundations of statistical procedures we discuss in this module I highly recommend this textbook:

To learn more about data visualization and how to make your graphs look beautiful and convey information most accurately and efficiently see:


In addition, we will use a number of journal articles. Most journal articles will be freely available from the link included in the reading list (from campus computers). If this does not work (or if you are not on campus), search for the article via Trinity Stella Search (or Google Scholar) and log in to gain access.

Additional online resources:

- An Introduction to R
- Introduction to Econometrics with R
- Learning Statistics with R
- Learn R
- R Markdown Tutorial
- R Language Definition
- R Package Documentation
- YouTube:
  - First steps in R and RStudio
  - Intro to R
  - R Markdown

**Data**

Some useful links for obtaining data sets for quantitative analysis:

- Election and government information on 70+ countries - Political Parties, Presidents, Elections, and Governments Database
- Constituency-level election results for lower chamber (170+ countries) and upper chamber (24+ countries) legislative assemblies - Constituency-Level Elections Archive (CLEA)
- Democracy measures - Varieties of Democracy (V-Dem)
Software

In this class we will use R to work with data. R is free, open-source and interactive programming language for statistical analysis. RStudio is a versatile editor for working with R code and data that provides a more intuitive interface to many features of the language.

Both R and RStudio are widely available for all major operating systems (Windows, Mac OS, Linux). You should install them on your personal computer prior to attending tutorials. Use these links to download the installation files:

- R - https://cran.r-project.org/
- RStudio - https://posit.co/download/rstudio-desktop/

Assessment Details

The final grade consists of the following parts (with corresponding weighting):

- Participation (10%)
  Tutorial attendance, RQ presentation
- 3 R assignments (5% each)
- Research design (15%)
  Approximately 1-2 pages and no more than 500 words (references excluded)
- Research paper (60%)
  Approximately 10 pages and no more than 5,000 words (references excluded)
The length of the research design assignment and the final research paper provided above should serve as a guide. There is a 10% leeway in the word count. That is any submission that falls 10% short or exceeds by 10% the word counts listed above will not be penalised. More detailed instructions for each assignment are provided in the accompanying Research Design Guidelines and Research Paper Guidelines documents.

In the research paper, each student will identify a research question and then answer it using quantitative analysis. Students must present their research question during one of the workshops after reading week or, otherwise, get an approval for their research question from the instructor.

All assignments should be submitted via Blackboard. Go to the “Assessment” section — you should be able to see all the assignments listed there. You will need to upload your assignments as DOC, DOCX, ODT or PDF documents. For R assignment submissions you should compile your R markdown into DOC or PDF document prior to submission.

Please make sure that you understand the submission procedure. Unexcused late submissions will be penalized in accordance with standard department policy. Five points per day will be subtracted until the Monday a week and a half after the deadline at which point the assignment is deemed to have failed.

All assignments are due by **11:59 Tuesday** prior to the start of the lecture. See [module schedule summary](#) below for the full list of due dates.

The final research paper will be due by **23:59 Tuesday, 25 April 2023**. See Research Paper Guidelines for further details.

**Plagiarism**

Plagiarism — defined by the College as the act of presenting the work of others as one’s own work, without acknowledgement — is unacceptable under any circumstances. All submitted coursework must be **individual and original** (you should not re-use parts of a paper you wrote for another module, for example). You need to reference any literature you use in the correct manner. This is true for use of quotations as well as summarising someone else’s ideas in your own words. When in doubt, consult with the lecturer before you hand in an assignment. Plagiarism is regarded as a major offence that will have serious implications. For more information on the College policy on plagiarism, please see [avoiding plagiarism guide](#). All students must complete the online tutorial on avoiding plagiarism which can be found on this webpage.
Module Schedule

Week 1: Introduction ............................................. 7
Week 2: Descriptive Statistics ................................. 7
Week 3: Probability Theory ..................................... 8
Week 4: Hypothesis Testing ..................................... 8
Week 5: Analysis of Proportions and Means ................. 8
Week 6: Correlation ................................................. 9
Week 7: Reading Week ............................................. 9
Week 8: Linear Regression I .................................... 9
Week 9: Linear Regression II ................................... 9
Week 10: Linear Regression III ............................... 10
Week 11: Causation ................................................ 10
Week 12: Logistic Regression ................................. 10
Module Schedule Summary ................................. 11

Week 1: Introduction

Required Readings:

- Ch 1 Agresti 2018

Additional Readings:


Week 2: Descriptive Statistics

Required Readings:

- Chs 2-3 Agresti 2018

Additional Readings:

Week 3: Probability Theory
Required Readings:

• Ch 4 Agresti 2018

Additional Readings:


Week 4: Hypothesis Testing
Required Readings:

• Chs 5–6 Agresti 2018
• Ch 6 Mesquita and Fowler 2021

Additional Readings:


Week 5: Analysis of Proportions and Means
Required Readings:

• Chs 7–8 Agresti 2018

Additional Readings:


**Week 6: Correlation**

**Required Readings:**

• Chs 2–4 Mesquita and Fowler 2021

**Additional Readings:**

• Ch 9 Agresti 2018


**Week 7: Reading Week**

**Week 8: Linear Regression I**

**Required Readings:**

• Ch 9 Agresti 2018

• Ch 5 Mesquita and Fowler 2021

**Additional Readings:**


**Week 9: Linear Regression II**

**Required Readings:**

• Ch 10 Mesquita and Fowler 2021

**Additional Readings:**

• Chs 10–11 Agresti 2018
Week 10: Linear Regression III

Required Readings:

- Ch 9, 11 Mesquita and Fowler 2021

Additional Readings:

- Ch 14 Agresti 2018

Week 11: Causation

Required Readings:

- Chs 13 Mesquita and Fowler 2021

Additional Readings:


Week 12: Logistic Regression

Required Readings:

- Ch 15 Agresti 2018

Additional Readings:

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Lecture Topic</th>
<th>Workshop Topic</th>
<th>Tutorial Topic</th>
<th>Assignment Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>23 January</td>
<td>Introduction</td>
<td>R Overview</td>
<td>Getting Started with R</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>30 January</td>
<td>Descriptive Statistics</td>
<td>Data Structures</td>
<td>Data &amp; Variables</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>6 February</td>
<td>Probability Theory</td>
<td>Probability Distributions</td>
<td>Distributions &amp; Sampling</td>
<td>1 R Assignment</td>
</tr>
<tr>
<td>4</td>
<td>13 February</td>
<td>Hypothesis Testing</td>
<td>Data Frames</td>
<td>Data Frames &amp; Plotting</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>20 February</td>
<td>Analysis of Proportions &amp; Means</td>
<td>Factor Variables</td>
<td>Cross Tabulation</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>27 February</td>
<td>Correlation</td>
<td>Visualisations</td>
<td>Correlation</td>
<td>2 R Assignment</td>
</tr>
<tr>
<td>7</td>
<td>5 March</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>12 March</td>
<td>Linear Regression I</td>
<td>RQ Presentations I</td>
<td>Linear Regression I</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>19 March</td>
<td>Linear Regression II</td>
<td>RQ Presentations II</td>
<td>Linear Regression II</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>26 March</td>
<td>Linear Regression III</td>
<td>RQ Presentations III</td>
<td>Linear Regression III</td>
<td>3 R Assignment</td>
</tr>
<tr>
<td>11</td>
<td>2 April</td>
<td>Causation</td>
<td>RQ Presentations IV</td>
<td>Causation</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>9 April</td>
<td>Logistic Regression</td>
<td>RQ Presentations V</td>
<td>Logistic Regression</td>
<td>Research Design</td>
</tr>
</tbody>
</table>