ECON510 TA Session: Introduction to LaTeX

Dibya Mishra* and Jintao Sun†

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1 Installation

Before installing the TeX/LaTeX editor, you need to download and run the basic **MiKTeX** installer to set up the TeX/LaTeXsystem. Get the **MiKTeX** installer here https://miktex.org/download for Windows or Mac.

Then you should choose your TeX/LaTeX editor. The popular ones are:

TeXmaker (download here https://www.xm1math.net/texmaker/)

TeXstudio (download here https://www.texstudio.org/)

TeXworks (download here http://www.tug.org/texworks/)

Overleaf is a popular online TeX/LaTeX editor. Co-authors can share and collaborate to edit the tex file online rather than through cloud storage softwares such as Dropbox, Google Drive, or OneDrive. You can register your account and create your project here https://www.overleaf.com/.

2 Basics

There are a lot of LaTeXtutorials online that you can refer to. I recommend two in **Overleaf**: Learn LaTeX in 30 minutes and Dr John Lees-Miller's 3-part LaTeX tutorial series. Some other tutorials are much longer and you can use them as a dictionary, *e.g.*, The Not So Short Introduction to LaTeX and the very detailed documentation in **Overleaf** (see: https://www.overleaf.com/learn/latex/Main_Page).

2.1 Packages and Templates

We need basic packages in LaTeX to set up font, font size, margins, first line indent, and so on. You can accumulate the packages and form your own tex file template. As an example, see the packages used in your **Homework 1**.

You can find multiple useful tex file templates in **Overleaf** for academic journal, curriculum vitae, poster, and so on (see: https://www.overleaf.com/latex/templates). American Economic Association (AEA) also provides templates in different formats for manuscript native files (see: https://www.aeaweb.org/journals/policies/templates).

2.2 Generating Title, Author, Date

We can generate the article title, author name(s) with institution name(s) and email(s) in the footnote, and the date (make it updated).

*Department of Economics, Rice University. Email: ddm5@rice.edu
†Department of Economics, Rice University. Email: js167@rice.edu

2.3 Formatting

chapter, section, subsection, subsubsection, ...

itemize, enumerate, ...

Here is an example of itemization:

- Separating equilibria
- Pooling equilibria
- Semi-separating equilibria
- Equilibria in which both players non-trivially randomize

Here is an example of enumeration:

1. Separating equilibria
2. Pooling equilibria
3. Semi-separating equilibria
4. Equilibria in which both players non-trivially randomize

2.4 Math Mode

Mathematical mode is the most frequent we will use in LaTeX. Your **Homework 1** is a good example.

To type in some math symbols in a sentence, you can write: Euler's formula is $e^{ix} = \cos x + i \sin x$.

To type in a single line centered, you can write: a function $U : X \to \mathbb{R}$ is *quasi-concave* if and only if

$$\forall x,y \in X,\, \forall \alpha \in (0,1) :\ U(\alpha x + (1-\alpha)y) \geq \min\{U(x),U(y)\}$$

To type in multiple formulas in multiple lines and make them aligned, you can write: suppose x_1, $x_2 \in X$ with $x_1 \neq x_2$ and define

$$\hat{y}_1 = \underset{y \in \Gamma(x_1)}{\arg\max}\ [F(x_1,y) + \beta f(y)] \tag{1}$$

$$\hat{y}_2 = \underset{y \in \Gamma(x_2)}{\arg\max}\ [F(x_2,y) + \beta f(y)] \tag{2}$$

By adding a star, you can avoid automatically enumerating: with $0 < \theta < 1$, define

$$x_\theta = \theta x_1 + (1-\theta)x_2$$
$$y_\theta = \theta \hat{y}_1 + (1-\theta)\hat{y}_2$$

Let's skim **Homework 1** to see some math expressions mostly often used.

2.5 Making Your Own Theorem Styles and Math Operators

As you see in **Homework 1**, Prof. Thirkettle has created some new theorem styles and math operators of his own. Let's look at how we could use them.

Definition 1. Here is Definition 1

Example 1. *Here is Example 1*

2.6 Making Tables

The main difference between **table** and **longtable** is that **longtable** provides a mixed-use case for having a too-large table that you want to split across the page boundary. There also exists a difference between when you want to add table notes. You can also use **tabular** to make simple tables.

Table 1: **International Student Enrollment at Rice University from 1999-2019**

Academic Year	Undergraduate IS	Graduate IS	Total IS	Overall total	IS%
1999-2000	84	434	518	4184	12.38
2000-2001	77	471	548	4372	12.53
2001-2002	72	551	633	4300	14.72
2002-2003	93	569	662	4733	13.99
2003-2004	103	571	674	4864	13.86
2004-2005	99	592	691	4950	13.96
2005-2006	111	644	755	4947	15.26
2006-2007	139	662	801	5179	15.47
2007-2008	168	684	852	5259	16.20
2008-2009	203	718	921	5337	17.26
2009-2010	285	767	1052	5577	18.86
2010-2011	340	773	1113	5763	19.31
2011-2012	367	827	1194	6080	19.64
2012-2013	390	898	1288	6402	20.12
2013-2014	452	975	1427	6354	22.46
2014-2015	462	1037	1499	6563	22.84
2015-2016	476	1087	1563	6692	23.36
2016-2017	472	1139	1611	6805	23.61
2017-2018	458	1174	1632	6907	23.63
2018-2019	455	1217	1672	7009	23.86
2019-2020	478	1311	1789	7146	25.03

[a] Data source: The Office of International Students & Scholars (OISS) Statistical Report for Fall 2019
[b] IS: International degree-seeking students (non-immigrants only)
[c] IS%: Percentage of Rice student population that is, or was, international
[d] Totals do not include visiting/exchange international students
[e] Data collected on 09/11/2019

Table 2: **International Student Enrollment at Rice University from 1989-2019**

Academic Year	Undergraduate IS	Graduate IS	Total IS	Overall total	IS%
1989-1990	85	378	463	4220	10.97
1990-1991	65	401	466	4239	10.99
1991-1992	72	400	472	4291	11.00
1992-1993	77	390	467	4268	10.94
1993-1994	81	384	465	4257	10.92
1994-1995	89	370	459	4178	10.99
1995-1996	82	374	456	4235	10.77

1996-1997	81	386	467	4187	11.15
1997-1998	74	389	463	4285	10.81
1998-1999	74	435	509	4312	11.80
1999-2000	84	434	518	4184	12.38
2000-2001	77	471	548	4372	12.53
2001-2002	72	551	633	4300	14.72
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A Simple Table

upper left	upper right
lower left	lower right

Here is a brief tutorial for making tables in LaTeX https://es.overleaf.com/learn/latex/Tables. Positioning the tables is also a topic (see: https://www.overleaf.com/learn/latex/positioning_images_and_tables).

You will do a lot of making tables when writing your empirical papers in the future. Moreover, statistical softwares can automatically generate a tex file with table typing that you can compile (that is, you can write codes in STATA or R to auto-generate a tex file with all the statistics, variable names, caption, table notes, and even table formats that you need to compile for a table). This is another big topic and here are some starter-level tutorials : http://www.jwe.cc/2012/03/stata-latex-tables-estout/, http://repec.sowi.unibe.ch/stata/estout/esttab.html, http://repec.org/bocode/e/estout/spost.html, http://tabout.net.au/downloads/tabout_user_guide.pdf.

3 Adding References

Sometimes we can just add a footnote[1]. More rigorously, we need a reference section.

Here we refer to the lemon market paper by George Akerlof.[1] You can accumulate and manage your own literature bibliography. https://www.overleaf.com/learn/latex/bibliography_management_with_bibtex is a useful tutorial for how to use bibtex file.

References

1 George A Akerlof. The market for "lemons": Quality uncertainty and the market mechanism. In *Uncertainty in economics*, pages 235–251. Elsevier, 1978.

4 Alternative Choice: LyX

LyX (see https://www.lyx.org/) seems to be an alternative (and popular) choice among some scholars. It is something combining LaTeX and MS Office Word: you can experience some LaTeX typing while the contents can be **what you type in is what you see**. For example, enter **Ctrl+M** and you can enter the math mode. Type some Greek alphabets then you can see them immediately. LyX also provides various templates. A good news is that you can incorporate LaTeX codes in LyX editing.

I am not quite familiar with LyX, but you can do your own homework. Based on the requirement of this course, LaTeXis preferred.

5 Some Small Assignments

How to generate a table of contents (menu)? How to make just one page landscape (for example, when you need a landscape page for a very wide table)? What if an equation is too long for one line? .....

Think about one such small assignment and make it happen.

6 Last Sentence

Practice makes perfect for using LaTeX, similarly as for using statistical or programming softwares. Start using LaTeXto write your assignments, research proposals or papers today. After one semester, you will see a big change.

[1] This is a footnote.