

# Applied L<sup>A</sup>T<sub>E</sub>X and Markdown for Researchers

Laboratorio de Investigación para el Desarrollo del Ecuador

Syllabus

**Instructor:** Daniel Sánchez, M.A.

**Module length:** 4 hours

**Level:** Introductory

**GitHub repository:** <https://github.com/laboratoriolide/applied-latex>

## 1 Course Description

This short module will introduce the use of the typographic system L<sup>A</sup>T<sub>E</sub>X, focusing on its applied use for research. Further, the short module introduces Markdown and its use in conjunction with data analysis software.

## 2 Contents

The following is a planned outline of the course. This may change depending on the pace of the class. Lecture materials will be uploaded to the module's GitHub repository.

### 2.1 Lecture 1: Introduction to L<sup>A</sup>T<sub>E</sub>X and document editing

- Introduction to L<sup>A</sup>T<sub>E</sub>X, what is it and what is it for?
- Brief history of L<sup>A</sup>T<sub>E</sub>X
- Preliminary issues
  - Hardware requirements
  - Installation of T<sub>E</sub>X distributions
  - Development environments (IDEs: VS Code, T<sub>E</sub>XMaker, etc.)
  - Overleaf: using L<sup>A</sup>T<sub>E</sub>X online
  - Identification of keyboard shortcuts and important keycaps
- L<sup>A</sup>T<sub>E</sub>X file structure
- Simple commands
- Packages
- Document classes
- Basic document formatting
- Text handling
  - Alignment

- Lists
- Titles, covers and abstracts
- Indexes
- Headers and footnotes

## 2.2 Lecture 2: Math mode, tables and figures

- Introduction to math mode
- Basic symbols and greek letters
- Equations
- Matrices
- Basic tables
- Automated table-making: Excel2LaTeX / Overleaf addins
- Including figures and subfigures

## 2.3 Lecture 3: Bibliography management with L<sup>A</sup>T<sub>E</sub>X, complex documents

- BibT<sub>E</sub>X and BibL<sup>A</sup>T<sub>E</sub>X
- Zotero integration
- Brief review of Mendeley, Citavi and other integrations
- Citation and bibliography formatting, styling
- Multi-file projects
- Cross-referencing
- Tips for error debugging
- Time-permitting: basic plotting with tikz and pgfplots

## 2.4 Lecture 4: Integration with statistical packages

- RMarkdown/Quarto
  - Basic Markdown syntax
  - R code chunks
  - Output formats
  - Use of L<sup>A</sup>T<sub>E</sub>X
- Presenting data analysis results with R
  - *stargazer*
  - *kableExtra*
  - *modelsummary*
  - *gt* and *flextable*
- Stata
  - *estout*
  - *outreg2*

## 2.5 Advanced topics (if time allows)

- Presentations with beamer and Quarto
- Advanced document formatting with classes
- Using L<sup>A</sup>T<sub>E</sub>X from Word
- *knitr/sweave*
- Codecogs
- Working with Python/Jupyter

## 3 Evaluation

Please consult the program’s regulation manual for short module evaluation criteria. All communication will be done through the program’s Slack channel.

## 4 Materials

I will provide all necessary materials for the course in the GitHub repository. Typically, this will include lecture slides, code snippets, and other resources. Consult the Reference Material section for additional resources.

## 5 Software

We will mostly rely on Overleaf. However, you must install a T<sub>E</sub>X distribution on your computer for local demonstrations. I recommend using T<sub>E</sub>XLive for Windows, Linux and macOS. An alternative is MiK<sub>T</sub>E<sub>X</sub> for Windows.

For editing, an integrated development environment (IDE) is recommended. T<sub>E</sub>X Maker is a good option for Windows, macOS and Linux.

For Markdown, we will use VS Code and RStudio, both of which are free. You can install the *Markdown All in One* extension for VS Code. Follow the instructions for your *\*Intro to R\** module to install R and RStudio. For cloning the repository, you will need Git, which you can install with your instructions from the *\*Git & GitHub\** module.

## 6 Keyboard layout

We will routinely need to type symbols like and others. Make sure you are comfortable with your keyboard layout and that you can type these symbols easily. This may seem trivial, but it is important for the course, as we absolutely cannot afford to lose time finding symbols on the keyboard. You may need to change your keyboard layout to the correct language so that the computer follows the physical layout of your keyboard. For Windows users, this is easily done by pressing **Win + Space** and selecting the correct layout (see here)<sup>1</sup>.

## 7 Communication

All communication will be done through the program’s Slack channel. I do not monitor email regularly, so please use Slack for any questions or concerns.

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<sup>1</sup>Mac and Linux Users, sorry, you’re on your own here.

## Bibliography

- Frain, John C. Applied LATEX for Economists, Social Scientists and Others: TEP Working Paper No. 0214.
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- Goulding, Kevin. usepackageTikz for economists.
- Greenber, Harvey J. A Simplified Introduction to LaTeX.
- Griffiths, David F., and Desmond J. Higham. *Learning Latex: Second Edition*. 2nd ed. Philadelphia: Society for Industrial and Applied Mathematics, 2016.
- Kottwitz, Stefan. *LaTeX Beginner's Guide*. 1st ed. Birmingham: Pack Publishing, 2011.
- Krummel, Michelle. LaTeX Tutorials (featuring Texmaker). <https://www.youtube.com/watch?v=0ivLZh9xK1Q&list=PL1D4EAB31D3EBC449>.
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- Yu Ko, Chiu. Tikz Cookbook: Diagrams in Economics. [https://play.google.com/books/reader?id=t3ZZDwAAQBAJ&hl=en\\_GB&pg=GBS.PP1](https://play.google.com/books/reader?id=t3ZZDwAAQBAJ&hl=en_GB&pg=GBS.PP1).