

# L<sup>A</sup>T<sub>E</sub>X

## A SHORT INTRODUCTION

Jesse Knight

University of Totonro

Date TBD

Location TBD

# Overview

Introduction

Getting Started

Examples

# INTRODUCTION

# What is L<sup>A</sup>T<sub>E</sub>X?

A typesetting program: *content*  $\rightarrow$  *a document*

# What is L<sup>A</sup>T<sub>E</sub>X?

A typesetting program: *content*  $\rightarrow$  *a document*

# What is L<sup>A</sup>T<sub>E</sub>X?

A typesetting program: *content*  $\rightarrow$  *a document*

input: filename.tex

L<sup>A</sup>T<sub>E</sub>X

output: filename.pdf

```
\begin{document}
\maketitle
\tableofcontents
\clearpage
\setlength{\parskip}{6pt}

\section{Scenarios}
For model checks, we explore 3 simulation scenarios:
\newcommand{\scenario}[2]{\textbf{\nameref{sec:#1}}: #2}
\begin{enumerate}
\item \scenario{eq}
{only susceptible groups; for verifying demographic outputs}
\item \scenario{epi}
{only susceptible and undiagnosed groups; for verifying transmission dynam
\item \scenario{full}
{all population groups; for verifying intervention dynamics}
\end{enumerate}
\clearpage

\section{Equilibration}\label{sec:eq}\renewcommand{\sec}[eq]
\figi{\sec-X-activity}
{Equilibration proportions of activity groups and sex}
\figi{\sec-N-all}
{Total population during equilibration, adjusted to reach  $S_N 0\%$  at the
\clearpage

\section{Epidemic}\label{sec:epi}\renewcommand{\sec}[epi]
\subsection{Population Proportions}
\figii{\sec-X-activity}{activity groups}
{\sec-X-infected}{infected groups}
{Population proportions}

\subsection{Prevalence}
\figii{\sec-prevalence-sexwork}{FSW and clients}
```



Model Checks: Dynamic Model of HIV Transmission in eSwatini with focus on Female Sex Workers	
Jesse Knight, Hui Ting Ma, Linwei Wang, Sharmistha Mishra	
October 9, 2018	
<b>Contents</b>	
1 Scenarios	2
2 Equilibration	3
3 Epidemic	4
3.1 Population Proportions	4
3.2 Prevalence	4
3.3 Incidence	5
3.4 Cumulative Infections	5
3.5 Mixing Matrices	6
4 Full Model	8
4.1 Population Proportions	8
4.2 Prevalence	8
4.3 Incidence	9
4.4 Cumulative Infections	9
4.5 Mixing Matrices	10
5 Boolean Checks	12
6 Code	13

# Advantages of L<sup>A</sup>T<sub>E</sub>X

separate content and formatting

automatic numbers and cross-references

beautiful math

comments and version control

split up your documents into parts

create a book



# Advantages of L<sup>A</sup>T<sub>E</sub>X

- ▶ separate content and formatting
- ▶ automate numbers and cross-references
- ▶ beautiful math
- ▶ comments and version control
- ▶ split-up large documents into parts
- ▶ it's free!

# Advantages of L<sup>A</sup>T<sub>E</sub>X

- ▶ separate content and formatting
- ▶ automate numbers and cross-references
- ▶ beautiful math
- ▶ comments and version control
- ▶ split-up large documents into parts
- ▶ it's free!

# Advantages of L<sup>A</sup>T<sub>E</sub>X

- ▶ separate content and formatting
- ▶ automate numbers and cross-references
- ▶ beautiful math
- ▶ comments and version control
- ▶ split-up large documents into parts
- ▶ it's free!

# Advantages of L<sup>A</sup>T<sub>E</sub>X

- ▶ separate content and formatting
- ▶ automate numbers and cross-references
- ▶ beautiful math
- ▶ comments and version control
- ▶ split-up large documents into parts
- ▶ it's free!

# Advantages of L<sup>A</sup>T<sub>E</sub>X

- ▶ separate content and formatting
- ▶ automate numbers and cross-references
- ▶ beautiful math
- ▶ comments and version control
- ▶ split-up large documents into parts
- ▶ it's free!

# Advantages of L<sup>A</sup>T<sub>E</sub>X

- ▶ separate content and formatting
- ▶ automate numbers and cross-references
- ▶ beautiful math
- ▶ comments and version control
- ▶ split-up large documents into parts
- ▶ it's free!

# How does L<sup>A</sup>T<sub>E</sub>X Work?

Three layers:

1. “primitives” – e.g. `\def\pi{3.14}` defines a macro `\pi` to contain “3.14”  
+ “kernel” – e.g. tools to combine primitives
2. “classes” – e.g. an article, which should have: title, author, sections, etc.  
+ “packages” – e.g. modify or extend a basic class
3. “document” – e.g. this specific article (including content!)

# How does L<sup>A</sup>T<sub>E</sub>X Work?

Three layers:

1. “primitives” – e.g. `\def\pi{3.14}` defines a macro `\pi` to contain “3.14”
  - + “kernel” – e.g. tools to combine primitives
2. “classes” – e.g. an article, which should have: title, author, sections, etc.
  - + “packages” – e.g. modify or extend a basic class
3. “document” – e.g. this specific article (including content!)



# How does L<sup>A</sup>T<sub>E</sub>X Work?

Three layers:

1. “primitives” – e.g. `\def\pi{3.14}` defines a macro `\pi` to contain “3.14”  
+ “kernel” – e.g. tools to combine primitives
2. “classes” – e.g. an article, which should have: title, author, sections, etc.  
+ “packages” – e.g. modify or extend a basic class
3. “document” – e.g. this specific article (including content!)

# How does L<sup>A</sup>T<sub>E</sub>X Work?

Three layers:

1. “primitives” – e.g. `\def\pi{3.14}` defines a macro `\pi` to contain “3.14”  
     + “kernel” – e.g. tools to combine primitives
2. “classes” – e.g. an article, which should have: title, author, sections, etc.  
     + “packages” – e.g. modify or extend a basic class
3. “document” – e.g. this specific article (including content!)

# How does L<sup>A</sup>T<sub>E</sub>X Work?

Three layers:

1. “primitives” – e.g. `\def\pi{3.14}` defines a macro `\pi` to contain “3.14”  
 + “kernel” – e.g. tools to combine primitives
2. “classes” – e.g. an article, which should have: title, author, sections, etc.  
 + “packages” – e.g. modify or extend a basic class
3. “document” – e.g. this specific article (including content!)

# How does L<sup>A</sup>T<sub>E</sub>X Work?

Three layers:

1. “primitives” – e.g. `\def\pi{3.14}` defines a macro `\pi` to contain “3.14”  
     + “kernel” – e.g. tools to combine primitives
2. “classes” – e.g. an article, which should have: title, author, sections, etc.  
     + “packages” – e.g. modify or extend a basic class
3. “document” – e.g. this specific article (including content!)

# GETTING STARTED

# Your First Document

```
\documentclass{article}  
% document header  
\begin{document}  
  % document content  
  Hello World  
\end{document}
```

But first: Overleaf → “New Project”

# Your First Document

```
\documentclass{article}  
% document header  
\begin{document}  
  % document content  
  Hello World  
\end{document}
```

But first: [Overleaf](#) → “New Project”

# Your First Document

```
\documentclass{article}  
% document header  
\begin{document}  
  % document content  
  Hello World  
\end{document}
```

But first: [Overleaf](#) → “New Project”



# Document Elements

`\title{title}`

`\author{author}`

`\date{date}`

`\section{section}`

`\subsection{subsection}`

`\subsubsection{subsubsection}`

`\tableofcontents`

`\bibliography{bibliography}`

# Document Elements

- ▶ title, author, date
- ▶ sections
- ▶ math
- ▶ cross-references & table of contents
- ▶ citations & bibliography

# Document Elements

- ▶ title, author, date
- ▶ sections
- ▶ `math`
- ▶ cross-references & table of contents
- ▶ citations & bibliography

# Document Elements

- ▶ title, author, date
- ▶ sections
- ▶ math
- ▶ cross-references & table of contents
- ▶ citations & bibliography

# Document Elements

- ▶ title, author, date
- ▶ sections
- ▶ math
- ▶ cross-references & table of contents
- ▶ citations & bibliography

# Document Elements

- ▶ title, author, date
- ▶ sections
- ▶ math
- ▶ cross-references & table of contents
- ▶ citations & bibliography

# EXAMPLES

# Putting it all Together



# Putting it all Together

- ▶ e.g. a thesis
- ▶ e.g. a CV
- ▶ e.g. an article

# Putting it all Together

- ▶ e.g. a thesis
- ▶ e.g. a CV
- ▶ e.g. an article

# Putting it all Together

- ▶ e.g. a thesis
- ▶ e.g. a CV
- ▶ e.g. an article

# Helpful Resources

- ▶ [Overleaf](#) – Online  $\text{\LaTeX}$  writing application
- ▶  [\$\text{\LaTeX}\$  Install Guide](#) – To install  $\text{\LaTeX}$  on your computer (offline)
- ▶ [TeXstudio](#) – Great editor for composing  $\text{\LaTeX}$  “code” (offline)
- ▶  [\$\text{\TeX}\$  Stack Exchange](#) – Q & A style how-to and debugging help
- ▶  [\$\text{\LaTeX}\$  Cheat Sheet](#) – A really nice reference for common commands