

TITLE IN ALL CAPS

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in

Partial Fulfillment of the Requirements for the

Degree of Doctor of Philosophy

YEAR

Supervisor of Dissertation

Supervisor's Typed Name, Full Faculty Title and Affiliation

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ABSTRACT

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CHAPTER 1

UNIVERSITY OF PENNSYLVANIA PH.D. DISSERTATION LATEX TEMPLATE

1.1. Introduction

This template aims to fulfill University format requirements when one follows the instructions, resolves errors and warnings, and does not change the style file or font settings. Your graduate group may have additional formatting requirements like specific citation and bibliography styles.¹ Check with your advisor and edit the template as needed. Please consult the Office of the Provost dissertation *Formatting FAQs* for the most up-to-date requirements and policies.

1.2. Getting Started

The template requires TeX Live 2022 and is optimized for pdfLaTeX and the LaTeX editor Overleaf. Other LaTeX editing programs may require you to compile the document more than once. To claim your free Overleaf Pro account, go to the [Penn Libraries Overleaf Portal](#) and click on the green “Log in through your institution” button.

Click [here](#) if you have a question about Overleaf, and they’ll make sure it reaches the right person. Click [here](#) for their help page to learn how to use Overleaf and LaTeX. See Chapter 1.5 for additional resources.

1.2.1. Packages

The template automatically loads the packages it requires to function. See the `PackagesLoaded-byTemplate.tex` file for a complete list of all the packages loaded by the template. You may manually load other packages if you wish, and Overleaf will give you a warning message when you compile your document if your package conflicts with one of the template’s packages. If you receive a warning, you can consult the specified package documentation on [CTAN](#) for a possible resolution.

¹If you are using another LaTeX template, please make sure it complies with all University formatting requirements.

1.3. Margins

As of January 2023, the margins must be 1 inch on each side. Remember to resolve all overfull or underfull warnings to help ensure your dissertation meets the margin requirements.² Click [here](#) to learn how to identify and resolve the warnings. Common causes of warnings include

- **LaTeX CANNOT automatically break long mathematical expressions or parenthetical references across multiple lines.** Chapter 3 demonstrates two methods for manually splitting equations.
- You can manually control the hyphenation by using the `\hyphenation{}` hints command. For example, write `\hyphenation{rep-re-sent-a-tive}` in the preamble to tell LaTeX where it can break the word “representative.”
- The verbatim environment and the `\verb` command remove LaTeX’s formatting controls. There may be instances that require you to manually adjust line breaks.
- The `breaklinks` option of the `hyperref` package is activated, however there may be instances of URLs running into the margins that require your manual intervention.

1.4. Template Tips

1.4.1. Chapters, sections, and subsections

Create chapters with the `\chapter` command, sections with the `\section` command, and subsections with the `\subsection` command. If you use the `\MakeUppercase` command to autocapitalize chapter titles, carefully check each title and its table of contents entry for compliance with University formatting requirements. You may wish to split chapters into separate `.tex` files for easier document management. You can use the `\include{}` command to add the chapters to your main `.tex` file. Click [here](#) to learn more.

If a chapter or section title contains math expressions or other symbols, the `hyperref` package may give a `PDFDocEncoded` warning when you compile your document. Use the `\texorpdfstring`

²This is a common source of errors – please double check the margins before submitting your final dissertation.

command to edit the corresponding PDF bookmark text to resolve the warning. For example, the section title “Lemurs Wrote $E = mc^2$ in Mud on the Riverbank” should be coded

```
\section{Lemurs Wrote \texorpdfstring{$E=mc^2$}{E=mc2} in Mud on the Riverbank}
```

1.4.2. Page orientation

The template’s default page orientation is portrait. Use the landscape environment to create landscape pages. Page number location and margins will automatically update like page 6.

1.5. Getting Help and Giving Feedback

Questions about LaTeX?

- Click [here](#) to connect with LaTeX resources, tutorials, and more.

Want to give feedback on the template?

- Click [here](#) to share it with us.

1.6. Acknowledgments

The University of Pennsylvania Ph.D. Dissertation LaTeX Template was initiated by Dr. Beth S. Wenger, Associate Dean for Graduate Studies, School of Arts and Sciences. It was developed by Lauren Gala, Penn Libraries with assistance from Dr. Julia Hartmann and Dr. Man Cheung Tsui, Department of Mathematics, and Bridget Rothera, Graduate Division School of Arts and Sciences. Portions of the code and text were reprinted or adapted with permission from Ratcliffe S.J. (2017) [Penn Biostat LaTeX Template: PhD dissertation](#) modified from Dissertation Template for Wharton PhD Candidates in LaTeX.

CHAPTER 2

TABLES AND FIGURES

2.1. Tables

The captions of tables inside the table environment (see Table 2.1) will display in the List of Tables.

Use the `\label` to label tables.

		Primes				
		2	3	5	7	
Powers	504	3	2	0	1	
	540	2	3	1	0	
Powers	gcd	2	2	0	0	min
	lcm	3	3	1	1	max

Table 2.1: Example Table

2.2. Figures

The captions of figures inside the figure environment (see Figure 2.1) will display in the List of Illustrations. Use the `\label` to label figures.³

³This also includes photographs, maps, schemes, diagrams, etc.



Figure 2.1: Lemur photograph

LaTeX takes into account line and page breaks when determining where to place floating objects like figures and tables on a page. You can override LaTeX's placement decisions by using the float package options. Consult the [float package documentation](#) to learn how to gain more control over where and how float objects display.

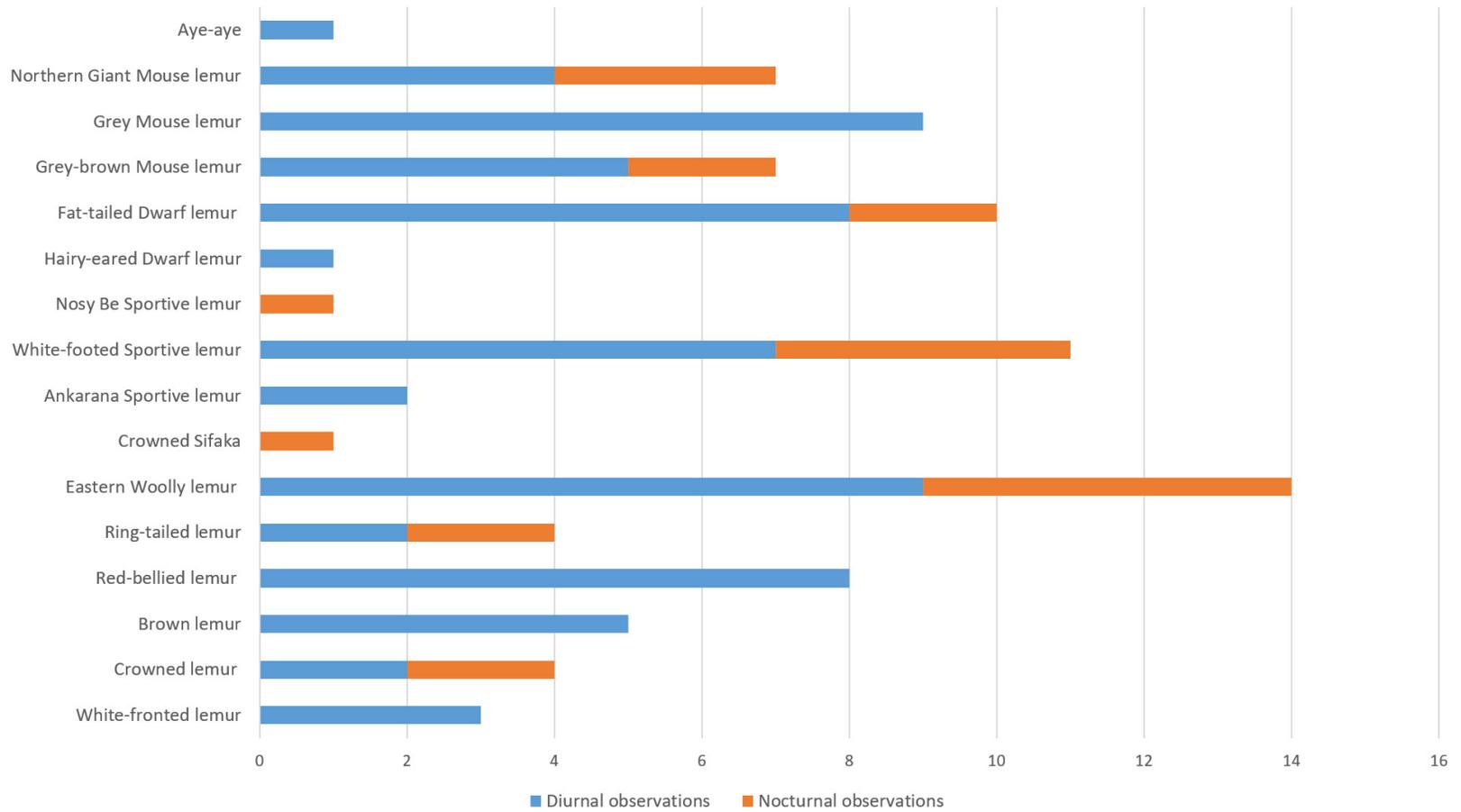


Figure 2.2: Lemur bar chart on landscape page

CHAPTER 3

EQUATIONS

The template automatically loads several math packages like `amsmath`, `amssymb`, and `amsfonts`. The `split` and the `multline` environments allow you to split an equation over multiple lines. Equation 3.1 is written in the `split` environment, and Equation 3.2 is in the `multline` environment. Notice the differences in how the two environments align the equations and where they place the equation number.

$$\begin{aligned} A &= \frac{\pi r^2}{2} \\ &= \frac{1}{2}\pi r^2 \end{aligned} \tag{3.1}$$

$$\begin{aligned} p(x) &= 3x^6 + 14x^5y + 590x^4y^2 + 19x^3y^3 + 3x^6 + 14x^5y + 590x^4y^2 + 19x^3y^3 \\ &\quad + 3x^6 + 14x^5y + 590x^4y^2 + 19x^3y^3 - 12x^2y^4 - 12xy^5 + 2y^6 - a^3b^3 \end{aligned} \tag{3.2}$$

CHAPTER 4

APPENDICES

Appendices are optional. Use the `\chapter` command inside the custom `append` environment to insert appendices. Use the `\ref{ }` command to reference appendices in your text.

CHAPTER 5

CITATIONS AND BIBLIOGRAPHY

LaTeX bibliography packages and citation management programs enable you to efficiently cite and format bibliographic references. You can manage bibliographic entries in a separate bibliography database file (*.bib) or you can embed the entries directly into the main .tex file. While the LaTeX template was built for the former approach, you can modify it to accommodate latter.

5.1. Getting Started

Please watch this [short video](#) to learn the principles underpinning the template bibliography before proceeding.

5.2. Default Template Settings

The commands written in `sampledissertation.tex` load the `natbib` package in its preamble and reference the bibliographic entries stored in `bibliography.bib`.

This is an example inline citation (Heard, 2020). If you want to cite two publications in one place like (McGoogan, 2020; Wright, 2014), write one citation command. You can add a prenote or postnote (Lake, 1979, p. 78) to a citation.

5.3. Customization

Citation and bibliography formatting commands are written in the main .tex file for your convenience. You can edit the relevant code in the .tex file to produce citation and bibliography styles appropriate for your field. If you wish to make significant changes to the structure of the bibliography, you may need to edit the `bibliof` environment defined in `upennstyle.sty`.

5.3.1. Styles and formatting

The `natbib` package, selected format and style options, and example citations are for demonstration. In addition to `natbib`, other packages and accompanying documentation are free to download from [CTAN](#). Always consult the package documentation for additional citation and bibliography commands and formatting options. Remember that the available commands and styles differ between

packages.

5.3.2. Embedded bibliography

You can edit the template to manage your bibliography directly in the .tex file obviating the need for a separate .bib file. Replace the `\bibliography` command in the `bibliof` environment with the list of bibitems and edit relevant code elsewhere in the template as needed.

5.4. Recommended Resources

- Click [here](#) to learn how to manage citations and bibliographies in LaTeX documents
- Click [here](#) to learn citation best practices and how to use citation management programs
- Click [here](#) to watch a short introduction to citing and formatting references with natbib

APPENDIX A

TITLE OF APPENDIX A

The content of Appendix A begins here. Use the `\chapter` command to insert additional appendices.

A.1. Section Name of Appendix A

Use the `\section` command to create sections.

APPENDIX B

TITLE OF APPENDIX B

The content of Appendix B begins here.

BIBLIOGRAPHY

Stephen B. Heard. *Charles Darwin's Barnacle and David Bowie's Spider: How Scientific Names Celebrate Adventurers, Heroes, and Even a Few Scoundrels*. Yale University Press, 2020.

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