THE TITLE OF YOUR THESIS IN

INVERTED PYRAMID

FORMAT

A THESIS

Presented to the Department of Electrical Engineering

California State University, Long Beach

In Partial Fulfillment

of the Requirements for the Degree

Master of Science in Electrical Engineering

Committee Members:

Albert Einstein, Ph.D. (Chair)
Max Planck, Ph.D.
Thomas Young, Ph.D.
Erwin Schrödinger, Ph.D
Stephen Hawking, Ph.D

College Designee:

Richard Feynman, Ph.D.

By First A. Last

B.S., 2018, University of California, Irvine

May 2020

ABSTRACT

A list of keywords may be used as the last paragraph with first line indented and a heading as the first word or phrase in italics with a colon. The abstract should not be longer than two pages.

ACKNOWLEDGEMENTS

The acknowledgments page is not required, but many people include one. You may give appreciation to anyone who has assisted you with writing or researching your manuscript as well as friends and family or anyone who has inspired you or supported you during your life or the course of your education.

If you wish to dedicate your manuscript to someone, you can write out a dedication as part of your acknowledgments, but a separate dedication page is not allowed. All of the formatting rules that apply to your text apply to the acknowledgments page.

Sentences or paragraphs in languages other than English can be used in the acknowledgments without quotation marks or italics or translation. Slang and colloquialisms can be used, but keep in mind that your manuscript will be accessible online to future employers and others assessing your background who may be find such language unprofessional.

If you have received funding for your research and the funding organization requires recognition, mention it on the acknowledgments page.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

Abbreviation	Description
IEEE	Institute of Electrical and Electronics Engineers
ASME	American Society of Mechanical Engineers

LIST OF WORKS

1. *Titles of Paintings, Sculptures, and Other Works of Art Use Italics and Headline Style Capitalization and Dimensions of the Piece Can Be Included at the End in Parentheses* (8.5 in. by 11 in.)

2. "Titles of Photographs Use Quotation Marks and Headline Style Capitalization and Dimensions of the Piece Can Be Included at the End in Parentheses" (40 cm by 40 cm)

3. Descriptions of the items depicted in a photograph of an untitled work or a photo of an element in the design of the exhibition can use headline style capitalization or sentence style capitalization; if a title or description takes up more than one line, indent all lines that follow the first line further so that words on those lines begin underneath words on the first line (rather than beginning flush with words on the first line)

Images of these works are available as supplemental files to this manuscript in ProQuest Dissertations and Theses database.

PREFACE

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus. Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.

<div align="center">**CHAPTER 1**</div>

<div align="center">**BASIC TYPESETTING**</div>

In these paragraphs, we will display examples for many common features in LATEX. The code is shown in `main.tex` and the associated output in `main.pdf`. We assume you already know the basic syntactical structure of TEXwith its commands and environments. If you are not familiar, it is recommended you read `intro to latex.pdf` provided in this package. We will start with the most basic examples of different fonts and styles.

<div align="center">**Fonts and Styles**</div>

Bold font is made using the `\textbf` command. *Italic* font is made using the `\textit` command. <u>Underline</u> font is made using the `\underline` command. `Monospace/teletype` font is made using the `\texttt` command. Sans-serif font is made using the `\textsf` command.

<div align="center">**Math**</div>

One of LATEX's greatest strengths is its mathemetical typesetting. You can enter inline math $e^{i\pi}$. You can also have a math block.

$$f(x) = \int_{-\infty}^{\infty} g(x)\,\mathrm{d}x$$

You can have numbered equations with the `equation` environment.

$$\Phi(n) = \gamma^n + \Delta\gamma \cdot \vec{\zeta} \tag{1}$$

You can also align equations by using a `&` in the `align*` environment. Omitting the `*` will number each line.

$$h_1 = \mathbf{X}_1 + N$$

$$h_2 = \mathbf{X}_1 + N$$

$$\vdots$$

$$h_n = \mathbf{X}_n + N$$

Make sure you use the proper notation for your field. A common mistake is to italicize units in math mode. Units are supposed to be typset in a roman font because μm in italic means you are multiplying two variables and μm means your value is in micrometers. A similar mistake is often made for special functions. If you are using a multi-letter function such as sin() or floor(), it should not be italic for the same reason as before. To fix these issues, you can use the `\mathrm` command when in math mode to set your text as roman (or upright). Greek letters need to be specified as upright by prepending 'up' to the command, e.g., `$\upmu$`.

Quotation marks

Quotes are written in latex using ` for opening and ´ for closing. They can be used for 'single' and "double" quotes alike.

Lists

Bulleted lists are made with the `itemize` environment. Numbered lists are made with hte `enumerate` environment. They can be made hierrarchal by embedding another lists within. A bulleted list:

- First level

  – second level

A numbered list:

1. First level

    (a) second level

Code Listing

You can make a code block using the `verbatim` environment. Be mindful that unlike most TEXenvironments, it is senstive to spaces (but not tabs) at the beginning of lines so that you may indent your code.

```
class Fill:

  def __init__(self, color=BLACK, style='solid'):

    self.color = color

    self.style = style
```
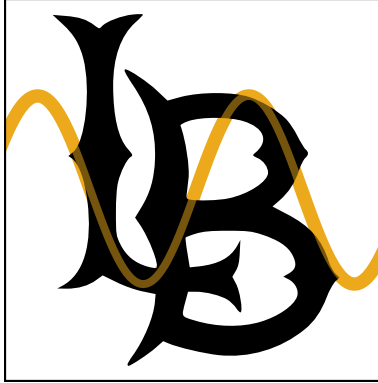
Figures

Figures can be included using the `\includegraphics` command, and their placement and captioning can be configured using the `figure` environment. Generally, LATEXcan determine the best placement of your figure on the page itself, but you can give it a placement option of h, t, b, or p to place it <u>h</u>ere, on <u>t</u>op, on <u>b</u>ottom, or on its own <u>p</u>age. Note that in `main.tex`, we have already set the graphics path with the `\graphicspath{ {Figures/ } }` command, which means it is always going to look in that folder for your figures.

The graphics path is already set

Tables

Tables can be generated using the `tabular` environment, and their placement and captioning is configured with the `table` environment, like with figures. In the `tabular` environment, you provide a section parameter that configures your number ofcolumns, their text alignment, and vertical borders.

FIGURE 1. The CSULB logo partially superimposed over a sine wave. This extra text is a test of the caption behavior when there is a longer caption. Lorem ipsum dolor.

TABLE 1. An example of a table

Color	Radius, r [mm]	RMS Voltage, v [V]
Cyan	72.2	2.1
Magenta	45.2	5.5
Yellow	78.5	1.3
Black	33.3	6.9

Citations and Cross-references

You can add citations from your `references.bib` file using the `\cite` command [1]. You can also cross-reference equations, figures, and tables and many other items by giving them a custom label with the `\label` command, and using the `\ref` command to call them. Citations and references like this are very nice because you don't have to worry about item numbering and how it may change as you develop your document; you tell LATEXwhere you want it, and it will handle the numbering so it makes sense. And in PDF viewers, the cross-references are clickable intra-document links that will take you to the associated item. Figure 1. Table 1. Equation 1.

Footnotes

Footnotes can be placed with the `\footnote` command[1].

---

[1]This is a footnote but it's a very long footnote so that we can test the indent of the footnote text when it leads onto a second line at the bottom of the page.

Headings

This document class supports up to third level subheadings or *subsubsections*. Fourth level headings are not currently supported.

CHAPTER 2

DUMMY TEXT

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

First Level Subhead (section)

Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu

6

purus. Donec bibendum quam in tellus. Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.

Second Level Subheads (subsection)

Quisque ullamcorper placerat ipsum. Cras nibh. Morbi vel justo vitae lacus tincidunt ultrices. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. In hac habitasse platea dictumst. Integer tempus convallis augue. Etiam facilisis. Nunc elementum fermentum wisi. Aenean placerat. Ut imperdiet, enim sed gravida sollicitudin, felis odio placerat quam, ac pulvinar elit purus eget enim. Nunc vitae tortor. Proin tempus nibh sit amet nisl. Vivamus quis tortor vitae risus porta vehicula.

Fusce mauris. Vestibulum luctus nibh at lectus. Sed bibendum, nulla a faucibus semper, leo velit ultricies tellus, ac venenatis arcu wisi vel nisl. Vestibulum diam. Aliquam pellentesque, augue quis sagittis posuere, turpis lacus congue quam, in hendrerit risus eros eget felis. Maecenas eget erat in sapien mattis porttitor. Vestibulum porttitor. Nulla facilisi. Sed a turpis eu lacus commodo facilisis. Morbi fringilla, wisi in dignissim interdum, justo lectus sagittis dui, et vehicula libero dui cursus dui. Mauris tempor ligula sed lacus. Duis cursus enim ut augue. Cras ac magna. Cras nulla. Nulla egestas. Curabitur a leo. Quisque egestas wisi eget nunc. Nam feugiat lacus vel est. Curabitur consectetuer.

Third level subheads (subsubsection). Suspendisse vel felis. Ut lorem lorem, interdum eu, tincidunt sit amet, laoreet vitae, arcu. Aenean faucibus pede eu ante. Praesent enim elit, rutrum at, molestie non, nonummy vel, nisl. Ut lectus eros, malesuada sit amet, fermentum eu, sodales cursus, magna. Donec eu purus. Quisque vehicula, urna sed ultricies auctor, pede lorem egestas dui, et convallis elit erat sed nulla. Donec luctus. Curabitur et nunc. Aliquam dolor odio, commodo pretium, ultricies non, pharetra in, velit. Integer arcu est, nonummy in, fermentum faucibus, egestas vel, odio.

Sed commodo posuere pede. Mauris ut est. Ut quis purus. Sed ac odio. Sed vehicula hendrerit sem. Duis non odio. Morbi ut dui. Sed accumsan risus eget odio. In hac habitasse platea dictumst. Pellentesque non elit. Fusce sed justo eu urna porta tincidunt. Mauris felis odio,

sollicitudin sed, volutpat a, ornare ac, erat. Morbi quis dolor. Donec pellentesque, erat ac sagittis semper, nunc dui lobortis purus, quis congue purus metus ultricies tellus. Proin et quam. Class aptent taciti sociosqu ad litora torquent per conubia nostra, per inceptos hymenaeos. Praesent sapien turpis, fermentum vel, eleifend faucibus, vehicula eu, lacus.

2.1   Example of First-Level Subheading With Hierarchical Numbering

Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Donec odio elit, dictum in, hendrerit sit amet, egestas sed, leo. Praesent feugiat sapien aliquet odio. Integer vitae justo. Aliquam vestibulum fringilla lorem. Sed neque lectus, consectetuer at, consectetuer sed, eleifend ac, lectus. Nulla facilisi. Pellentesque eget lectus. Proin eu metus. Sed porttitor. In hac habitasse platea dictumst. Suspendisse eu lectus. Ut mi mi, lacinia sit amet, placerat et, mollis vitae, dui. Sed ante tellus, tristique ut, iaculis eu, malesuada ac, dui. Mauris nibh leo, facilisis non, adipiscing quis, ultrices a, dui.

2.1.1   Example of a Second-Level Subheading With Hierarchical Numbering

Morbi luctus, wisi viverra faucibus pretium, nibh est placerat odio, nec commodo wisi enim eget quam. Quisque libero justo, consectetuer a, feugiat vitae, porttitor eu, libero. Suspendisse sed mauris vitae elit sollicitudin malesuada. Maecenas ultricies eros sit amet ante. Ut venenatis velit. Maecenas sed mi eget dui varius euismod. Phasellus aliquet volutpat odio. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Pellentesque sit amet pede ac sem eleifend consectetuer. Nullam elementum, urna vel imperdiet sodales, elit ipsum pharetra ligula, ac pretium ante justo a nulla. Curabitur tristique arcu eu metus. Vestibulum lectus. Proin mauris. Proin eu nunc eu urna hendrerit faucibus. Aliquam auctor, pede consequat laoreet varius, eros tellus scelerisque quam, pellentesque hendrerit ipsum dolor sed augue. Nulla nec lacus.

2.1.1.1 Example of a third-level subheading with hierarchical numbering. Suspendisse vitae elit. Aliquam arcu neque, ornare in, ullamcorper quis, commodo eu, libero. Fusce sagittis erat at erat tristique mollis. Maecenas sapien libero, molestie et, lobortis in, sodales eget, dui. Morbi ultrices rutrum lorem. Nam elementum ullamcorper leo. Morbi dui. Aliquam sagittis.

Nunc placerat. Pellentesque tristique sodales est. Maecenas imperdiet lacinia velit. Cras non urna. Morbi eros pede, suscipit ac, varius vel, egestas non, eros. Praesent malesuada, diam id pretium elementum, eros sem dictum tortor, vel consectetuer odio sem sed wisi.

Non-hierarchical heading: Sed feugiat. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Ut pellentesque augue sed urna. Vestibulum diam eros, fringilla et, consectetuer eu, nonummy id, sapien. Nullam at lectus. In sagittis ultrices mauris. Curabitur malesuada erat sit amet massa. Fusce blandit. Aliquam erat volutpat. Aliquam euismod. Aenean vel lectus. Nunc imperdiet justo nec dolor. Sed feugiat. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Ut pellentesque augue sed urna. Vestibulum diam eros, fringilla et, consectetuer eu, nonummy id, sapien. Nullam at lectus. In sagittis ultrices mauris. Curabitur malesuada erat sit amet massa. Fusce blandit. Aliquam erat volutpat. Aliquam euismod. Aenean vel lectus. Nunc imperdiet justo nec dolor.

APPENDICES

APPENDIX A

AN EXAMPLE OF A SINGLE PART OF MULTIPLE APPENDICES

Some information that would go in the appendix.

APPENDIX B

ANOTHER EXAMPLE OF A SINGLE PART OF MULTIPLE APPENDICES

More information that would go in an appendix.

REFERENCES

REFERENCES

[1] R. Wayne, "The book title," *The Journal*, vol. 72, pp. 500–505, 2012.