CLINICAL MICROBIOLOGY BACTERIOLOGY IMMUNOLOGY VIROLOGY MYCOLOGY MOLECULAR BIOLOGY

Dissertation submitted as part of fulfilment for the

M.D. (Branch- IV Microbiology) Degree examination of

the Tamil Nadu Dr. M.G.R. Medical University

to be held in May-2023

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY
CHENNAI, TAMIL NADU

August 2020

QUOTATIONS

Some say the world will end in fire,
Some say in ice.
From what I've tasted of desire
I hold with those who favor fire.
But if it had to perish twice,
I think I know enough of hate
To say that for destruction ice
Is also great
And would suffice.

ROBERT FROST

DEDICATION

To Aishu and Viyan

CERTIFICATE

This is to certify that this dissertation entitled **CLINICAL MICROBIOLOGY BACTERIOLOGY IMMUNOLOGY VIROLOGY MYCOLOGY MOLECULAR BIOLOGY** is a bonafide research work done by **Dr.Ezhilnilavan Murugesan**, Post graduate in Microbiology, under my direct supervision and guidance in the Department of Microbiology, K.A.P.V. Govt. Medical College, Trichy - 620001, in partial fulfillment of the regulations of The Tamil Nadu Dr. M.G.R. Medical University for the award of **M.D Degree in Microbiology (Branch IV)**. The contents of this thesis, in full or in parts, have not been submitted to any other Institute or University for the award of any degree.

Dr. VANITHA, M.D.,
DEAN
MGM Govt. Hospital &
K.A.P.V. Govt. Medical College
Trichy - 620001

Dr. K. LAKSHMI, M.D.,
Associate Professor
Dept. of Microbiology
K.A.P.V. Govt. Medical College
Trichy - 620001

DECLARATION

I, **Dr.Ezhilnilavan Murugesan**, Post graduate, Department of Microbiology, K.A.P.V. Govt. Medical College, Trichy, solemnly declare that the dissertation titled **CLINICAL MICROBIOLOGY BACTERIOLOGY IMMUNOLOGY VIROLOGY MYCOLOGY MOLECULAR BIOLOGY** is a bonafide work done by me at Department of Microbiology, K.A.P.V. Govt. Medical College, Trichy under the expert guidance and supervision of **Dr. K. LAKSHMI, M.D.,** Associate Professor, Department of Microbiology, K.A.P.V. Govt. Medical College, Trichy. This dissertation is submitted towards the partial fulfillment of the regulations of The Tamil Nadu Dr. M.G.R. Medical University for the award of **M.D Degree in Microbiology (Branch IV)**. The contents of this thesis, in full or in parts, have not been submitted to any other Institute or University for the award of any degree.

Place: Trichy
Date: 16th Aug 2020

Dr. Ezhilnilavan Murugesan

Dr. K. LAKSHMI, M.D.,
Associate Professor
Dept. of Microbiology
K.A.P.V. Govt. Medical College
Trichy - 620001

ACKNOWLEDGEMENTS

I wish to express my sincere thanks to **Dr. Vanitha, M.D.**, Dean, Mahatma Gandhi Memorial Government General Hospital & K.A.P.V Government Medical College, Trichy for permitting me to use the resources of this institution for my study.

I owe my heartfelt gratitude and sincere thanks to my guide **Dr. K. Lakshmi, M.D.**, Associate Professor, Department of Microbiology for her valuable suggestions, guidance, constant support, motivation and encouragement throughout this study.

Sincere thanks to Former Professor **Dr. S. Dhanapaul M.D., D.M.V.**, Department of Microbiology for his constant encouragement and support during this work.

I extend my gratitude to my co-guide **Dr. Vanathi M.D.**, Assistant Professor, Department of Microbiology for her valuable guidance and constant support in this study.

I wish to extend my thanks to our Assistant Professors **Dr.Lavanya.R M.D., Dr.Kogilapriya M.D., Dr. Bhuvaneshwari M.D., Dr. Beulah M.D.,** for their support.

I would like to extend my thanks to all my postgraduate colleagues and technicians for their constant support and help in this study.

I am thankful to my dear parents, in-laws for their unconditioned love, sacrifice and constant emotional support. I thank my wife **Dr. Aishwarya S, M.D.,** and my son **Viyan E** for their constant motivation, emotional support and help in completing the dissertation work.

I would like to thank the Institutional Ethics Committee, K.A.P.V Government Medical college for approving my study.

Last but not least, I would like to thank the patients participated in this study for their co-operation and support.

ABSTRACT

KEYWORDS: LaTeX; Thesis; Style files; Format.

A LaTeX class along with a simple template thesis are provided here. These can be used to easily write a thesis suitable for submission at IIT-Madras. The class provides options to format PhD, MS, M.Tech., Dual Degree and B.Tech. thesis. It also allows one to write a synopsis using the same class file. Also provided is a BIBTeX style file that formats all bibliography entries as per the IITM format.

The formatting is as (as far as the author is aware) per the current institute guidelines.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

GLOSSARY

The following are some of the commonly used terms in this thesis:

OpenFOAM An opensource C++ toolbox for the development of customized numerical solvers, and pre-/post-processing utilities for the solution of continuum mechanics problems, most prominently including computational fluid dynamics

CFD A branch of fluid mechanics that uses numerical analysis and data structures to analyze and solve problems that involve fluid flows

FireFOAM FireFOAM is a CFD solver used for LES modeling of fire and its suppression in the OpenFOAM

ABBREVIATIONS

IITM	Indian Institute of Technology Madras
NCCRD	National Centre for Combustion Research and Development
RTFM	Read the Fine Manual

NOTATION

English Symbols

R_E	Radius of the earth
R_u	Universal Gas Constant

Greek Symbols

α	Angle of thesis in degrees
β	Flight path in degrees

Miscellaneous

$\|x\|$	Absolute value of x
$‰$	Per-mille (or per thousand)

CHAPTER 1

INTRODUCTION

This document provides a simple template of how the provided `iitmdiss.cls` LaTeX class is to be used. Also provided are several useful tips to do various things that might be of use when you write your thesis.

Before reading any further please note that you are strongly advised against changing any of the formatting options used in the class provided in this directory, unless you are absolutely sure that it does not violate the IITM formatting guidelines. *Please do not change the margins or the spacing.* If you do change the formatting you are on your own (don't blame me if you need to reprint your entire thesis). In the case that you do change the formatting despite these warnings, the least I ask is that you do not redistribute your style files to your friends (or enemies).

It is also a good idea to take a quick look at the formatting guidelines. Your office or advisor should have a copy. If they don't, pester them, they really should have the formatting guidelines readily available somewhere.

To compile your sources run the following from the command line:

```
% latex thesis.tex
% bibtex thesis
% latex thesis.tex
% latex thesis.tex
```

Modify this suitably for your sources.

To generate PDF's with the links from the `hyperref` package use the following command:

```
% dvipdfm -o thesis.pdf thesis.dvi
```

1.1 Package Options

Use this thesis as a basic template to format your thesis. The `iitmdiss` class can be used by simply using something like this:

```
\documentclass[PhD]{iitmdiss}
```

For getting a print form of the same thesis, add the option `PrntForm` like:

```
\documentclass[PhD,PrntForm]{iitmdiss}
```

To change the title page for different degrees just change the option from `PhD` to one of `MS`, `MTech`, `DD`, `MBA`, `MSc` or `BTech`. The other specific degrees are not supported yet but should be quite easy to add if you look at the code used to generate above degree pages in `iitmdiss.cls` file. The title page formatting really depends on how large or small your thesis title is. Consequently it might require some hand tuning. Edit your version of `iitmdiss.cls` suitably to do this. I recommend that this be done once your title is final.

To write a synopsis simply use the `synopsis.tex` file as a simple template. The synopsis option turns this on and can be used as shown below.

```
\documentclass[PhD,synopsis]{iitmdiss}
```

Once again the title page may require some small amount of fine tuning. This is again easily done by editing the class file.

This sample file uses the `hyperref` package that makes all labels and references clickable in both the generated DVI and PDF files. These are very useful when reading the document online and do not affect the output when the files are printed.

1.2 Example Figures and tables

Figure **??** shows a simple figure for illustration along with a long caption. The formatting of the caption text is automatically single spaced and indented. Table **??** shows a sample table with the caption placed correctly. The caption for this should always be placed before the table as shown in the example.

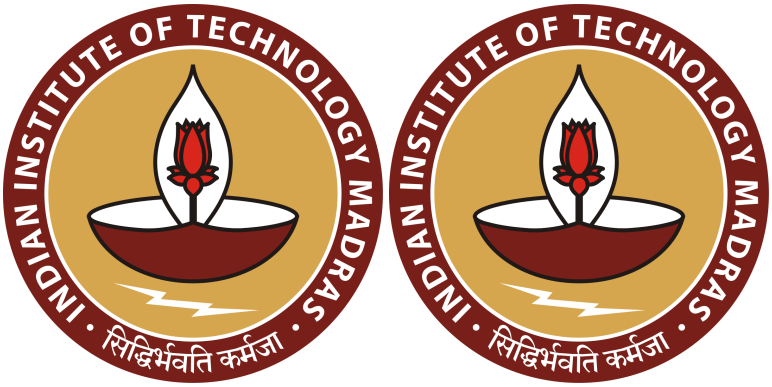

Fig. 1.1: Two IITM logos in a row. This is also an illustration of a very long figure caption that wraps around two two lines. Notice that the caption is single-spaced.

Table 1.1: A sample table with a table caption placed appropriately. This caption is also very long and is single-spaced. Also notice how the text is aligned.

x	x^2
1	1
2	4
3	9
4	16
5	25
6	36
7	49
8	64

1.3 Bibliography with BIBTEX

I strongly recommend that you use BIBTEX to automatically generate your bibliography. It makes managing your references much easier. It is an excellent way to organize

your references and reuse them. You can use one set of entries for your references and cite them in your thesis, papers and reports. If you haven't used it anytime before please invest some time learning how to use it.

I've included a simple example BIBTEX file along in this directory called `refs.bib`. The `iitmdiss.cls` class package which is used in this thesis and for the synopsis uses the `natbib` package to format the references along with a customized bibliography style provided as the `iitm.bst` file in the directory containing `thesis.tex`. Documentation for the `natbib` package should be available in your distribution of LATEX. Basically, to cite the author along with the author name and year use `\cite{key}` where `key` is the citation key for your bibliography entry. You can also use `\citet{key}` to get the same effect. To make the citation without the author name in the main text but inside the parenthesis use `\citep{key}`. The following paragraph shows how citations can be used in text effectively.

More information on BIBTEX is available in the book by **?**, which is a citation for book. **?** is the same book citation in the old format where the year comes at the end. Now to cite the references within parentheses. There are many references (**?**) that explain how to use BIBTEX. Read the `natbib` package documentation for more details on how to cite things differently.

Here are other references for example. The present study has been carried out in OpenFOAM which is based on **?**. The Lagrangian solver has two injection models based on the nature of injection source viz. `pointInjection` model which injects the spray at a given point, and `detailed- SprayProfileInjection` model which injects the spray over a spherical sector of given injection radius. The configuration and experimental data to compare the spray statistics is taken from **?**

The above paragraphs had journal and book references. Other sample references to check are: for thesis **???**, for conferences **???**, for manual **?**, for book chapter **?**. One more reference, **?** with arxiv and doi.

Python (**?**) is a programming language and is cited here to show how to cite something that is best identified with a URL. For technical report, **?** is an example, and

? is an example of a non-technical report.

1.4 Other useful LaTeX packages

The following packages might be useful when writing your thesis.

- It is very useful to include line numbers in your document. That way, it is very easy for people to suggest corrections to your text. I recommend the use of the `lineno` package for this purpose. This is not a standard package but can be obtained on the internet. The directory containing this file should contain a lineno directory that includes the package along with documentation for it.
- The `listings` package should be available with your distribution of LaTeX. This package is very useful when one needs to list source code or pseudo-code.
- For special figure captions the `ccaption` package may be useful. This is specially useful if one has a figure that spans more than two pages and you need to use the same figure number.
- The notation page can be entered manually or automatically generated using the `nomencl` package.

More details on how to use these specific packages are available along with the documentation of the respective packages.

CHAPTER 2

ANOTHER CHAPTER

More details on how to use these specific packages are available along with the documentation of the respective packages.

APPENDIX A

A SAMPLE APPENDIX

Just put in text as you would into any chapter with sections and whatnot. That's the end of it.

More details on how to use these specific packages are available along with the documentation of the respective packages.

APPENDIX B

ANOTHER SAMPLE APPENDIX

Another sample text

LIST OF PUBLICATIONS

I. REFEREED JOURNALS BASED ON THE THESIS

1. Authors.... Title... *Journal*, Volume, Page, (year).

II. REFEREED JOURNALS (Others)

III. PRESENTATIONS IN CONFERENCES

1. Authors.... Title... *Conference*, Page, (year).

IV. PUBLICATIONS IN CONFERENCE PROCEEDINGS

CURRICULUM VITAE

1. NAME : Syed Ashruf

2. DATE OF BIRTH : 29 Feb 1992

3. EDUCATIONAL QUALIFICATIONS

2013 Bachelor of Technology (B. Tech.)

Institution : Indian Institute of Technology Madras

Specialization : Aerospace Engineering

2015 Master of Science (M. S.)

Institution : Indian Institute of Technology Madras

Specialization : Aerospace Engineering

Doctor of Philosphy

Institution : Indian Institute of Technology Madras

Specialization : Aerospace Engineering

Registration Date : 15 July 2013

DOCTORAL COMMITTEE

CHAIRPERSON	:	Dr. Professor and Head Department of Aerospace Engineering
GUIDE(S)	:	Dr. 1 Professor Department of Aerospace Engineering
		Dr. 2 Professor Department of Aerospace Engineering
MEMBERS	:	Dr. A Professor Department of Aerospace Engineering
		Dr. B Professor Department of Mechanical Engineering
		Dr. C Sr. Lead Research Scientist FM Global Research, Norwood, MA, USA