To the Graduate Council:
I am submitting herewith a thesis written by Tim Pobst entitled "My Thesis or Dissertation Title." I have examined the final paper copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Environmentall Engineering.

Dr. John Schwartz, Major Professor

We have read this thesis
and recommend its acceptance:

Dr. Bruce Robinson

Dr. He

Accepted for the Council:

Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

To the Graduate Council:
I am submitting herewith a thesis written by Tim Pobst entitled "My Thesis or Dissertation Title." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Environmentall Engineering.

Dr. John Schwartz, Major Professor

We have read this thesis
and recommend its acceptance:

Dr. Bruce Robinson

Dr. He

Accepted for the Council:

Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

My Thesis or Dissertation Title

A Thesis Presented for

The Master of Science

Degree

The University of Tennessee, Knoxville

Tim Pobst

May 2014

dedication...

Acknowledgements

I would like to thank...

Some quotation...

Abstract

Abstract text goes here...

Contents

List of Tables ix

List of Figures x

1 Introduction 1

1.1 Disclaimer . . . 1

1.2 Getting started . . . 2

1.3 References . . . 5

1.4 Theorem environments . . . 5

1.5 Figures . . . 6

1.5.1 Single figures . . . 6

1.5.2 Multipart figures . . . 7

2 Trend Analsysis 8

2.1 Methods . . . 8

2.1.1 Introduction . . . 8

2.1.2 Body . . . 8

3 Means Comparison 11

3.1 Methods . . . 11

3.1.1 Introduction . . . 11

3.1.2 Bonferoni Introduction . . . 12

4 Conclusions **13**

Bibliography **14**

A Site Data **17**

A.1 17

Vita **20**

List of Tables

2.1 10

A.1 18

A.2 19

List of Figures

1.1 UT thesis template folder structure. 2
1.2 Sample caption. 6
1.3 Geometric shapes. 7
1.4 Geometric shapes. 7

Chapter 1

Introduction

This is a very short guide to an unofficial thesis/dissertation template for the University of Tennessee. It is based on the 2010 thesis specifications but can be easily altered as the guidelines are changed. This template requires a basic knowledge of LaTeX and should cover the basic requirements in terms of required packages and functionality.

1.1 Disclaimer

This template is distributed with ABSOLUTELY NO WARRANTY. It serves as a guideline and constitutes a basic structure for a thesis/dissertation. The user assumes full responsibility for formatting and typesetting their document and for verifying that all the thesis requirements set by the University of Tennessee are met. Please refer to the most recent UT thesis guide http://web.utk.edu/ thesis/thesisresources.shtml or contact the thesis consultant (http://web.utk.edu/ thesis/). Please report any bugs to the thesis consultant.

1.2 Getting started

The general structure of this template is based on the tree shown in Figure 1.1. The titles of the folders are self descriptive and should guide you to proper file placement. Note that this is only a suggested model that could be modified to fit your own organizational structure.

There are two important files in this template: "ut-thesis-template.tex" and "utthesis.cls". The "utthesis.cls" is the class file that contains the settings, definitions, packages, and macros for this template to work properly and is located in the root directory. This file constitutes the document class for the template. It is based on the report class and provides some customized functionality. For example, it can automatically generate the signature pages for committees of up to five members. It will also generate a title page for you. In certain cases, one of the packages included in this template may conflict with a package that you are adding. You will have to resolve this conflict by either removing the package that is not being used or by modifying some settings with either packages. The packages that are preloaded in

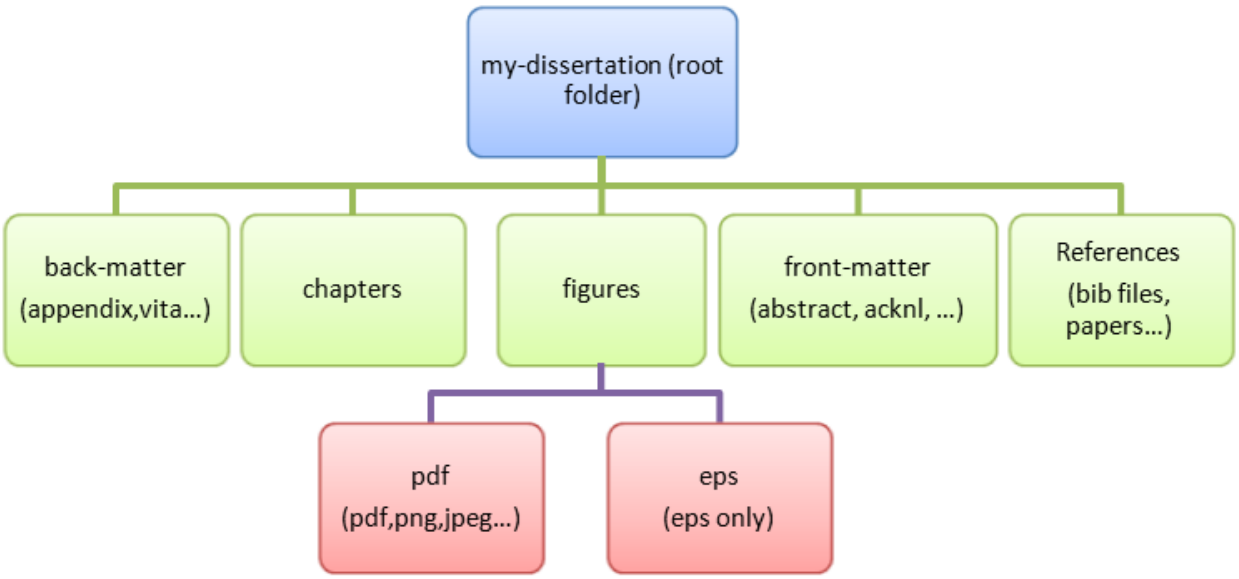


Figure 1.1: UT thesis template folder structure.

this class file are: amsmath, amsthm, amssymb, setspace, geometry, hyperref, and color.

The "my-dissertation.tex" file is the main file for your thesis/dissertation. This is where you should start editing and planning for your thesis/dissertation. You may want to change the name of the file to something like "my-name-dissertation.tex". Next, invoke the proper options for the "utthesis" document class. This class will take all the options for the report class in addition to two options: thesis/dissertation and monochrome. If you are writing a thesis, you must use "thesis" otherwise, use "dissertation" or omit that option because dissertation is the default setting. The monochrome option converts all your document to monochrome - except figures. This is very useful when printing your document. Because this dissertation has colored hyperlinks, these will look washed out when printed on a monochrome printer. Therefore, it is handy to have a monochrome copy of you3r thesis for print. Below are some examples of typical settings.

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
Thesis, color, one side
\documentclass[thesis,monochrome,letterpaper,12pt]{utthesis}
Thesis, monochrome, one side
\documentclass[thesis,monochrome,letterpaper,12pt]{utthesis}
Thesis, color, twoside side (good for binding)
\documentclass[thesis,twoside,letterpaper,12pt]{utthesis}
Thesis, monochrome, twoside side (good for binding)
\documentclass[thesis,monochrome,twoside,letterpaper,12pt]{utthesis}
Dissertation, color, one side
\documentclass[dissertation,letterpaper,12pt]{utthesis}
Dissertation, monochrome, two side
\documentclass[dissertation,twoside,letterpaper,12pt]{utthesis} . . .
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

Now you are ready to fill in the proper values corresponding to your name, degree, advisor etc... This can be done in the following section:

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% TO DO: FILL IN YOUR INFORMATION BELOW - READ THIS SECTION CAREFULLY
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
\title{My Thesis or Dissertation Title}
\author{My Name}
\copyrightYear{2012}
\graduationMonth{May}
\majorProfessor{My Advisor}
\keywords{List, Of, Keywords}
\viceProvost{Carolyn R. Hodges}
\major{Mechanical Engineering}
\degree{Master of Science}
\college{Engineering}
\dept{Mechanical, Aerospace and Biomedical Engineering}
\university{The University  of Tennessee, Knoxville}
\numberOfCommitteeMembers{2}
\committeeMemberA {Committee Member 1}
\committeeMemberB {Committee Member 2}
\committeeMemberC {Committee Member 3}
\committeeMemberD {Committee Member 4}
\committeeMemberE {Committee Member 5}
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

Note, that if you have less than five committee members, you will only need to fill in the names of your committee. The template will take care of the rest given that you provide the correct number of committee members. For example, if you have three members on your committee, you only need to fill in

```
\numberOfCommitteeMembers{3}
\committeeMemberA {Committee Member 1}
\committeeMemberB {Committee Member 2}
\committeeMemberC {Committee Member 3}
```

1.3 References

The bibliography style used in this template is "apalike". It is an author-year style based on the APA specification. Here are a few examples. wrote a book on thermodynamics. The book by on gas dynamics is a classic textbook used in most courses on compressible flows. You can also use the citations at the end of a line. For more information, visit http://merkel.zoneo.net/Latex/natbib.php.(Robinson et al., 2008).

1.4 Theorem environments

This template contains predefined theorem, lemma, and corollary environments. For example

Theorem 1.1 (First theorem)**.** *This is an example theorem.*

Proof for theorem. 1.1 This is the proof for this theorem. □

Lemma 1.1.1 (First lemma)**.** *This is the first lemma.*

Corollary 1.1.1. *This is the first corollary.*

1.5 Figures

1.5.1 Single figures

For more information, check: http://en.wikibooks.org/wiki/LaTeX/Floats,_Figures_and_Captions

```
\begin{figure}[t for top, b for bottom, h for here, ! to force placement]
    % Requires \usepackage{graphicx}
    \centering % center the figure
    \includegraphics[width=5in or 127mm etc...]{figure-name}\\
    \caption{figure caption}\label{figure label}
\end{figure}
```

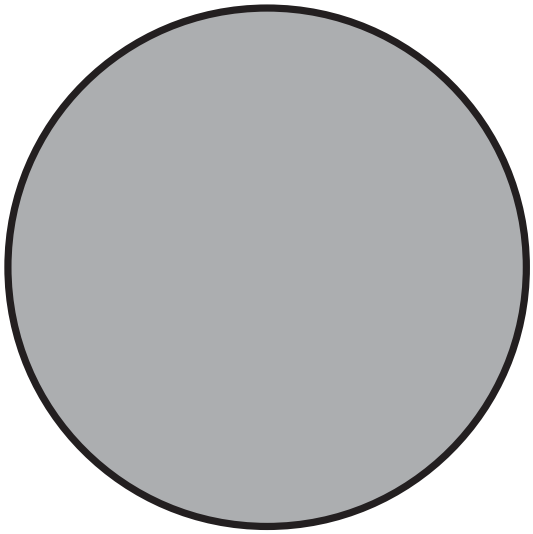
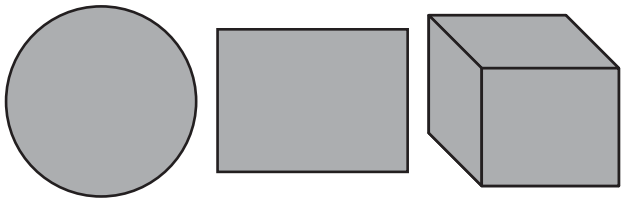


Figure 1.2: Sample caption.

1.5.2 Multipart figures

For multipart figures, you need to use the package "subfig". here's an example

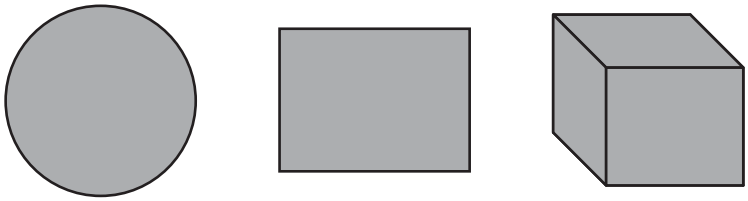
```
\begin{figure}
    \centering
    \subfloat[figure a]{\label{fig:figure-a} \includegraphics[width=w]{fig02a}}
    \subfloat[figure b]{\label{fig:figure-b} \includegraphics[width=w]{fig02b}}
    \subfloat[figure c]{\label{fig:figure-c} \includegraphics[width=w]{fig02c}}
    \caption{Sample of a multipart figure} \label{fig:multipart-figure}
\end{figure}
```



(a) Circle **(b)** Rectangle **(c)** Cube

Figure 1.3: Geometric shapes.

To add some space between the figures above, one can use the usual spacing commands such as "qquad"



(a) Circle **(b)** Rectangle **(c)** Cube

Figure 1.4: Geometric shapes.

Chapter 2

Trend Analsysis

2.1 Methods

2.1.1 Introduction

- Trend analysisi for Stream Survey has been done before and repoted in (Robinson et al., 2008) and the biotics effects report (Meijun Cai, 2012)
- A trend analysis of the data collected through the Stream Survey can be used to help determine the water quality of the streams
- The most important trend is the trend for pH
- **Outline** The trend analysis will be conducted on Stream Survey data spanning the years 1993-2012 using the statistical program JMP for deterining outliers and the statistical program SPSS for the actual trend analysis.

2.1.2 Body

- A trend analysis will answer the continuing question concerning the overall health of the park which is, "How are the streams doing?". More specifically "Is the pH trending towards a higher pH or a lower pH?"

Data

- The data comes from years of analyzing water samples collected through the Stream Survey.
- A single trend line could be made to emcompase all 20 years worth of water quality data, but this would make discovering the cause of the trends more difficult.
- Assuming ecosystems try to achieve equilibrium the change obsered over all time should be zero.
- So in order to easier learn from this trend analysis, it will be logically broken up into smaller sets of years.
- Different sets may have different positive or negative trends for which seperate hypothosis have been or can be forulated and tested in this trend analysis.
- The seperate data sets are **insert time set tables here**

Instruments

- **outliers section fom notebook**
- IBM's SPSS was used to conduct this trend analysis.
- These options were chosen for regression and assumptions for this procedure include.(from notebook and textbook)

•

Elevation Bands created for this paper

Elevation Bands	Meters (Feet)	n	Site #
1	304.8-609.6 (1000-2000)	5	13 ,23, 24, 30, 479
2	609.6-762 (2000-2500)	9	4, 311, 268, 480, 310, 483, 147, 148, 484
3	762-914.4 (2500-3000)	13	114, 481, 482, 149, 66, 492, 137, 293, 270, 493, 485, 144, 224
4	914.4-1066.8 (3000-3500)	4	143, 142, 73, 71
5	1066.8-1371.6 (3500-4500)	4	74, 221, 251, 233
6	1371.6< (4500<)	2	253, 234

Table 2.1

Chapter 3

Means Comparison

3.1 Methods

3.1.1 Introduction

- In the year scrubbers were installed into the Bullrun and kingston power plants
- These scrubers significantly reduced the amount of SO_4 emitted by the smoke stacks of the power plants by **how much**
- A the same time an obvious decrease in measured SO_4 was discovered in the Stream Survey samples (Meijun Cai, 2012). **bar graph from biotics effects report**
- The amount of SO_4 in the streams is thought to be (correlated with?) to the pH index of the streams when the SO_4 goes up the pH goes down.
- The hypothesis is that of the three sets of data containing water quality measurents from 1993 to 2012, if the data is broken at 2002 and 2008, that because of the obvious measured decrease in SO_4, there will be an obvious difference of means in the sets before and after 2008.
- This can be tested using an Analysis of Variance procedure.

- The data is only pH measurements for the three sets

  Instruments

  - The program used for this procedure was (probably SAS).
  - Heterscedasticity can be a problem a brown-forsythe test was employed to test for this.
  - If three groups are analyzed using ANOVA the only two outcomes may be "they are different" or "they are not different".
  - If they are not different then the analysis of the data is over.
  - If they are different then it would be nice to know which sets are different.
  - This is acomplished with a Bonferoni analysis

3.1.2 Bonferoni Introduction

- Introduction from text book.
- rank-sum

  instruments

  - Bonferoni can output a graph presenting the means of each group in order to visually check for a difference in means. It will also output 95% confidence intervals between each pair of groups. This way definative answers can be found for the question of "are they or are they not the same?"
  - Bonferoni assumptions
  - SAS

Chapter 4

Conclusions

Bibliography

Bibliography

Meijun Cai, J. S. S. (2012). Biological effects of stream water quality on aquatic macroinvertebrates and fish communities within great smoky mountains national park. 8, 11

Robinson, R. B., Barnett, T. W., Harwell, G. R., Moore, S. E., Kulp, M., and Schwartz, J. S. (2008). ph and acid anion time trends in different elevation ranges in the great smoky mountains national park. *Journal of Environmental Engineering*, 134(9):800–808. 5, 8

Appendix

Appendix A

Site Data

A.1

GRSM Stream Survey site descriptions			
	Site ID	Site Description	Watershed
1	173	Mill Creek above Abrams Creek	Abrams
2	174	Abrams Creek below Cades Cove	Abrams
3	488	Mill Creek at Pumphouse on Forge Creek Road	Abrams
4	489	Abrams Creek 300 m below trailhead bridge	Abrams
5	142	Beech Creek above Lost Bottom Creek	Cataloochee
6	143	Lost Bottom Creek (Cataloochee Creek)	Cataloochee
7	144	Palmer Creek above Pretty Hollow Creek	Cataloochee
8	147	Lower Cataloochee Creek	Cataloochee
9	148	Lower Little Cataloochee Creek	Cataloochee
10	149	Middle Cataloochee Creek at bridge	Cataloochee
11	293	Rough Fork at Caldwell House	Cataloochee
12	493	Palmer Creek at Davidson Branch Trail	Cataloochee
13	4	Lower Rock Creek	Cosby
14	114	Cosby Creek at log bridge	Cosby
15	137	Upper Rock Creek (Cosby Creek)	Cosby
16	492	Camel Hump Creek off Low Gap Trail	Cosby
17	221	Hazel Creek above cascades	Hazel
18	224	Hazel Creek just below Proctor Creek Confluence	Hazel
19	310	Bone Valley Creek (Hazel Creek)	Hazel
20	311	Hazel Creek below Haw Gap Creek	Hazel
21	479	Hazel Creek at Campsite 86	Hazel
22	480	Haw Gap Creek at bridge near Campsite 84	Hazel
23	481	Little Fork above Sugar Fork Trail	Hazel
24	482	Sugar Fork above Little Fork	Hazel
25	483	Sugar Fork above Haw Gap Creek	Hazel
26	484	Hazel Creek at Cold Spring Gap Trail	Hazel
27	485	Walker Creek above Hazel Creek Trail	Hazel
28	13	Little River at boundary	Little
29	23	Lower Middle Prong Little River	Little
30	24	Lower West Prong Little River	Little
31	30	West Prong Little Pigeon at Headquarters	Little
32	66	West Prong Little Pigeon at Chimneys Picnic Area	Little
33	71	Road Prong above barrier cascade	Little
34	73	Walker Camp Prong above Road Prong	Little
35	74	Walker Camp Prong above Alum Cave Creek	Little
36	233	Walker Camp Prong above Alum Cave	Little
37	234	Upper Road Prong	Little
38	237	Walker Camp Prong at last bridge	Little
39	251	Beech Flats above US 441 loop	Oconaluftee
40	252	Beech Flats below roadcut	Oconaluftee
41	253	Beech Flats above roadcut	Oconaluftee
42	268	Oconaluftee River below Smokemont	Oconaluftee
43	270	Beech Flats at Kephart Footbridge	Oconaluftee

Table A.1

GRSM Stream Survey site descriptions								
	Site ID	Elevation (ft)	Elevation (m)	slope	Latitude	Longitude	Historical Elevation Classes	New elevation classes
1	173	1715	522.73	35.68	35.59104	-83.85361	3	3
2	174	1715	522.73	10.27	35.59186	-83.85308	3	3
3	488	1790	545.59	4.04	35.58349	-83.83446	4	1
4	489	1710	521.21	32.78	35.59145	-83.85397	4	1
5	142	3300	1005.84	32.42	35.63565	-83.14537	5	2
6	143	3280	999.74	35.69	35.63625	-83.14481	6	2
7	144	2990	911.35	35.66	35.63900	-83.13078	5	2
8	147	2460	749.81	16.84	35.66688	-83.07277	4	3
9	148	2475	754.38	7.58	35.66913	-83.07283	4	3
10	149	2550	777.24	4.45	35.64627	-83.07554	5	3
11	293	2755	839.72	18.73	35.62442	-83.11391	5	4
12	493	2840	865.63	33.10	35.63462	-83.11943	6	6
13	4	2080	633.98	6.11	35.76133	-83.21044	3	1
14	114	2510	765.05	13.71	35.74863	-83.20066	5	2
15	137	2750	838.20	22.92	35.74616	-83.21630	5	2
16	492	2730	832.10	25.86	35.74457	-83.19876	5	6
17	221	4000	1219.20	30.02	35.54632	-83.58283	8	3
18	224	2999	914.00	17.92	35.53212	-83.62234	6	3
19	310	2240	682.75	19.63	35.49994	-83.68014	4	4
20	311	2155	656.84	26.20	35.49377	-83.68852	4	5
21	479	1740	530.35	39.70	35.47233	-83.71933	3	5
22	480	2201	671.00	10.07	35.49474	-83.68873	4	5
23	481	2540	774.19	30.90	35.50256	-83.70835	5	5
24	482	2540	774.19	38.66	35.50236	-83.70859	5	6
25	483	2320	707.14	34.29	35.49947	-83.69494	4	6
26	484	2475	754.38	9.11	35.50331	-83.65930	5	1
27	485	2860	871.73	5.17	35.52249	-83.63101	6	1
28	13	1100	335.28	44.21	35.66763	-83.71450	2	1
29	23	1150	350.52	5.96	35.65724	-83.70979	2	1
30	24	1150	350.52	31.60	35.65682	-83.71017	2	1
31	30	1430	435.86	2.17	35.68819	-83.53672	2	1
32	66	2680	816.86	17.92	35.63723	-83.49484	5	2
33	71	3400	1036.32	31.28	35.63440	-83.47032	6	2
34	73	3360	1024.13	28.98	35.63476	-83.46931	6	2
35	74	3820	1164.34	18.07	35.62912	-83.45102	7	2
36	233	4255	1296.92	21.86	35.61830	-83.42718	8	3
37	234	5000	1524.00	23.93	35.60975	-83.45043	10	3
38	237	4520	1377.70	30.21	35.62409	-83.41692	9	3
39	251	4010	1222.25	19.03	35.60226	-83.41533	8	3
40	252	4680	1426.46	33.32	35.60666	-83.43391	9	3
41	253	4760	1450.85	26.42	35.60682	-83.43510	9	3
42	268	2169	661.00	3.31	35.55293	-83.30937	4	4
43	270	2799	853.00	22.92	35.58641	-83.36400	5	4

Table A.2

Vita

Vita goes here...