Writing your PhD thesis in LaTeX

Using the CU thesis template

by

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Doctor of Philosophy

August 2017

Faculty of Engineering, Environment and Computing

Optional CU Centre or School

Placeholder for Certificate of Ethical Approval

(Note, this page is replaced with your final ethical approval certificate.)

I would like to dedicate this thesis to humanity . . .

(All the textual content will be replaced with you own work, see the first chapter on how to get started, or begin with the brief introduction at http://tekeye.uk/free_resources/thesis-template-in-latex-for-cu-phd.)

Declaration

Something along the lines of the following. I hereby declare that except where specific reference is made to the work of others, the contents of this dissertation are original and have not been submitted in whole or in part for consideration for any other degree or qualification in this, or any other university. This dissertation is my own work and contains nothing which is the outcome of work done in collaboration with others, except as specified in the text and Acknowledgements. Then alter the following as appropriate. This dissertation contains upto 40,000 (engineering or scientific)/80,000 (social or humanities) words (and must not exceed the word limit by 10%). See section 8.12.2 of the Academic Regulations to determine final length limitations.

Another Proud Author
August 2017

Acknowledgements

And I would like to acknowledge ...

Abstract

This is where you write your abstract ...

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Chapter 1

Introduction to CULTT

1.1 What is CULTT?

The Coventry University LaTeX Thesis Template (CULTT) is designed as a starting point for writing and formatting a Coventry University (CU) Thesis prior to submission for examination and printing. This template is not official and it is up to the thesis author to ensure that the format, requirements and contents of the thesis are correct. However, this template should prove useful for those using LaTeX to prepare their CU Thesis.

CULTT was created as a CU Thesis template for use on ShareLaTeX, the online service for producing documents with LaTeX. ShareLaTeX also supports collaborative working, see https://www.sharelatex.com/ for futher information. Another online LaTeX editor and collaboration service is Overleaf, https://www.overleaf.com/.

Rather than reinvent the wheel CULTT was derived from an existing thesis template. There are plenty of examples available. For CULTT the basis was the Cambridge University Engineering Department's (CUED) thesis template.

If you are not using LaTeX you will not need CULTT. However, the use of LaTeX for producing all academic documents (not only a thesis) is recommended. Although LaTeX may appear strange to those who normally use word processing software, the benefits are immense once you get use to it. ShareLaTeX has some great documentation to help get started, see https://www.sharelatex.com/learn/. The LaTeX Project website is at https://www.latex-project.org/. If not using an online LaTeX service then install a LaTeX environment onto your computer. MiKTeX is a good package which can be installed on Windows, Mac, and Linux, see https://miktex.org/ (also available from the CU Cloudpaging Player Apps service). MiKTeX includes the TeXworks editor, https://www.tug.org/texworks/. A *LaTeX for Beginners* document is available at http://www.docs.is.ed.ac.uk/skills/documents/3722/3722-2014.pdf.

1.2   Using CULTT

CULTT can be used on a local computer or uploaded to a online LaTeX service. The thesis template is divided into sub-folders for ease of organisation. The template provides lots of examples of textual constructs that may be required in the thesis. All of the the textual content (and constructs) in the various LaTeX files (e.g. this Introduction chapter) will be replaced with the authors own content. The content stored in the *tex* files is brought together in the top level (root) *thesis.tex*, which includes the other tex files in the sub-folders as required. This allows the thesis to be divided into smaller chunks for better management and safety. Working on smaller sections of the thesis reduces the chance of accidentally destroying large parts of text. (Always take regular backups of all work produced.)

When your final CU Ethics PDF is available (https://ethics.coventry.ac.uk/) replace the PDF in the *Ethics* folder.

1.2.1   Coventry University Thesis Writing Resources

There are a several requirements to meet for a correct CU Thesis submission. They are covered by the CU Academic Regulations, visit http://www.coventry.ac.uk/life-on-campus/ the-university/key-information/registry/academic-regulations/ and download section 8 to read **8.12 The higher degree thesis**.

The CU Student Portal, accessed via the *Portals* link on the CU website, https://share. coventry.ac.uk/students, has links to relevant documents in the *Doctoral College* section (under *Study at CU*). See the *Preparing for your PRP and Viva* section to find the **Thesis Information PDF** (called *Thesis Requirements.pdf*).

Further CU help on thesis writing can be obtained from Coventry University's Centre for Academic Writing (CAW), https://cawbookings.coventry.ac.uk/. They also look after the CU Harvard Referencing Style (short linked at https://goo.gl/9jxdPX).

Chapter 2

Examples of Text

2.1 What is loren ipsum? Title with math σ

Lorem Ipsum is simply dummy text of the printing and typesetting industry (see Section 2.3). Lorem Ipsum [**?**] has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software including versions of Lorem Ipsum [**? ? ?**].

The most famous equation in the world: $E^2 = (m_0 c^2)^2 + (pc)^2$, which is known as the **energy-mass-momentum** relation as an in-line equation.

A *LaTeX class file* is a file, which holds style information for a particular LaTeX.

$$CIF: \quad F_0^j(a) = \frac{1}{2\pi\iota} \oint_\gamma \frac{F_0^j(z)}{z - a} dz \tag{2.1}$$

2.2 Why do we use loren ipsum?

It is a long established fact that a reader will be distracted by the readable content of a page when looking at its layout. The point of using Lorem Ipsum is that it has a more-or-less normal distribution of letters, as opposed to using 'Content here, content here', making it look like readable English. Many desktop publishing packages and web page editors now use Lorem Ipsum as their default model text, and a search for 'lorem ipsum' will uncover many

web sites still in their infancy. Various versions have evolved over the years, sometimes by accident, sometimes on purpose (injected humour and the like).

2.3   Where does it come from?

Contrary to popular belief, Lorem Ipsum is not simply random text. It has roots in a piece of classical Latin literature from 45 BC, making it over 2000 years old. Richard McClintock, a Latin professor at Hampden-Sydney College in Virginia, looked up one of the more obscure Latin words, consectetur, from a Lorem Ipsum passage, and going through the cites of the word in classical literature, discovered the undoubtable source. Lorem Ipsum comes from sections 1.10.32 and 1.10.33 of "de Finibus Bonorum et Malorum" (The Extremes of Good and Evil) by Cicero, written in 45 BC. This book is a treatise on the theory of ethics, very popular during the Renaissance. The first line of Lorem Ipsum, "Lorem ipsum dolor sit amet..", comes from a line in section 1.10.32.

The standard chunk of Lorem Ipsum used since the 1500s is reproduced below for those interested. Sections 1.10.32 and 1.10.33 from "de Finibus Bonorum et Malorum" by Cicero are also reproduced in their exact original form, accompanied by English versions from the 1914 translation by H. Rackham

"Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum."

Section 1.10.32 of "de Finibus Bonorum et Malorum", written by Cicero in 45 BC: "Sed ut perspiciatis unde omnis iste natus error sit voluptatem accusantium doloremque laudantium, totam rem aperiam, eaque ipsa quae ab illo inventore veritatis et quasi architecto beatae vitae dicta sunt explicabo. Nemo enim ipsam voluptatem quia voluptas sit aspernatur aut odit aut fugit, sed quia consequuntur magni dolores eos qui ratione voluptatem sequi nesciunt. Neque porro quisquam est, qui dolorem ipsum quia dolor sit amet, consectetur, adipisci velit, sed quia non numquam eius modi tempora incidunt ut labore et dolore magnam aliquam quaerat voluptatem. Ut enim ad minima veniam, quis nostrum exercitationem ullam corporis suscipit laboriosam, nisi ut aliquid ex ea commodi consequatur? Quis autem vel eum iure reprehenderit qui in ea voluptate velit esse quam nihil molestiae consequatur, vel illum qui dolorem eum fugiat quo voluptas nulla pariatur?"

1914 translation by H. Rackham: "But I must explain to you how all this mistaken idea of denouncing pleasure and praising pain was born and I will give you a complete

account of the system, and expound the actual teachings of the great explorer of the truth, the master-builder of human happiness. No one rejects, dislikes, or avoids pleasure itself, because it is pleasure, but because those who do not know how to pursue pleasure rationally encounter consequences that are extremely painful. Nor again is there anyone who loves or pursues or desires to obtain pain of itself, because it is pain, but because occasionally circumstances occur in which toil and pain can procure him some great pleasure. To take a trivial example, which of us ever undertakes laborious physical exercise, except to obtain some advantage from it? But who has any right to find fault with a man who chooses to enjoy a pleasure that has no annoying consequences, or one who avoids a pain that produces no resultant pleasure?"

Section 1.10.33 of "de Finibus Bonorum et Malorum", written by Cicero in 45 BC: "At vero eos et accusamus et iusto odio dignissimos ducimus qui blanditiis praesentium voluptatum deleniti atque corrupti quos dolores et quas molestias excepturi sint occaecati cupiditate non provident, similique sunt in culpa qui officia deserunt mollitia animi, id est laborum et dolorum fuga. Et harum quidem rerum facilis est et expedita distinctio. Nam libero tempore, cum soluta nobis est eligendi optio cumque nihil impedit quo minus id quod maxime placeat facere possimus, omnis voluptas assumenda est, omnis dolor repellendus. Temporibus autem quibusdam et aut officiis debitis aut rerum necessitatibus saepe eveniet ut et voluptates repudiandae sint et molestiae non recusandae. Itaque earum rerum hic tenetur a sapiente delectus, ut aut reiciendis voluptatibus maiores alias consequatur aut perferendis doloribus asperiores repellat."

1914 translation by H. Rackham: "On the other hand, we denounce with righteous indignation and dislike men who are so beguiled and demoralized by the charms of pleasure of the moment, so blinded by desire, that they cannot foresee the pain and trouble that are bound to ensue; and equal blame belongs to those who fail in their duty through weakness of will, which is the same as saying through shrinking from toil and pain. These cases are perfectly simple and easy to distinguish. In a free hour, when our power of choice is untrammelled and when nothing prevents our being able to do what we like best, every pleasure is to be welcomed and every pain avoided. But in certain circumstances and owing to the claims of duty or the obligations of business it will frequently occur that pleasures have to be repudiated and annoyances accepted. The wise man therefore always holds in these matters to this principle of selection: he rejects pleasures to secure other greater pleasures, or else he endures pains to avoid worse pains."

Chapter 3

My third chapter

3.1 Lorem Ipsum

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3.2   Examples of Lists

How do you put a list in a LaTeX document? Use *enumerate*, *itemize*, or *description*.

Enumeration

1. The first topic is dull

2. The second topic is duller

    (a) The first subtopic is silly

    (b) The second subtopic is stupid

3. The third topic is the dullest

Itemize

- The first topic is dull

- The second topic is duller

    - The first subtopic is silly

    - The second subtopic is stupid

- The third topic is the dullest

Description

The first topic is dull

The second topic is duller

> **The first subtopic** is silly
>
> **The second subtopic** is stupid

The third topic is the dullest

3.3   Reasonably long section title

Notice how the section title in the index has been replaced by an alternative. Now I'm going to randomly include a picture, Figure 3.1.
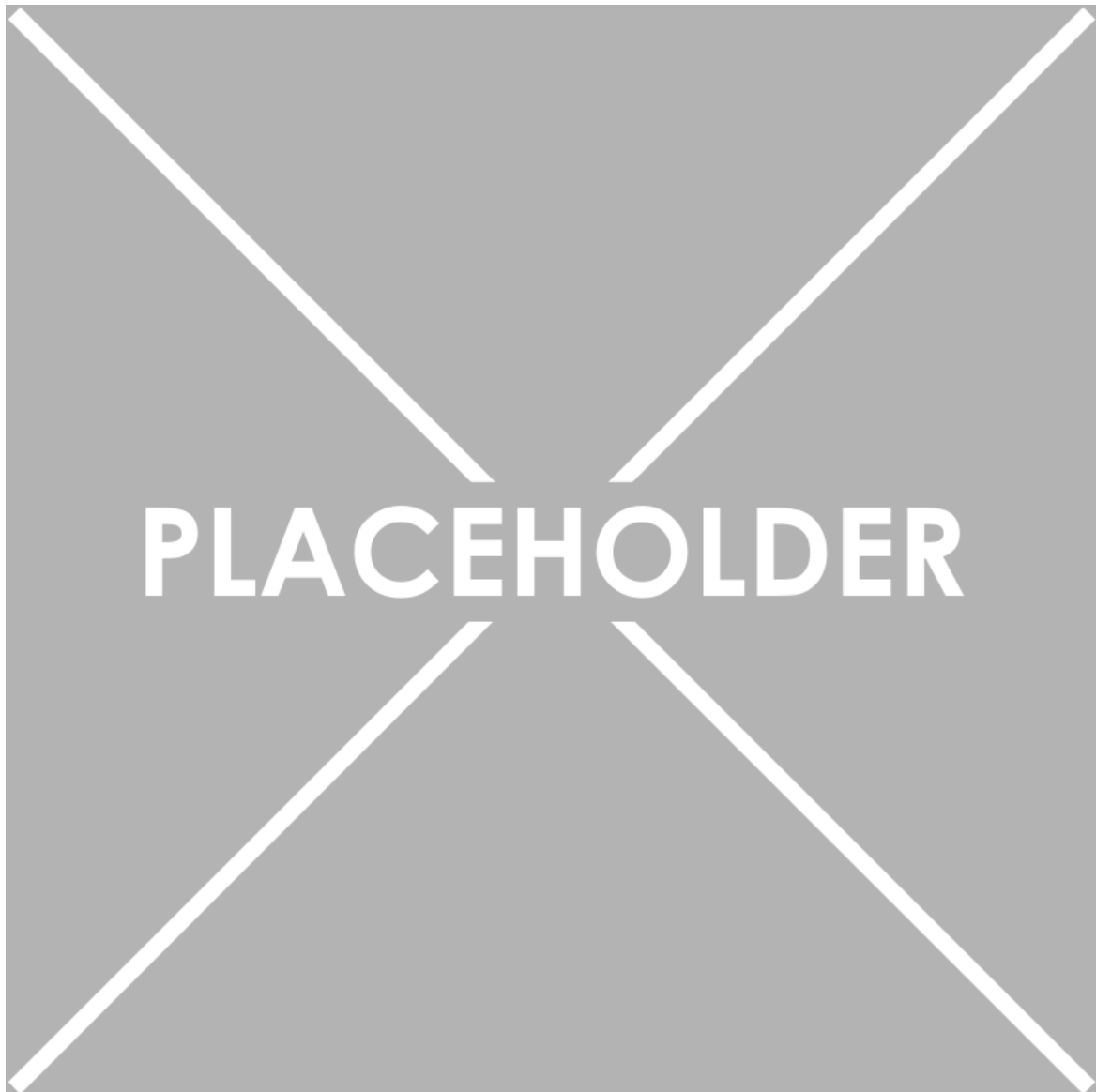
Fig. 3.1 This is just a long figure caption for the Public Domain placeholder graphic from openclipart.org

3.4   Hidden section

Lorem ipsum dolor sit amet, consectetur adipiscing elit. In magna nisi, aliquam id blandit id, congue ac est. Fusce porta consequat leo. Proin feugiat at felis vel consectetur. Ut tempus ipsum sit amet congue posuere. Nulla varius rutrum quam. Donec sed purus luctus, faucibus velit id, ultrices sapien. Cras diam purus, tincidunt eget tristique ut, egestas quis nulla. Curabitur vel iaculis lectus. Nunc nulla urna, ultrices et eleifend in, accumsan ut erat. In ut ante leo. Aenean a lacinia nisl, sit amet ullamcorper dolor. Maecenas blandit, tortor ut scelerisque congue, velit diam volutpat metus, sed vestibulum eros justo ut nulla. Etiam nec ipsum non enim luctus porta in in massa. Cras arcu urna, malesuada ut tellus ut, pellentesque mollis risus.Morbi vel tortor imperdiet arcu auctor mattis sit amet eu nisi. Nulla gravida urna vel nisl egestas varius. Aliquam posuere ante quis malesuada dignissim. Mauris ultrices tristique eros, a dignissim nisl iaculis nec. Praesent dapibus tincidunt mauris nec tempor. Curabitur et consequat nisi. Quisque viverra egestas risus, ut sodales enim blandit at. Mauris quis odio nulla. Cras euismod turpis magna, in facilisis diam congue non. Mauris faucibus nisl a orci dictum, et tempus mi cursus.

3.5   Hello World

Let us start with **some bold font** and then *some forced italic* and contrast that with *emphasise* (which may not be italic in some LaTeX packages). Why not include a footnote that appears at the bottom of the page[1]. How about a program listing using *verbatim*.

```
#include <stdio.h>

main( )
{
    printf("hello, world\n");
}
```

3.6   SI Units Example

The SI Units for dynamic viscosity is $\mathrm{N\,s\,m^{-2}}$. The SI Unit for electrical resistance is Ω.

---

[1]My footnote goes blah blah blah! . . .

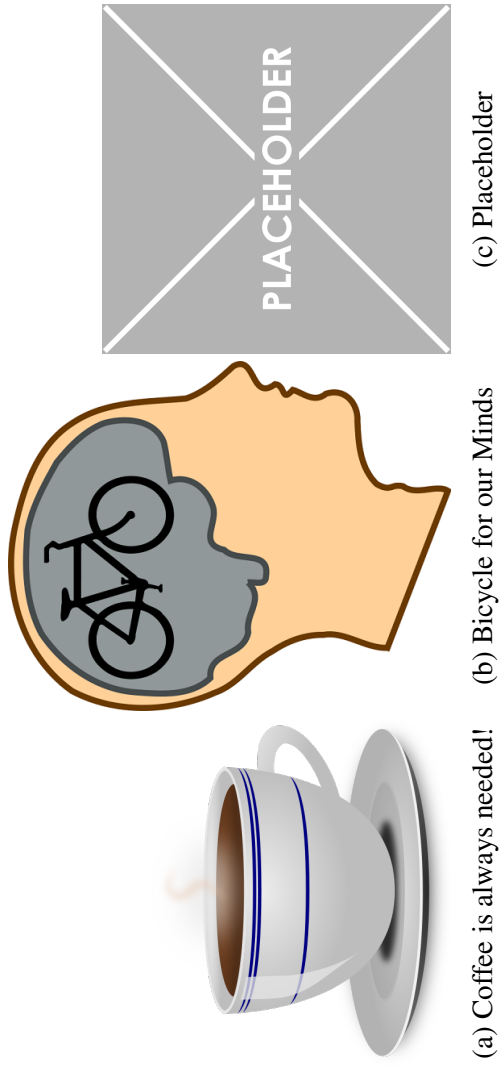(a) Coffee is always needed!   (b) Bicycle for our Minds   (c) Placeholder

Fig. 3.2 My Graphics

Subplots

I can cite Bicycle for our Minds (see Fig. 3.2b) and others, e.g. a Placeholder graphic (Fig. 3.2c) or I can cite the whole figure as Fig. 3.2

Chapter 4

My fourth chapter

4.1 First section of the fourth chapter

And now I begin my fourth chapter here . . .

And now to cite some more people **? ?**]

4.1.1 First subsection in the first section

. . . and some more

4.1.2 Second subsection in the first section

. . . and some more . . .

First subsub section in the second subsection

. . . and some more in the first subsub section otherwise it all looks the same doesn't it? well we can add some text to it . . .

4.1.3 Third subsection in the first section

. . . and some more . . .

First subsub section in the third subsection

. . . and some more in the first subsub section otherwise it all looks the same doesn't it? well we can add some text to it and some more and some more and some more and some more and some more and some more and some more . . .

Second subsub section in the third subsection

. . . and some more in the first subsub section otherwise it all looks the same doesn't it? well we can add some text to it . . .

4.2   Second section of the third chapter

and here I write more . . .

4.3   The layout of formal tables

This section has been modified from *Publication quality tables in LaTeX** by Simon Fear.

The layout of a table has been established over centuries of experience and should only be altered in extraordinary circumstances.

When formatting a table, remember two simple guidelines at all times:

1. Never, ever use vertical rules (lines).

2. Never use double rules.

These guidelines may seem extreme but I have never found a good argument in favour of breaking them. For example, if you feel that the information in the left half of a table is so different from that on the right that it needs to be separated by a vertical line, then you should use two tables instead. Not everyone follows the second guideline:

There are three further guidelines worth mentioning here as they are generally not known outside the circle of professional typesetters and subeditors:

3. Put the units in the column heading (not in the body of the table).

4. Always precede a decimal point by a digit; thus 0.1 *not* just .1.

5. Do not use 'ditto' signs or any other such convention to repeat a previous value. In many circumstances a blank will serve just as well. If it won't, then repeat the value.

A frequently seen mistake is to use '\begin{center}' . . . '\end{center}' inside a figure or table environment. This center environment can cause additional vertical space. If you want to avoid that just use '\centering'

Table 4.1 A badly formatted table

Dental measurement	Species I		Species II	
	mean	SD	mean	SD
I1MD	6.23	0.91	5.2	0.7
I1LL	7.48	0.56	8.7	0.71
I2MD	3.99	0.63	4.22	0.54
I2LL	6.81	0.02	6.66	0.01
CMD	13.47	0.09	10.55	0.05
CBL	11.88	0.05	13.11	0.04

Table 4.2 A nice looking table

Dental measurement	Species I		Species II	
	mean	SD	mean	SD
I1MD	6.23	0.91	5.2	0.7
I1LL	7.48	0.56	8.7	0.71
I2MD	3.99	0.63	4.22	0.54
I2LL	6.81	0.02	6.66	0.01
CMD	13.47	0.09	10.55	0.05
CBL	11.88	0.05	13.11	0.04

Table 4.3 Even better looking table using booktabs

Dental measurement	Species I		Species II	
	mean	SD	mean	SD
I1MD	6.23	0.91	5.2	0.7
I1LL	7.48	0.56	8.7	0.71
I2MD	3.99	0.63	4.22	0.54
I2LL	6.81	0.02	6.66	0.01
CMD	13.47	0.09	10.55	0.05
CBL	11.88	0.05	13.11	0.04

Appendix A

Further Information

General

This template should provide a good starting point for writing up a Coventry University Thesis. It has briefly covered writing LaTeX in ShareLaTeX and MiKTeX. There is plenty of help available for setting up a LaTeX environment on a variety of operating systems and editing in LaTeX from the Internet. The original CUED template provides further information on installing LaTeX environments, see the Appendix in the *thesis.pdf* file at https://github.com/kks32/phd-thesis-template.

Useful Links

Overview article - http://tekeye.uk/free_resources/thesis-template-in-latex-for-cu-phd

CULTT GitHub repository - https://github.com/GR8DAN/coventry-thesis

Learn with the ShareLaTeX documentation - https://www.sharelatex.com/learn/

Use MiKTeX for a PC LaTeX environment - https://miktex.org/

LaTeX for beginners - http://www.docs.is.ed.ac.uk/skills/documents/3722/3722-2014.pdf

List of LaTeX symbols - http://www.rpi.edu/dept/arc/training/latex/LaTeX_symbols.pdf

The LaTeX Project - https://www.latex-project.org/

Cambridge template - http://www-h.eng.cam.ac.uk/help/tpl/textprocessing/ThesisStyle/

classicthesis - An Alternative Thesis Template - http://www.miede.de/#classicthesis

Coventry University Academic Regulations (for information on the thesis requirements)
    - http://www.coventry.ac.uk/life-on-campus/the-university/key-information/registry/
    academic-regulations/

The Coventry University Portal (to access the thesis information provided by the Doctoral
    College) - https://share.coventry.ac.uk/students

Coventry University's Centre for Academic Writing (providing support for CU students)
    - https://cawbookings.coventry.ac.uk/

Coventry University's Harvard Referencing Guide - https://goo.gl/9jxdPX

Coventry University Students portal - https://share.coventry.ac.uk/students

Coventry University Ethics portal - https://ethics.coventry.ac.uk/

Appendix B

This is another Appendix

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Sed vitae laoreet lectus. Donec lacus quam, malesuada ut erat vel, consectetur eleifend tellus. Aliquam non feugiat lacus. Interdum et malesuada fames ac ante ipsum primis in faucibus. Quisque a dolor sit amet dui malesuada malesuada id ac metus. Phasellus posuere egestas mauris, sed porta arcu vulputate ut. Donec arcu erat, ultrices et nisl ut, ultricies facilisis urna. Quisque iaculis, lorem non maximus pretium, dui eros auctor quam, sed sodales libero felis vel orci. Aliquam neque nunc, elementum id accumsan eu, varius eu enim. Aliquam blandit ante et ligula tempor pharetra. Donec molestie porttitor commodo. Integer rutrum turpis ac erat tristique cursus. Sed venenatis urna vel tempus venenatis. Nam eu rhoncus eros, et condimentum elit. Quisque risus turpis, aliquam eget euismod id, gravida in odio. Nunc elementum nibh risus, ut faucibus mauris molestie eu.