# **Computer Essentials for Engineers**

**GNG1103 – Engineering Design** 

# **Part B2 – Documents (Google Docs)**

This lab discusses two basic word processing tools: Microsoft (MS) Word and Google Docs. MS Word is a more mature tool with more features, but is not described in detail in this document. However, real-time sharing requires use of Microsoft's cloud drive, OneDrive.

As a cloud-based application, Google Docs makes sharing documents and real-time co-editing documents very simple. The tool is free, although a gmail account is required and it might also be argued that you are "paying" with information that you are forced to share both with google and their affiliates. A good introduction to Google Docs is given in: <a href="https://www.youtube.com/watch?v=OBITNezSmLY">https://www.youtube.com/watch?v=OBITNezSmLY</a>. The use of this tool to create a technical document is described here.

Engineering design work is often captured in text with illustrative graphics and tables. Much of the design work that you will do in your career will be captured (both for archival and also for sharing and collaboration purposes) using some kind of technical report format. In such documents, words are concise and often easier to understand than in speech discussions and they are recorded in a compact format.

Indeed, communication between native and non-native speakers of a given language is often simplified when things are written down. In short, a technical document captures your: thoughts, understanding and analyses forever. Moreover, it is captured in a way that can be understood and examined by other people (and by yourself, too, later!).

Taking the time to learn the automatic features of either tool can save you a *lot* of time. While you may think that you know the tools in this lab already; this is probably not entirely true. New features are continually being added to save a user time when editing or maintaining their documents.

Typical engineering documents that you will encounter at University (and afterwards) are:

- Technical reports
- Technical papers (e.g. for conferences and journals)

The formats of these types of technical documents can vary but are generally very similar and usually include the following things (in order of occurrence 1). See also <a href="http://engineering.uottawa.ca/downloads/pdf/thesisguideline.pdf">http://engineering.uottawa.ca/downloads/pdf/thesisguideline.pdf</a> :

- **Title Page**: This is what people see first, so make it clean and professional. Include the title itself in title case (and maybe the organization or course name for which it was created), your name or names, the date of creation of the document. Many organizations have specific requirements for both format and content for this page.
- **Abstract**: A very short summary of the content of the report. Because of the high-level treatment and the length, the big boss might *only* read these 100 words or so of your document, so summarize the important contributions only.
- Acknowledgements: Acknowledge the contributions of others, in your work, as appropriate.

- Table of Contents, List of Figures, List of Tables: We will learn how to generate these automatically using both MS Word and Google Docs
- Nomenclature: Symbols used
- Glossary: Specialized terms used and their meaning in plain English
- **Main body**: This needs to be organized hierarchically with headings that go no more than three levels deep (explained in more detail later, but numbering might look like 4.3.2, but *not* 4.3.2.2, where 4 is the chapter number). Typically, the first section is an introduction that sets the context for your work and helps a non-expert reader understand the importance of your work. In a full technical paper, a literature survey would be expected next, followed by results and discussion
- **Conclusions and Recommendations**: The main conclusions should all be here, extracted from the main body, followed by recommendations for future work or next steps.
- **References**: There are powerful add-on tools available for Google docs. We will discuss one of these called Zotero: <a href="https://www.zotero.org/">https://www.zotero.org/</a>) that lets you organize and store a database of references. The stored references can then be used easily in multiple documents. Unlike MS Word, Google Docs *needs* an add-on tool of some kind for the convenient manipulation of references in scientific format. A good report has references, since it implies that the authors "did their homework" and didn't "re-invent the wheel". You need to be aware of what other people have done, although you should not be copying their work, of course (*plagiarism* is both an academic *and* a professional offence; don't do it!).
- **Appendices**: These are extra sections of text that are not central to the main body nor even required for understanding, but are included for the sake of detail or completeness. They are taken out of the main flow and put at the end ("appended") to avoid making the main body unnecessarily long or unwieldy.

#### **General Advice**

We will now create a document with this format, although we will leave out some of the less important sections. In general, you should use the automatic features in the word processor, rather than doing things manually. For example, don't type in carriage returns and extra spaces to line things up, when you can simply change the paragraph attributes for the whole document. This makes the final result more consistent and wastes less of your time.

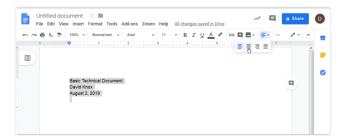
If it seems like you are doing things slowly and laboriously and you feel like 'there must be a better way of doing this', then there is *probably a better way of doing it*! The internet is your friend. Strive to make your final document the best in can be, especially in terms of content, but also in terms of presentation quality! Don't settle for shoddy quality, just because you don't know how to do something. Instead, learn how to do it.

For that, the context-sensitive help is useful. If you are not sure about the use for a specific icon, hover your cursor over it and read the resulting help text. For example, in the diagram below, the cursor was hovered (left stationary for a few seconds) over the 'centering' icon, resulting in the help message shown. When you do this, the keyboard shortcut for the icon is also given by both tools.

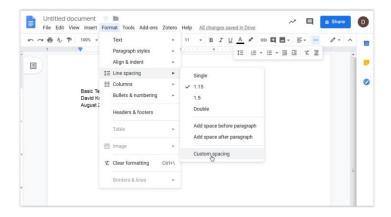


#### **Create a Document**

- 1. Select "Start a new document"/Blank in Google Docs. Templates are available, but we will not use these now.
- 2. Add the text: "Basic Technical Document" and hit the *Enter* key.
- 3. Next type your own name and hit the *Enter* key once again.
- 4. Include the current date in a format like "January 7, 2017" and hit Enter again.
- 5. This should now be on a page by all itself and should look something like this:



In Google Docs, your document is saved automatically on your Google Drive, but you might want to download a copy of it periodically (the procedure for doing this is explained at the end of this document). Given the emptiness of this page, we want to centre the text (as is being done in the diagram with the mouse pointer to the text which is currently left-justified). We can increase the size of the fonts and make the title bold, etc.



6. We can also adjust the line spacing after or before a paragraph. Select the Format/Line Spacing/Custom spacing menu item.

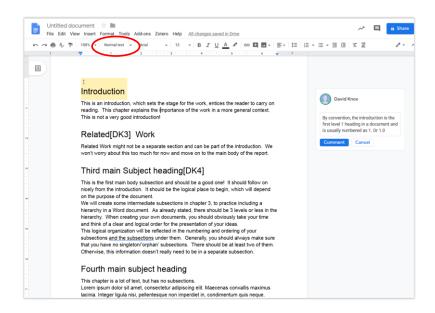
- 7. We next insert a page break after the last line by selecting *Insert/Break/Page/Page Break* or use the *CTRL+Enter* or *H+Enter* (on a MAC) keyboard shortcut.
- 8. The next page is blank by convention, so you can insert yet another page break. This allows the abstract to start on the same side as the title page.

#### **Headings**

- 9. Generation of a Table of Contents requires headings and styles that we will need to create in our main body. Next we insert another page break as a placeholder for now and continue on to the main section of our document.
- 10. This document will only have seven numbered chapters. We have some intermediate subsections in chapter 5, to practice inclusion of a heading hierarchy in a document. As already stated, there should be 3 levels or less in the hierarchy as follows:
  - 1. Introduction
  - 2. Related Work
  - 3. Third Main Subject Heading
  - 4. Fourth Main Subject Heading
  - 5. Fifth Main Subject Heading
    - 5.1 The first subsection beneath the fifth main subject heading
    - 5.2 The second subsection beneath the fifth main subject heading
      - 5.1.1 First subsection
      - 5.1.2 Second subsection
      - 5.1.3 Third subsection
  - 6. Conclusions and Recommendations
  - 7. References
- 11. The text in our document will be organized with 3 to 5 concise sentences in each paragraph, but we will use some random-looking Lorem Ipsum (i.e. random) text generated from: <a href="http://www.lipsum.com/feed/html">http://www.lipsum.com/feed/html</a>.
- 12. To save some time, this has all been captured already for you in a document inside the 'Lab 1/Lab1 Computer Tools folder called "Basic Technical Document.doc".

What is the	difference	between	files	created	with	a suffix	of <i>odt</i> ,	docx or t	xt?
odt									

- 13. Download the file from Brightspace.
- 14. Select the heading 'Introduction' by clicking anywhere in the text and then selecting *Format/Paragraph Styles/Heading 1/Apply Heading 1*. The text will change to the defined format, which will show you that the paragraph style for the "Introduction" heading has been changed successfully (see the next figure).
- 15. Repeat step (9) until all first-level headings are assigned the heading style of *Heading 1*.



You will need to select the text in question and then pick the style from the pull-down menu that defaults to 'Normal text'. The specific selection points are circled in red in the figure. Note that the 'DK3'/'DK4' etc. labels arise because of the way the word processor interprets MS Word comments (i.e. as footnotes) during the import process. To insert comments, double-click on any text. A small '+' icon appears on the right side of the page, allowing comments to be captured just like the one that is shown in the figure.

16. Repeat the same procedure for changing the style of all of the headings at each level, using Heading2 for second-level titles and Heading3 for third-level titles.

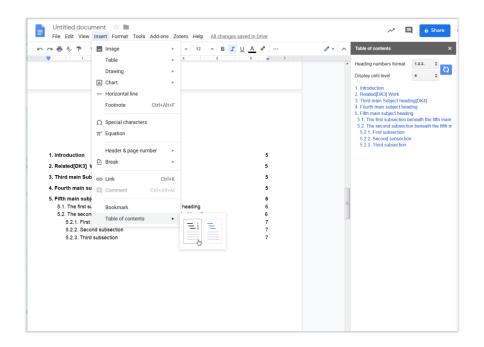
The result should be as follows <with the final assigned style shown in angled braces at the beginning of each title heading text>:

```
<Heading1> Introduction
<Heading1> Related Work
<Heading1> Third Main Subject Heading
<Heading1> Fourth Main Subject Heading
<Heading1> Fifth Main Subject Heading
<Heading2> The first subsection beneath the fifth main subject heading
<Heading2> The second subsection beneath the fifth main subject heading
<Heading3> First subsection
<Heading3> Second subsection
<Heading3> Third subsection
<Heading1> Conclusions and Recommendations
<Heading1> References
```

17. We want numbered headings. Google Docs requires you to add an add-on called 'table of contents': <a href="https://www.experts-exchange.com/articles/19359/Using-the-Table-of-Contents-Add-On-for-Google-Docs.html">https://www.experts-exchange.com/articles/19359/Using-the-Table-of-Contents-Add-On-for-Google-Docs.html</a>.

#### **Table of Contents**

18. To create the Table of Contents, first place your cursor where you want the Table of Contents to be created. Select *Insert/Table of contents* and then choose the icon with the context-sensitive help that says "with page numbers".

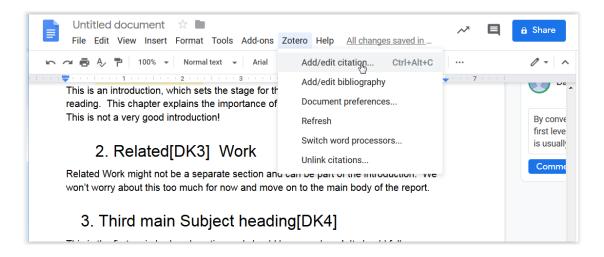


19. By right-clicking and selecting the update icon , this table of contents can be updated with a single mouse click, or by clicking on the refresh icon, which appears on the left of the table, once the cursor is placed anywhere in the *Table of Contents*. Try it yourself by adding another Heading1 title like 'Another Heading' somewhere and then assign it a style of Heading1 first. After updating, you should see your new section appear in an updated *Table of Contents*.

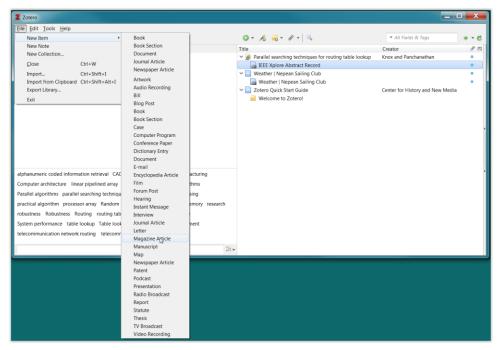
# Citations and List of References (bibliography)

20. You can create references to external sources. These are often called citations and there are different conventions for their format. References might also be required for figures or tables or even other sections or subsections in the document.

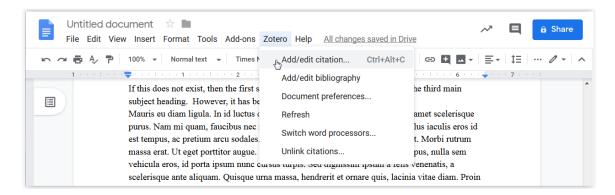
Google Docs needs Zotero to handle citations adequately and this must be installed on the computer that you are using. Zotero runs as a program, but is also visible in the Firefox and Google Chrome browsers, themselves. In addition, it will appear as a menu title in a Google Docs document. By selecting Zotero/Add/edit citation or using the Ctrl+Alt+C or  $\mathcal{H}+Alt+C$  (on a MAC) keyboard shortcut, citations can be added easily, from the database of citations organized in the Zotero application. This database needs to be set up first, before the citation can be added.



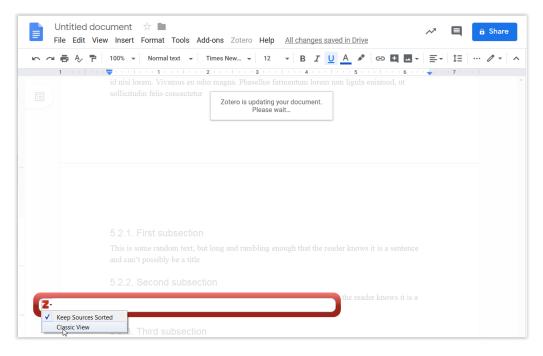
To create the reference in the Zotero application select *File/New Item/* and then pick the appropriate item type (e.g. Magazine Article, Conference paper, etc.) as shown in the figure below. You can also install a Zotero connector into your web browser, which can simplify creating citations from things you find via your browser:



Once the citation exists in Zotero, you will be able to access it from the *Zotero* menu in Google Docs (Mozilla Firefox or Google Chrome browsers) but you need to keep the Zotero application running. In Google Docs, you select *Zotero/Add/edit citation* as shown in the figure.



You will be told that "Zotero is updating your document. Please wait..." and will be given a single-line Zotero pop-up, which you can switch to "Classic view". You may also be prompted for a citation/reference system type. If so, pick "IEEE". Double-click the particular citation that you want to add and you should get a number like [1] inserted into your text.



21. Now that we have at least one citation, we can create a bibliography. Note that normal bibliographies will show the results of your research, which should be much more comprehensive (e.g. for product benchmarking, there is almost certainly **more than one** similar product which you will need to reference). A single citation would be pretty miserable, so take some time now to create another one, making up the required information about author, etc.

In reality, different organizations have different formats for both the references and the bibliography and they will provide documentation on exactly what they want. Sometimes, it would be *really* nice if everyone could just agree on a single format, but they don't. Many organizations will provide a template to simplify the process for you,

but this is not always true.

To create a bibliography in Google Docs, select *Zotero/Add/Edit Bibliography* and... eventually... one will be added into your document. You may be prompted to confirm the operation with a pop-up window. If you add more citations/references, you only need to select *Zotero/refresh* to get an updated references list.

#### Adding a Figure (inside a canvas object)

- 22. So far, we have learned how to insert a citation to external sources like books and websites. What about cases where we want to refer to a heading or to a figure or something else in our own document? We will first create a figure inside a drawing canvas, give it a caption and then create a reference to that figure.
- 23. To insert a figure in Google Docs, according to <a href="https://sites.google.com/a/gapps.uwcsea.edu.sg/dover-primary-ict/resources/addacaptiontoanimageinagoogledoc">https://sites.google.com/a/gapps.uwcsea.edu.sg/dover-primary-ict/resources/addacaptiontoanimageinagoogledoc</a> the best way is to use a Google Drawing inside your document. Place your cursor where you want your image and select <a href="https://sites.google.com/a/gapps.uwcsea.edu.sg/dover-primary-ict/resources/addacaptiontoanimageinagoogledoc">https://sites.google.com/a/gapps.uwcsea.edu.sg/dover-primary-ict/resources/addacaptiontoanimageinagoogledoc</a> the best way is to use a Google Drawing inside your document. Place your cursor where you want your image and select <a href="https://sites.google.com/a/gapps.uwcsea.edu.sg/dover-primary-ict/resources/addacaptiontoanimageinagoogledoc">https://sites.google.com/a/gapps.uwcsea.edu.sg/dover-primary-ict/resources/addacaptiontoanimageinagoogledoc</a> the best way is to use a Google Drawing inside your document. Place your cursor where you want your image and select <a href="https://sites.google.com/a/gapps.uwcsea.edu.sg/dover-primary-ict/resources/addacaptiontoanimageinagoogledoc">https://sites.google.com/a/gapps.uwcsea.edu.sg/dover-primary-ict/resources/addacaptiontoanimageinagoogledoc</a> the best way is to use a Google Drawing inside your document. Place your cursor where you want your image and select <a href="https://sites.google.com/a/gapps.uwcsea.edu.sg/document/">https://sites.google.com/a/gapps.uwcsea.edu.sg/document/</a> and select <a href="https://sites.google.com/a/gapps.uwcsea.edu.sg/document/">https://sites.google.com/a/gapps.uwcsea.edu.sg/document/</a> and select <a href="https://sites.google.com/a/gapps.uwcsea.edu.sg/document/">https://sites.google.com/a/gapps.uwcsea.edu.sg/document/</a> and select <a href="https://sites.google.com/a/gapps.uwcsea.edu.sg/document/">https://sites.google.com/a/gapps.uwcsea.edu.sg/document/</a> and select <a href="https://sites.google.com/a/gapps.uwcsea.e

## **Adding a Figure Caption**

24. To add a caption to a figure or table, install the cross-reference add-on:

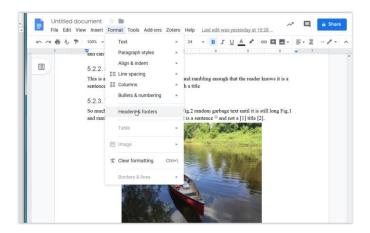
<a href="https://github.com/davidrthorn/cross\_reference/wiki/Overview">https://github.com/davidrthorn/cross\_reference/wiki/Overview</a> and follow the instructions to create a cross-reference to a figure. To create the label for the figure, position your cursor directly after and under the figure and type an arbitrary text value there like 'test'. Create a link using <a href="mailto:Insert/Link">Insert/Link</a> and then type #figur\_mylabel as the link text, where the first 7 characters are important, but the bit after the underscore can be <a href="mailto:any unique placeholder.">any unique placeholder string</a>.

## Cross References (e.g. create a reference to a figure caption)

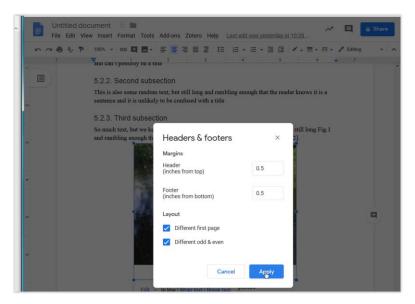
25. Now insert a reference to the newly-created figure caption. To do this, create a link using *Insert/Link* and then type #fig\_mylabel, whey mylabel is the same as the one that was used when creating the #figur\_mylabel label used for the caption. Note that the two labels must be identical for the link and automatic numbering to work properly later.

#### **Headers and Footers**

26. Finally, we will create some header and footer information (adding some page numbers to the footer). Select *Format/Headers & Footers*.

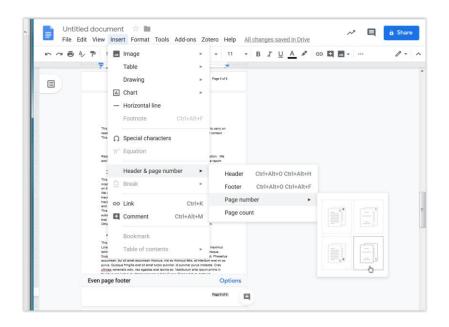


27. Check both boxes, indicating that the first page is special (this is true since we want it to be the title page and not have a printed page number like all the rest!). While optional, for illustrative purposes, we will also choose odd and even pages to be different. You can leave the default values for the header and footer margin sizes at 0.5 inches each. Click Apply.



While you may not be able to see the headers or footers, they are still there, but they are blank now. To see this, click on the upper or lower half inch of the page. Add a title to the even page header like 'Lab 1' (only) and change the text to a light grey colour. Add page numbers to both even and odd footers, so that they are in the form Page x of N, where x is the current page and N is the total page count. Select *Insert/Header & Page number/Page* 

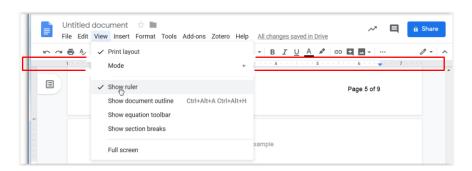
*number* and then pick the icon as shown in the following figure:



Type in the word 'of' after the page number and then select *Insert/Header & Page number/Page count* to get automatic text which will be adjusted as the total number of pages in the document goes up or down. Do this for both the odd and the even footers by clicking in any odd and any even footer area. Once adjusted for at least one page, *all* odd or even pages will be updated on a continuous basis from now on without further effort from you. You can change the colour and font of the page numbers.

#### Using the Ruler to set up margins and tabs

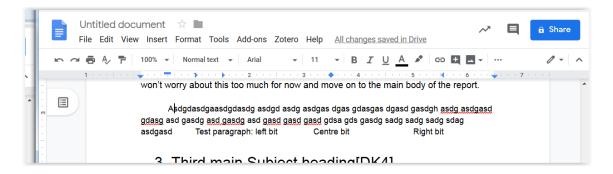
28. The ruler in can show us the margins on the page and also where tabs are located graphically. As you move your cursor onto different paragraphs, the ruler can change in appearance. Make sure that the VIEW/Show Ruler check mark is visible, or add one, to view the ruler. In the diagram below, the ruler is partially surrounded in red, although the menu is obscuring part of it.



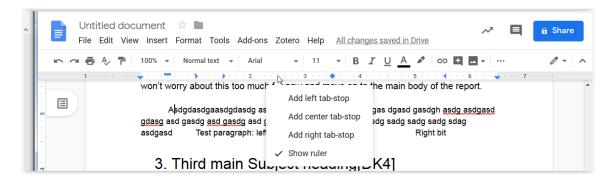
How can the ruler be hidden?

As you move your cursor onto different paragraphs in your document, you will see that the ruler can change in appearance. For the example paragraph in the following figure, you can see that:

- the left margin (shown with ) is set at the zero ruler location, with a hanging indent at 0.5 inches. This indent is only used for the first line of a paragraph (the position for the indent is shown with ).
- there are two left-justified tabs at 1" and 1.5" (shown with),
- there is a centre-justified tab (shown with ◆) at 3.5" and
- there is a right-justified tab (shown with ≤) at 5.5"
- there is a right margin (shown with **→**) at 6.5"



To add a new tab, simply right click on the ruler exactly at the point where you want the tab to exist and then pick the appropriate tab type as shown in the following figure. To move a tab just drag it to its new position. To delete an existing tab marker altogether, select it and then drag it off the ruler entirely. As a test, type text in the same paragraph, hitting the tab key a few times. You will notice that the text will be aligned for these tab characters using your defined tab markers. This is useful if you are trying to line up text in columns.



## Saving and submitting your finished document

29. In Google Docs, your document is saved automatically, as already stated. However, you will need to download a copy that you can submit into Brightspace in the Part B folder, along with the filled-in portion of this document. Select

*File/Download/choose\_a\_format*. You can use either an MS word format or a pdf format for this download. The resulting file will be stored in your normal downloads folder:

