1 Introduction

This is a short paper about technical papers. Some rules will be introduced that will be required for the papers for the CPSC and CECN students in ENGR 281. These rules are requirements, not laws. When you go to work you should expect your employer to have specific rules as to the format, layout, and other characteristics of documents you will create or contribute to. In that same sense, you have these requirements.
Throughout this paper, I will mention some observations from technical writing, typography, and human factors that I consider relevant. This paper will be consistent — at least in most aspects of format — with the requirements set forth for your documents.

I have interacted with many graduates in my decades of teaching. In the last decade, one of my primary responsibilities has been as an interface to the industries that hire you as graduates. It is often volunteered that your success will be more dependent upon your communication skills than your programming prowess. You should seize every opportunity to work on your communication within the guidelines of each opportunity.

Practicing professionals encounter similar guidelines and their variability. Each journal has its own set of rules for submission of papers. Each conference has the same and often have rules for presentations.

Should I have a table of contents? That is a question that should have come to your mind. My answer is yes if the document is five or more pages long — a bit later I will state that these documents will be single spaced, so that lower limit is five pages of single spaced text. Shorter ones do not need a table of contents. Common sense should be applied. The number of entries in the table of contents should never appear to be a label applied to every paragraph. A table of contents should be a brief outline of the document.

2 A Checklist and More

Most sections of this paper will have a list as part of the exposition. Lists are a common means of showing technical information in a formal, structured, and easily understood form.

The lists in this and the next section are intended as guidelines for documents in ENGR 281. These lists are based on my experience on the great features and bad features of the thousand or so reports I have read. Items addressed in these lists include style, writing, and formatting.

1. Good English is always the first requirement. Spelling is a significant part of good English. You should remember that sections, tables, and figures are inappropriate for action verbs. That is a small error that
when avoided often makes the document smoother. You are encouraged to obtain a copy of the classic by Strunk and White [7].

2. The report should be written in the first person! Most journals now accept technical papers in first person.

3. You shall use a roman font for the bulk of your paper. You formatting system should also have italic and bold fonts to be used for emphasis. These fonts should be quite similar in appearance to the roman font. A slanted font font should also be used in the bibliographic section of the document. Some standards allow underlining bibliographic items, but this standard does not. If your formatter does not have a slanted font, then use the italic in references.

4. Use a current technology formatter. The use of these formatters does not guarantee a good document. These technologies enable you to create good documents. Commercial word processors — like WordPerfect and MicroSoft WORD — are certainly acceptable. The open software system AbiWord has a number of interesting features and can be used on Win32 and Unix systems. The public domain \TeX/P\TeX is my preferred system. My reasons for this preference are:
   - it is a markup system which aids content as the first consideration — IMHO,
   - it is stable and produces high quality output,
   - it is available world wide,
   - there is a large number of contributors to its evolution as part of the open movement, and
   - it allows use of the standard editors that we use in programming and other application areas.

3 Format and Layout

The items in this list are presented in a “list environment” with the label being a keyword or phrase. These could have been merged with the previous list but I wished to illustrate this valuable type of list and to have another section in the paper.

Spacing. The report will be single-spaced! Double spacing was a standard when manual typing was the means of producing documents. This allowed room for editing which became part of the document.
Ragged right. You shall turn off right margin alignment and should suppress hyphenation in most systems.

Margins and type size. Your documents shall be in a roman font at 12 pt. The margins shall be at least one inch on all four sides. This should lead to most lines having 10 to 12 words. This will be consistent with the word density of most books. Books will be smaller than the standard letter paper and will usually be set at 10 pt. Also, these margins allow room for user annotation.

Graphics and floats. The inclusion of graphics, tables, pictures, and code fragments should be done to make or emphasize points that may not be understood. These are never done to be cute! It is not universal that graphics are better than tables, so be careful. A graphic that represents quantitative data should not be used if there is less than 32 data. See [2] and [8] for extensive discussions on making quality graphics.

These items may float. These items should be placed soon after the first paragraph where they are referenced. If there is sufficient room for the item it can be included at that point in the document. If not, it will float to the next page. Local rules sometimes specify:

- these items appear only at the top of a page/column,
- these items appear only at the bottom of a page/column,
- these items should appear at the first available place but can float to a later page if necessary.

We will use the last bullet as our rule.

You have seen three different list environments — I hope you noticed. These lists have labels that are numbers, bullets, and phrases or descriptions. Each has its own place. Enumerated list labels can be numbers, letters, or roman numerals. Bulleted lists should not be used if there is a lead-in like “these five items . . . ”

Now, I will resume my listing of the rules:

- Pages shall be numbered consecutively starting with the first section and continued through the bibliography. Appendices follow and should continue the numbering.
- Sections should probably start on a new page if the title and first paragraph will not fit on the current page. If you can’t figure out
more than three sections for your paper, you have not worked on it seriously enough.
Section and subsection titles should be long enough to be descriptive while avoiding verbosity. The titles **Introduction** and **Summary** are exceptions to the general rule that a section title should be longer than one word. As a matter of fact, the latter is often **Summary and Conclusions**.

- We frequently use computers to emulate typewriters. We should use computers to prepare the best documents we can, not to emulate what our grandparents did with typewriters. You should have choices of many fonts! Don’t be cute! Fonts other than standard proportional roman fonts should have specific reasons for use.
- Lists are special forms of paragraphs. They should be formatted in a hanging indentation form. The first line is not indented and subsequent lines are indented (like this list). **Bibliographies** are lists! **Do not** format lists like ordinary paragraphs.
- **Do not** underline! Emphasis of phrases should be accomplished by changing to a font related to the standard roman being used for the bulk of the document. (Underlining was a means to tell typesetters what should be italicized, bolded, or . . .) Do not even underline email addresses and **URLs**. Put them in a monospaced font (like Courier.)
- Budding computing professionals should show as many of the best elements of their profession as they can. Thus, do not use printers with resolution of less than 600 dots/inch. You may need to ask around rather than use the default printer.
- **Do not** put any of your assignments in a **folder**. You may staple the report in the upper left corner with one appropriate staple.
- Do not include any blank pages!

## 4 Pot Pourri

I will include a few paragraphs in this section without using a list format. These are items that many authors first learn about from professional editors or designers. They are more common than you probably think. A new paragraph should begin in one of two ways. Oops, that is much better presented as a list. So a list will be used in spite of my desire to
present the major part of this section as a set of paragraphs. Because of the explicit mention of two ways, I present this using an enumerated list:

1. there should be little or no extra white space separating it from the previous paragraph and it should be indented
2. there should be a visible amount of extra white space separating the paragraphs and it should not be indented.

In the latter case this extra white space should be much less than the full height of a blank line.

Many of today’s formatters have evolved from the use of typewriters. Often this evolution has been based on some amount of ignorance — assuming the book designers and others had good sense behind their decisions. Too often, we have used the same character for the four different dashes.

The dash in [1] is the em-dash. It should be the dash most commonly entered in text. The em-dash is often used as punctuation for parenthetic expressions. It is the character in the previous paragraph between ignorance and assuming.

This is fairly automatic in WORD 2000, but it is not really done right because it supresses the optional space on each side. In WORD 2000, you type a space and then two hyphens and it magically appears. If you type a space and then two hyphens, the pair will be replaced by an en-dash with space on both sides which should not be there. If you are using an earlier version of WORD or Word Perfect, exploring help should easily enable you to create short-cuts to the em-dash and en-dash. Oh yes, the latter is used for numeric ranges like: January 21–26, 2002.

The other two dashes are the hyphen which is still needed and the minus sign should be used in mathematics mode.

Most of your documents will be more than one page long. It is required that you use headlines or footlines on all pages after the first page. In this paper a simple footline is used and the page number is centered in the bottom margin. It is not required but it is recommended that the footline on the first page be supressed. If you use headlines instead of footlines, the headline on the first page must be supressed.

Many word processors have the snappy term smart quotes. They are not smart, they are just proper and not the dumb old opening and closing
being the same double prime. That came about from the limitations of the keyboard being finite.

However, too many technical documents are laden with improperly formatted long quotes. The following quote is formatted as properly for a quote that is two or more lines in length:

The need for more elaborate man/machine interaction can certainly be enhanced by designing more incomprehensible systems.

— Edsger Dijkstra

Notice that it is indented on both sides and is single spaced — even if the main document were double spaced.

You should not overuse font changes and try to make your documents appear like *high tech ransom notes*. However, you will often reference non-English, geeky things like computer terms. Monospaced fonts were common on typewriters and early computers. Today, many screens are dominated by monospaced text. The low resolution of the highest resolution screen makes use of proportionally spaced fonts not good. You shall use monospaced fonts (typically Courier) in your documents for geeky things like:

- code fragments and listings
- file names, and
- URLs

In URLs many non standard characters may appear. These include the following \ / ~ $ # . _ -. These non-English terms (URLs) can also be quite long and the line should be permitted to break after each of these special characters without the insertion of a hyphen.

## 5 Summary

This document generally follows the guidelines and rules given. If I have a bibliography for this, then surely it is a trivial matter for you to have one of similar weight and detail. The format is important in much the same
manner that when you interview for a job, you put your best foot forward by being well-groomed and not wearing a tank top and shorts.

The existence of the next section is due to the nature of this paper. Most papers that have a section after a summary section will have a title similar to **Recommendations for Further Work**. Then too, many papers have an earlier section with a title like **Literature Survey**. Local rules often specify that all nouns in a section or chapter title will be capitalized.

**Think!** A local rule could specify that every section begin on a new page. That is common in books with chapters. I do not suggest that unless there is room for only a small fraction of a section on that page. As you near the final version of a document, you should consider rewriting paragraphs and use of optional page breaks to keep important parts of text together. I considered doing the same before the bibliography. However, that would have used another page of paper and I considered that unnecessary.

## 6 References and Bibliographic Entries

Bibliographic entries should be referenced in the text. It is preferred to include the defining reference, one you should have read. Most reference should be books, conference proceedings, or peer-reviewed papers. Some of the bibliographic items for this paper have annotating paragraphs. See [1] for a number of examples if you don’t like this one.

Your paper shall be a technical paper related to your major. It shall have references other than textbooks. Your textbooks usually have a number of references that you should be able to find in the library. A reference implies permanence.

A number of current books have many URLs within their bindings. It is also common for a significant portion of the URLs to no longer exist. The point that must be made is that the URL itself is not a reference. The reference has author, title, publisher, date, etc. The URL is to be placed in an annotating paragraph for the reference with a phrase stating when the reference was viewed at this address.

Make sure that you have real references, not just the computer industry equivalent of the *National Enquirer*, vendor hype, and/or propaganda.
References


Some \TeX/\LaTeX books are available in the MSC under the MATH 696 course. They are usually available at booksellers in computer reference categories.

This serves the obvious need of assisting in putting decent documents (in a typographical sense) on the web because that is difficult. It includes introductions to html, xml, and pdf.


Several on-line references for help pages are linked as well as some longer introductions. Helpful for those who don’t buy real references that are complete with indices. Available online: club.eng.cam.ac.uk/help.old/tpl/textprocessing/LaTeX_intro.html


This book (and the next one) are classics even if they are fairly new. If you ever have the opportunity to hear Professor Tufte speak, do not pass it up. He is entertaining and at the same time his talks are loaded with
information. He gives guidelines when graphics are better than tables and vice versa.