Work Term Report
Basic Formatting

MME Department
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Presentation Outline

1. Why are you writing a work term report?

2. Topic selection

3. Advice by section
   a. Front matter
   b. Main body
   c. End matter

4. Formatting advice
Why are you writing a work term report?

- Waterloo Engineering students are required to write a total of 3 work term reports
- Typically 20-30 pages
- Main Purposes:
  - To demonstrate written communication skills
  - To demonstrate engineering proficiency
Why are you writing a work term report?

**Main Purposes:**

- To demonstrate written communication skills
- To demonstrate engineering proficiency

*by describing and solving a technical problem to an audience that does not need technical knowledge in your field*

- The Technical problem should be something that was done on your work placement, but can be ‘self-study’
Why are you writing a work term report?

Acceptable Topics:

- Research reports, design reports, case studies, feasibility assessments, transition document, etc.
- Something that a mechanical engineer would do, and which demonstrates some aspect of technical proficiency

Unacceptable Topics

- Descriptions of processes, systems, equipment, mathematical models
- Literature review
- Company practices or standards
Topic Selection

Example: Project Topics

✗ “Describing all the different current light fixtures in the plant.”

✓ “Determining if replacing current light fixtures with energy efficient fixtures is worth spending the initial capital.”
Advice by Section

Front Matter
Front Matter

- **Order of front matter**
  - Title Page *
  - Letter of Submittal *
  - Table of Contents ** (start numbering here)
  - List of Figures **
  - List of Tables **
  - Summary ** (always after List of Tables)

- **Do not** include a section called “Contributions”
  - Include this as a paragraph in the letter of submittal

* - no page number
** - roman numeral page number

1st page after the summary is page 1
Letter of Submittal

- Address to the Associate Chair for Mechanical or the Director of Mechatronics
  - Mechanical (Bill Owen)
  - Mechatronics (Andrew Kennings)

- Do not bold the title and employer.

This report titled “Lighting Retrofit Project Proposal for XYZ Foods” was prepared for my first work report at my 2A Co-Op placement at XYZ Foods. This report is submitted to

- **Must** contain the statement of declaration
  - “This report was written entirely by me and has not received any previous academic credit at this or any other institution”
Table of Contents, List of Figures, List of Tables

- Table of contents **should not** contain table of contents

```
Table of Contents
Table of Contents ........................................................................................................... i
List of Figures .................................................................................................................. ii
List of Tables .................................................................................................................. iii
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- Connect entry to its page number with a dotted line

- Ensure that the page numbers are aligned

- List of figures and list of tables should be on separate pages
Summary / Executive Summary

- It is a brief version of the **full** report
  - It is a synopsis, not a preview
  - Consider the summary to be the spoiler that provides all the exciting details of the project (not vague statements)

- Include quantified specifics
  - Results of implementation

- Should be 1 to 2 pages long
  - Preferably 1 page

- **Should be the last section written**
Advice by Section

Main Body
Outline of Main Body

- Work report should be like a technical story
  - A general outline for work term reports

<table>
<thead>
<tr>
<th>Introduction</th>
<th>Background about problem</th>
<th>Define the problem</th>
<th>Define the objective of the report</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering Judgement</td>
<td>Can take many forms</td>
<td>Should demonstrate engineering competence</td>
<td>Support your decisions with engineering analysis</td>
</tr>
<tr>
<td>and Analysis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Results/Implementation</td>
<td>Explain how solution is implemented</td>
<td>Results and analysis of implementation</td>
<td></td>
</tr>
<tr>
<td>Conclusions</td>
<td>Conclusions about objective, solution and results</td>
<td>Recommendations on how the project should move forward</td>
<td></td>
</tr>
</tbody>
</table>
Introduction - General

- Generic background information
  - Introduce important concepts

- Define the problem or project the report is trying to address
  - Why has the company commissioned the project?

- Define the objective of the project
  - What should be accomplished by the end of the report?

- **Must** use in text references
Introduction - Objective

- **Must** clearly state the objective in the introduction
  - The topic is not an objective

**Example**

❌ “The company would like to replace lighting fixtures to save energy costs.”

✔️ “The **objective** is to select and install lighting fixtures that provide the most savings to XYZ Foods.”
Introduction - Background

- The background may be included in the introduction if it is brief

- Supply technical background
  - Define all important acronyms and technical terms

- Teach the reader enough of the technical content so they can get through the report
Engineering Judgement and Analysis

- How this part of the report looks can depend strongly what the report is about.

- Some Examples:
  - Description of an experiment. Describe the test equipment, test procedure, report the results, analyze the results.
  - A design decision. Present the design specifications (objectives and constraints) and criteria, put forward design options, produce a (justified) decision matrix.
  - A design. Present the design specifications (objectives and constraints) and criteria, explain the redesign process (FEA, CFD, etc), produce a (justified) final product.
  - Etc.

- Provide reasoning and justification for all decisions

- Many students have the misconception that a decision matrix is a required part of a work report. This is not the case. While a decision matrix can be a useful tool during the design process, it is not always required.

- Need to display engineering analysis and judgement.
Results and Implementation

- **How** the solution was or will be implemented

- Discuss results of implementation
  - Refer to objectives, constraints, and criteria, and previous analysis as needed
  - **Quantifiable** results are preferable

**Example**
- Actual cost of the project
- Achieved energy savings

Note: The plural of “criterion” is “criteria” or “criterions”. Not “criterias” or “criterion”. The word “criteria” is not singular.
Conclusions

- No new information should be presented in the conclusion
  - Brief summary of solution and results.
  - Do not use point form

- Refer to the objective (was it met?).

Example

❌ “Installing more light fixtures will increase the productivity in the plant.”

✔️ “Installing solution 2 provides the most savings to XYZ Foods. Savings of X dollars was realized.”
Recommendations (Optional)

- Provide recommendations for the **project**
  - This *is not* a self reflection
  - Do not use point form

- Should be specific, measureable and attainable

- Look forward
  - *Do not* state what could have been done better during the process of the project
References

- Use a standard format, **must** contain sufficient information to locate the source
  - **Avoid** confidential sources (if possible)
  - If citing a web page, note the date last accessed
  - Do not reference an entire textbook. Be more specific
  - Too few references is likely going to cause a re-submit
References – Standard Formats

- IEEE Format
  - References are noted by [1], [2], etc.
  - Order corresponds to the order in which they are first referenced in the text. The first reference to appear is [1], the next is [2], etc.
  - Reference section is numbered consecutively

- APA Format
  - References are noted by (Name, Year).
  - Reference section is numbered alphabetically.

More information on referencing and plagiarism can be found in the MME_WorkReportWriting (rev Fall 2021) document.
Glossary (Optional)

- Only include if main text has numerous technical terms, company specific terms, or mathematical symbols

- Otherwise, define all terms or mathematical symbols in main text
Appendices (Optional)

- Relevant information that is not required for comprehensive understanding
- Reader **should not** need to look at the appendix while reading the report
- Must be referenced in text
- The appendices must be formatted to match the rest of the report
Other Stuff
Figures and Tables - Captions

- Captions should be with the figure / table
- Captions should be descriptive enough to know what the figure is from its description
- If the caption is shorter than one line, centre it. If it is longer than one line, right or fully justify it.
- If the table / figure is not your own, cite it in the caption
- Distinguish figure / table captions from the body text
Figures and Tables - Other

- Refer to **all** figures / tables in text by number
  - Ensure figures/tables have significance to discussion
  - Make sure the figure/table is actually discussed in the text. If you don’t discuss the figure/table in the text, then it should not be in the report.

- Make sure the table / figure is legible
- Don’t make figures so small that they are rendered useless
- Centre figures / tables
- Place the figure / table in the first convenient location after it is referenced
Figures

- Captions should be below figure
- If referring to a color in a picture, print in color
- Make sure data is distinguishable if printed in greyscale

Figure 10: Amount of different light fixtures
Captions appear above the table

Table 2: Total cost per fixture

<table>
<thead>
<tr>
<th>Type of Fixture</th>
<th>Fixture Price</th>
<th>Bulb Price</th>
<th>Number of Bulbs</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$150</td>
<td>$8</td>
<td>3</td>
<td>$174</td>
</tr>
<tr>
<td>2</td>
<td>$60</td>
<td>$4</td>
<td>4</td>
<td>$76</td>
</tr>
<tr>
<td>3</td>
<td>$30</td>
<td>$2</td>
<td>1</td>
<td>$32</td>
</tr>
</tbody>
</table>
Equations and Numbers

- Refer to **all** equations in text by number
- Don’t insert figures as graphics. Insert them using the equation editor
- Number all equations
- Reference all variables in the text using the same font as the equation
- Place the equation after it is first referenced
- Usually, numbers have units
Formatting

- Ensure consistent formatting throughout the report
  - Font Selection: do not use ornate fonts
  - Font Color: black only in the main text
  - Justification: Full or right, except for figures and tables
  - Paragraph spacing: Indent with no space, or no indent with space

- Formatting changes are distracting to the reader
- Random formatting changes show a lack of attention to detail, which is not what an engineer wants to portray.
Formatting

- 1.5 line spacing is normal
  - Can use 2.0, but it is generally for editing.

- Avoid a lot of white space

- Avoid Widows and Orphans
  - Widow: when a single line in a paragraph moves to the next page
  - Orphan: when a single word from a paragraph moves to the next page
Most Common Formatting Mistakes

From your markers – the most common (and easily fixed) work report formatting errors.

- Incorrect page numbering
- No or too few in-text referencing in the introduction
- No objective statement in the introduction
- Conclusions don’t refer back to the objective statement
- Figures / Tables / Appendices not referenced in the text