

SECTION 7: WORK TERM REPORT GUIDELINES

WHY DO YOU HAVE TO WRITE A REPORT?

The completion of a Work Term Report is an important part of the Co-op process because it helps to prepare you for your future career. The ability to communicate effectively in writing is essential to the professional scientist. The collection, organization and presentation of data in a clear, logical and concise format is a skill which only develops through practice.

In the Co-op program, you will be completing 3 (or 4) work term reports, which will be graded by a faculty member. You will receive feedback which will allow you to improve your professional writing skills. When possible, your work term report may be useful to your employer, and will remain with the company as a permanent example of your work. You should discuss ideas for your work term project with your job supervisor early in the work term to gain assistance in determining an appropriate subject. This is especially important when confidential or proprietary information may be included in your report. They must agree on your choice of topic.

Employers must also receive a draft copy of your report in advance of the submission deadline, for them to review if they so choose. The report is a reflection of work done under their supervision and they must feel comfortable with it before it is submitted to the University for marking.

COMPLETION

Satisfactory completion of a work term report for each work term is an academic requirement for graduation with the Co-op designation. The evaluation of work term reports is subject to the usual regulations regarding grading, plagiarism, and appeals.

Work term reports may sometimes contain classified information that the employer is unwilling to release. If so, the employer will then be asked to assess the report and advise the department as to its acceptability, or an edited version of the report may be submitted to the University for evaluation.

SUBMISSION DEADLINES

Work term reports are required on the completion of each four-month work term. It is important to start on the report by the end of the first month of the work term. Progress will be discussed during the site visit. **One hard copy of your report and one hard copy of title page & abstract should be submitted by the following dates:**

September 15 for summer work terms

January 15 for fall work terms

May 15 for winter work terms

Note: Email and fax copies will not be accepted.

If report receives a mark of Excellent, we will ask for a copy for our files.

EVALUATION PROCEDURE

Reports will be evaluated by members of the Faculty of Science or other professionals using the forms provided by the Co-op Office. (A sample of the form used for research reports is shown in the Appendix.) Once the topic for the report is known, the Co-op Coordinator will work with Faculty members to determine a suitable marker. A work term report containing confidential information will be graded by the employer. The employer may also require you to sign a confidentiality agreement at the start of your work term, requiring you to keep all information obtained at the work place confidential.

Reports will receive a grade of Excellent, Good, Satisfactory, Poor (correctable) or Unacceptable (needs to be rewritten). Reports receiving a grade of Poor or Unacceptable will be returned to the student and must be redone within 3 weeks to receive a grade of Satisfactory before the work term is recognized as complete. Your transcript will show the evaluation as pass/fail.

YOUR WORK TERM REPORT SHOULD INCLUDE:

- Be related to your work term activities in some way;
- Be complex enough to evoke analysis and a better understanding of the subject;
- Avoid confidential topics of concern to your employer;
- Be on a topic you have discussed with your employer/supervisor to ensure they are comfortable with your choice;
- Be clear, concise and correct; and
- Look professional. It must be bound or hole-punched and placed into a report holder (eg. Duo tang folder). It should not be stapled or left loose in a folder.

HONESTY DECLARATION

A Co-op Program Honesty Declaration Form must be filled out and submitted to the Co-op Office with each co-op work term report. A copy is shown in the Appendix. It will be provided to you by the Co-op Office. **Do not use any other honesty declaration form. Your report will not be marked if no honesty declaration is provided.**

If your report is being marked by your employer, you must submit the completed honesty declaration form to the Co-op Office or your report mark will not be submitted to the Registrar's Office.

THE REPORT FORMAT

Your report should be between 2,000 and 3,000 words, at a minimum. It should be typewritten, **double-spaced** on 8 ½ x 11 paper, with margins of not less than one inch. The preparation and typing of the report will normally be completed on your own time, unless arrangements have been made with your employer (i.e., they suggest you can use work hours to do your report).

The range of jobs carried out by Co-op students is extensive, and reports will vary considerably. To accommodate all possible job situations, there are five basic formats:

1. Research Report
2. Procedural Report
3. Professional Report
4. Review Report
5. Employer Report

Research Report

This format is used when the Co-op student is reporting on a research project, and should conform to accepted journal style. Journal articles are the most important means of communication among scientists, and it is essential that they be written in standard scientific format.

The Research Report includes:

1. Title Page
2. Letter of Submission
3. Table of Contents
4. List of Tables
5. List of Figures
6. Abstract
7. Introduction
8. Materials and Methods
9. Results
10. Discussion
11. Conclusions
12. References
13. Appendices (Optional)

Procedural Report

This format is used when the Co-op student is reporting on routine work carried out in a testing or manufacturing laboratory, where no original experimental research is being performed. Or where the student's role in the research is to carry out a specific procedure or series of procedures but they are not given any results to analyze. It is similar to the research report in style and format, but will report on routine procedures and discuss the significance, applications or

consequences of the results obtained. A sample of the type of results obtained using the procedure can be included to help illustrate the expected outcome.

The Procedural Report includes:

1. Title Page
2. Letter of Submission
3. Table of Contents
4. List of Tables
5. List of Figures
6. Abstract
7. Introduction
8. Standard Procedures
9. Results and Discussion
10. Conclusions
11. References
12. Appendices (Optional)

Professional Report

This is a combination of the strict scientific format and formal essay style. It is a format useful in consulting work, government, and industry. Co-op students may adopt this style if their work involves, for example, a comparative analysis of methodologies or published data. Many situations lend themselves to this report format, especially those where no primary research is possible or appropriate. Such a report communicates background information, differing views, evidence, conclusions, and recommendations.

The key is to ensure that a scientific approach is taken, regardless of the subject under review or discussion, and reference is made to the literature in the report. Also be sure to clarify the subject of your report, especially if it is defined or limited by your employer. Your reader needs to know what the parameters are for your report and why they were chosen.

The Professional Report includes:

1. Title Page
2. Letter of Submission
3. Table of Contents
4. List of Tables
5. List of Figures
6. Abstract
7. Introduction
8. Discussion
9. Conclusions
10. References
11. Appendices (Optional)

Review Report

A Review Report provides a broad review of the current literature related to a particular subject or area of research. A minimum of 25 to 30 references should be reviewed and included.

The Review Report includes:

1. Title Page
2. Letter of Submission
3. Table of Contents
4. List of Tables
5. List of Figures
6. Abstract
7. Introduction
8. Main Text (with Subsections as required to cover various aspects of the topic under review)
9. Conclusions
10. References
11. Appendices (Optional)

For a Review Report, the Introduction should clearly introduce the topic(s) being covered to the reader and explain how the chosen topics are related to your co-op work term.

The Main Text will be made up of a number of subsections, each with its own title. There should be a subsection for each part of the topic being reviewed and discussed. Figures and Tables should be used to illustrate the material being discussed. They must be mentioned and described in the text. Do not leave it to the reader to try and understand what they mean and why they have been included. If these are not explained in the text, you will be required to rewrite your report.

For the Conclusions, summarize the main findings of your review. Also be sure to indicate how this information enhanced your understanding of the work you were involved in for your work term.

For References, use the format in the Canadian Journal of Microbiology or other relevant journal, being sure to pay attention to the order of the information, when to use bold text, commas, periods, etc.. For example, below is a reference for a review article printed in Can. J. Microbiol:

Kostrzynska, M., and A. Bachand, 2006. Application of DNA microarray technology for detection, identification, and characterization of food-borne pathogens. Can. J. Microbiol. **52**: 1-8.

For Review Reports, only **one** website may be cited as a reference. The material used should be mainly from reference and text book, journal articles and reviews. Peer reviewed journal articles can still be obtained on-line, however websites that do not contain peer-reviewed material (e.g., Wikipedia) will be limited to one.

Employer Report

If an employer requires a format substantially different from the above styles (for example a procedural manual) the student should consult with the Coordinator immediately. With modifications, the report will likely be accepted as a Work Term Report. In many cases this type of report will have to be marked by the employer as they are the only ones who can judge if it is acceptable for their needs. The information above on Professional Reports applies, to some extent, to Employer Reports as well. The key is to ensure that a scientific approach is taken. It is important to develop an outline that your employer agrees with, so you know what they expect you to include in the report. Also be sure to clarify the subject of your report, especially if it is defined or limited by your employer. Your reader needs to know what the parameters are for your report and why they were chosen.

THE REPORT CONTENT

Title Page

The title page should conform to the sample given in Appendix A. Choose your title carefully, using the fewest possible words that adequately describe the contents of the paper. In preparing the title for a paper, authors should remember one salient fact: the title may be read by thousands of people. Few people will read the entire paper.

Letter of Submission

This letter should be addressed to your Faculty Co-op Advisor. The letter follows a standard business format and should include the following information:

- name of the employing organization and your immediate supervisor
- a brief outline of your employment responsibilities
- a clear statement of the purpose of your report
- indicate what type of report it is, including if it is an interim or full report
- a clear statement of your intended level of audience
- acknowledgement of any assistance given in the preparation of the report
- statement of confidentiality if appropriate

The submission letter is important as it sets the context for the report in the reader's mind. It helps the reader to know what to expect in the report and the circumstances under which the report was developed, particularly if the report uses a professional or employers report format. Be sure to note in your letter how the work will be used by your employer, if it will be. A sample of a submission letter can be found in the Appendix.

Table of Contents

This is a list that sets forth the major divisions and subdivisions, with their titles and page numbers. The Table of Contents itself is not listed.

List of Tables

This includes all tables with their individual numbers, titles, and page numbers. Use the same format as the Table of Contents.

List of Figures

This includes all figures with their individual numbers, titles and page numbers. Use the same format as the Table of Contents. Note that illustrations, tables and other supporting material not critical to the text presentation are placed in the Appendices and, as such, do not appear in the List of Tables or List of Figures.

Abstract

The abstract is a very important part of your report. Although located at the beginning, it is written after the report is completed, and must convey to the reader all the essential information of the report. It is a summary of the full report. It should be able to stand alone, as abstracts are often removed from the original publication and reprinted in secondary publications, e.g., Biological Abstracts. Like the title, many more people will read the abstract rather than the whole paper.

The abstract should not exceed 250 words. It should be on a page of its own, and consist of a single paragraph. Use the past tense.

It should include:

- a statement of the objectives and scope of the report
- a summary of the methods used (Research and Procedural Reports only)
- a brief statement of the main results; for Research and Procedural Reports the results will be based on experimental data; in a Professional or Review Report they may include literature surveyed, etc.
- the main conclusions which may include recommendations

Do not include any information or conclusion that is not stated in the report, and do not cite references to the literature.

Introduction

The introduction is important because it presents the background, the rationale, approach, and main objectives of the study. It should provide the reader with a sense of where this work fits into the larger picture. It should present first the nature and scope of the investigation, review the pertinent literature to orient the reader, and state the method of investigation, the principle results, and conclusions. It should be written in **present tense**.

Materials and Methods (Research and Procedural Reports only)

The details of the experimental procedure and apparatus are described in this section of the report. Keep the following in mind:

- describe the procedures in sequence including all information needed to understand the data and the discussion - it should provide enough detail that a competent worker can repeat the experiments; do not include results in this section;
- for procedures followed from a manual, a journal or any other publication, name the procedure, reference it properly, and note only the modifications;
- be sure to write out the procedures in paragraph form, not point form;
- use the past tense;
- do not use lab jargon or shorthand to explain your methods – e.g. “run westerns” is not an appropriate way to state a particular technique was used. Give a full description so that anyone outside your workplace can clearly understand the methods used;
- chemicals should be given their generic name followed, in parenthesis, by trade name, if applicable, e.g., sodium pentobarbital (Nembutal);
- when referring to buffers and reagents that were purchased premade, be sure to reference the supplier and use the name that they give to their product or kit.

If some aspects of your methodology must remain confidential, you should note this in your text. For example, you can describe which generic method was used and say “with modifications that are proprietary and cannot be disclosed in this report”.

Results (Research and Procedural Reports only)

The results form the basis for your analysis and conclusions. They should be well organized and clearly presented. Use the **past tense**. Descriptive or qualitative results should be logically organized into a series of subheadings and observations. Numerical data are generally presented in tables or graphs. Care should be taken to make them appear as professional as possible. Be sure that all measurements have the correct units stated and are in metric.

Each Figure or Table must have a caption that fully explains what is shown in the Figure or provided in the Table. Tables are numbered separately from Figures, i.e., there may be a Table 1 and 2 and a Figure 1 and 2. Any Figure or Table included in the report must be cited in the text of the paper. All figures and tables must be placed directly into the text, as soon after the place in the text where the Figure or Table is first referred to as possible, without creating a page break in the middle of the Figure or Table. They should be numbered in the order they are referred to in the text. This means that Figure 2 should not appear or be referred to in the text before Figure 1.

Do not place all figures and tables at the end of the report. While some journals do this, it is not the proper format for standard Co-op reports.

More on Figures and Tables:

Figures and Tables should be used to illustrate the material being discussed. They must be mentioned and described in the text. Do not leave it to the reader to try and understand what they mean and why they have been included. If these are not explained in the text, you will be required to rewrite your report.

There are several ways to refer to a figure or table in the text:

“The frequency of Tn10 insertions into *nifA* is shown in Table 3. Their distribution is non-random (Figure 3), with a majority...”

For Tables, the title always appears above the table, with a period after the number, as shown below:

Table 1. Interpretive Categories for *Streptococcus pneumoniae*

Antimicrobial Agent	Susceptible	Intermediate	Resistant
Oxacillin	≥ 20 mm	N/A	< 20 mm
Sulfamethoxazole	≥ 19 mm	16-18 mm	≤ 15 mm
Erythromycin	≥ 21 mm	16-20 mm	≤ 15 mm
Clindamycin	≥ 19 mm	16-18 mm	≤ 15 mm

For Figures, the title always appears below the Figure, with a period after the number, as shown below:

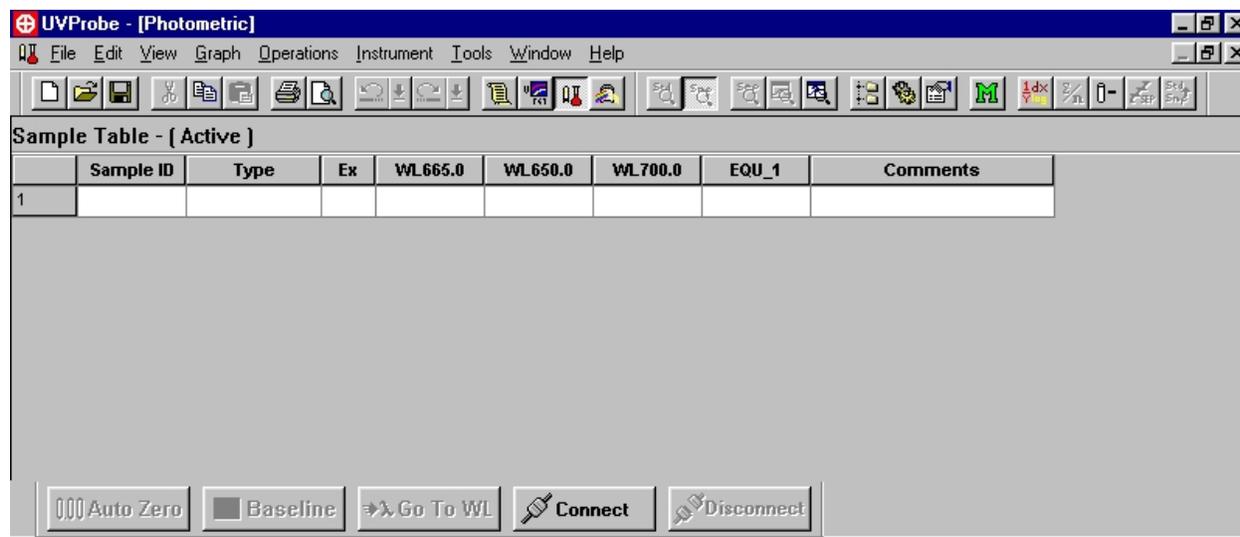


Figure 1. The file will open with the correct wavelengths (665, 650 and 700 nm) selected plus the calculation equation $\text{Conc } (\mu\text{g} / \text{l}) = 16.5 \cdot (A_{665} - A_{700}) - 8.3 \cdot (A_{650} - A_{700})$

Make sure your figures and tables are properly labeled and easy to read. If they are too small to be read clearly, they will be marked as unacceptable. Titles for figures and tables should be succinct, as detailed explanation should be provided in the text.

If a figure or table is being taken from a source, be sure it is correctly referenced at the end of the title, for example:

Table 2. Occurrence of HIV in Canada, by province, from 1980 to 2008 (Garber et al., 2010).

As many co-op students have discovered, creating tables and figures can take much more time than expected. Starting to create these early, even before you begin writing, can help you to organize your thoughts for your report.

Discussion

The discussion forms the main body of your report. Information should be well organized, clearly presented, and then analyzed with rigid objectivity. Do not omit information which conflicts with your hypothesis or expectations; discuss it and suggest alternate explanations. In a Research Report the discussion serves to explain experimental results. Whenever possible, include references to relevant literature. The use of subheadings may be useful to separate different sections.

Conclusions

This section is a brief statement of the major conclusions supported by the discussion. It should, where possible, end with a series of well thought out Recommendations. We want you to be analytical, and contribute your own thoughts about the study, i.e., identification of errors, means of improving the project, what should come next. Remember that the conclusions and recommendations must relate to the objective as outlined in the Introduction. If brief, this section may be included at the end of the Discussion (then titled Discussion and Conclusion).

References

References cited in the text should follow the format of a recognized journal such as The Canadian Journal of Microbiology, or Ecology. If there are more than two authors, the first author's name is given followed by "*et al.*" which is either underlined or in italics, as in Latin. The following examples illustrate how to include references in your text.

"A selective medium for tetracycline-sensitive cells was developed by Bochner *et al.* (1980) and modified by Maloy and Numm (1981)."

"A sharing of pollinators is thought to facilitate hybridization in orchids (Cozzolino and Widmer, 2005)."

References cited in the References Section are listed alphabetically by author and must include only those authors cited in your report. Include every reference cited. Show the reference by author, year, title, journal (if periodical), publisher (if book), and relevant pages.

Examples of how to reference books:

Brock, T.D. and M.T. Madigan, 1988. Biology of Microorganisms. 5th ed. Prentice-Hall, Englewood Cliffs, N.J.

Loomon, J. and K.F. Best, 1979, Budd's Flora of the Canadian Prairie Provinces Research Broad, Agriculture Canada Publication 1662.

Example of how to reference a periodical:

Bochner, B.R., H.C. Huang, G.L. Schleven, and B.N. Ames, 1980. Positive selection for loss of tetracycline resistance. *J. Bacteriol.* **143**: 926-933.

When citing a journal the standard abbreviation may be used, e.g., *J. Bacteriol.* Note that although “*et al.*” is used when citing more than two authors in the text, all authors must be listed in the References Section.

Example of how to reference a professional website:

Council of Biology Editors [CBE]. 2005 Oct 5. CBE home page.
<http://www.councilscienceeditors.org>. Accessed 2005 Oct 7.

Example of how to reference a manufacturer's kit or guidelines used for a procedure:

Life Technologies. 2000. DNazol Reagent: Genomic DNA Isolation Reagent User Instructions.

Premier Biosoft International. 2008. PCR Primer Length Design Guidelines.
<http://www.premierbiosoft.com> Accessed 2008 July 7.

Clinical and Laboratory Standards Institute. 2006. Performance Standards for Antimicrobial Susceptibility Testing: 16th informational supplement document M100-S16. CLSI/NCCLS M100-S15. Clinical and Laboratory Standards Institute, Wayne, PA.

Example of how to reference a personal communication as a source of information:

Wilson, F. 2011. Associate Professor, Department of Physiology, Faculty of Medicine, University of Manitoba. Personal Communication.

Appendices

The appendices are used to provide the reader with additional supporting information that elaborates on the main text, but is not essential to the principle theme of the report. For example, calculations, details of a method used, photographic illustrations, tables and other data that supplement the report should be placed in an Appendix. Identify the appendices by numbers or letters, assigning one Appendix to each group of common data. Any information appearing in an Appendix must be so referenced in the main text. The reader will not normally read an Appendix unless directed to it in the text.

DEVELOPING THE WORK TERM REPORT

To create a good report, we recommend that you follow these steps:

1. start early
2. select the subject
3. prepare an outline
4. write
5. revise
6. criticize
7. consult
8. revise if necessary
9. type and check final copy

Start early to avoid the last minute rush. Invariably a last minute effort shows in the report and often it results in an “Unsatisfactory” evaluation. Knowing the submission deadline and the various activities involved, and working backwards from the submission date, an appropriate start date can be selected. Develop this chart shortly after arriving on the job. It is easy to underestimate the time needed to complete your report and still give your employers enough time to review it and provide comments. If you do not take the time to develop a good report, it may leave your employer with a poor opinion of your performance, as it may indicate you did not care enough about the work to give the report the attention it required.

Selecting the subject can often present great difficulty. This is usually done in consultation with the employer. Most work terms involve either an assigned project or day-to-day involvement in the functions of a laboratory or a field project. If you have been assigned to a project, this should probably form the subject of the report. Otherwise, select an aspect of the job and treat it in detail. For example, a particular procedure could be compared with other possible methods, which could achieve similar or perhaps better results. You could demonstrate the relationship between a function you perform and the overall process in which your employer is engaged. Or you could conduct a review of the literature related to some aspect of the subject area your employer’s work addresses.

Prepare a detailed outline of the main topics in an order that is logical for the reader. As you cull the material you have accumulated from personal observations, test results, or printed information, be aware that some of it will serve merely as support and should appear in the Appendices, while some will provide background for use in the Introduction.

Writing begins wherever you find it easiest to start. Wherever you start, it is important to allow yourself uninterrupted time—several hours—and a completely free style. At this point do not be concerned with the finer aspects of spelling, punctuation, or grammar. Just let the words flow.

Assume that the reader is a scientist in your field but has no detailed knowledge of the subject matter in the report. While writing, constantly keep the reader in mind.

Revising begins when you read the first draft, correcting spelling errors, improving the grammar and punctuation, qualifying your thoughts, substituting a better word, and perhaps

rewriting a significant part of the report. This is a common activity even with the best of writers. Most reports need a considerable amount of “polishing” before they are ready to be submitted.

Criticism by another person is a real test of the ability to communicate effectively. Have a friend read your report and tell you what they think it says or does not say. Your supervisor should also be given the opportunity to read the report and provide their comments.

Revise your work again if necessary.

Check the report against the report evaluation form in the Appendix to be certain that everything is complete. The final presentation of the report affects its credibility—no one wants to accept recommendations or information from someone who cannot spell or construct a grammatical sentence, or who presents a report stained with coffee. Make sure your report is free of typographical errors and is placed in a neat duotang folder.

You must also give a final copy of your report to your employer for their files. If your report is not confidential and is awarded a grade of Excellent, a copy of your report will be requested for the Co-op Office report library.

STYLE AND PRESENTATION SUGGESTIONS

Be concise. Find the best possible words to say what you mean. Omit unnecessary words. Use short, common words rather than long or unusual ones. Eliminate padding as you revise your work. Avoid trivialities which could cloud the main points of your argument, but include every essential detail.

Be organized. Have all the necessary information gathered before you begin. Present it in order, and arrange it in such a way that it will help the reader understand your point of view, follow your logic and facts, and reach a conclusion.

Be logical. Say what you are going to do; do it; support what you have done; conclude.

Be consistent. Get right to the point and do not allow yourself or the reader to wander off in different directions. Your style, subject, and method of presentation as well as your use of tense, person, and format should be consistent. Use of the third person and passive voice is usually most appropriate.

Example of first person: “I ran a series of tests of the water temperature that indicated...”

Example of third person: “A series of tests of the water temperature indicated...”

However, be aware that some sections of a report should be written in a particular tense (e.g., the introduction should be in present tense while results should be written in past tense) and ensure you comply with these requirements.

Be accurate and complete. Be certain you have verified your figures, information and facts, that names are spelled correctly, and that your information is complete. Giving incomplete information is as serious as being inaccurate. **Plagiarism is unethical and unacceptable. If you find it necessary to quote someone, you must indicate this, giving all the information**

about your source. A direct quote must appear in double quotation marks (“”) to indicate you are using the exact wording from your source. Otherwise you could be accused of plagiarism.

As a scientist, you will be expected to be concise and accurate in your statements, avoid use of vague references to quantity, be as specific as possible but avoid reporting to a ridiculous degree of accuracy. Every report submitted must be accompanied by an Honesty Declaration form that you have filled out and signed. Reports will not be marked unless this form is attached.

Further information on cheating, plagiarism and fraud, including potential penalties, can be found online under Faculty of Science, cheating, plagiarism etc., information for students.
<http://umanitoba.ca/faculties/science/student/webdisciplinedocuments.html#students>

Be professional. The report should be neat, typed with margins and adequate spacing on good quality white bond paper (no coloured typewriter paper, onionskin, or notebooks). It should be carefully set up, with supporting graphs, illustrations, and footnotes where required.

Judicious use of illustrations, graphs and tables will help immensely in the description of items such as equipment, processes or plant layouts. Remember the old saying, “a picture is worth a thousand words”. That does not mean, of course, that you can reduce the content of your report by 1,000 words with the addition of one picture, but an illustration may sometimes provide greater accuracy or clarity than many words of explanation. However, you must still have some explanation of the illustration in your text. No illustration can stand on its own.

Be readable. Define terms, avoid jargon and technical slang. Remember that if you use an acronym, you must spell it out in the text the first time it is used.

Be careful. Check spelling and punctuation; they matter. Have a dictionary at hand. Have a friend proof read your final draft. The report will be graded “Unsatisfactory” and returned for revision if it contains plagiarism or substantial errors in spelling and grammar, or if its final version is not typed.

SECTION 8: INTERIM REPORT GUIDELINES

Students working a double (8 month) work term for the same employer may submit an interim report after the first four months of work.

The interim report will receive full consideration as a work report and is eligible for all grades normally used for typical work term reports. The intention of permitting an interim report is to allow further time for the project to progress so that results can be fully and competently discussed.

The interim report should have the following contents:

- Title Page
- Letter of Submission
- Abstract
- Introduction including
 - ▶ project overview
 - ▶ background information
- Materials and Methods
 - ▶ project definition (brief explanation of procedures and methods)
- Results and Discussion
 - ▶ progress to date (how you got there) and preliminary results
 - ▶ problems and successes
 - ▶ future direction (where you are going)
- Recommendations and Conclusions (if any)

It is expected that an interim report would contain approximately 5 pages of main body material (beginning with the Introduction). A detailed literature search is not expected and a cursory discussion of “Materials and Methods” is sufficient. However, references should be cited as needed.

A table of contents and lists of tables and figures can be included, if the report is longer than five pages.

The interim report is of no less importance than a full report, and will be graded accordingly.