



SPRING 2021
COURSE OUTLINE – ENGI 002W WORK TERM #2

This guide provides information on the requirements, expectations and evaluations for Work Term 2. To ensure students' work progresses smoothly this guide should be reviewed very carefully.

CRITICAL DATES:

Monday, 3 May 2021	Work Term Begins. Complete Work Term Confirmation online in MyMUNLife.
Friday, 21 May 2021	Deadline for submission of Work Term Objectives
Friday, 25 June 2021	Deadline for submission of Work Report Outline. Complete online in MyMUNLife.
Friday, 27 August 2021	Work Term ends and deadline for submission of the feedback form and communication component documents. Note: if mailing the forms/report, the postmark date will be recorded as the received date.
Wednesday, 8 September, 2021	Academic courses begin for Fall Semester
Thursday, 9 September 2021	Oral Presentations. Students presenting must be prepared to present at this time. Arrangements to be confirmed with your Academic Staff Member – Co-operative Education (ASM-CE).

STATEMENT OF EXPECTATIONS OF STUDENT CONDUCT

Like Professional Engineers, engineering students are expected to behave in a professional manner at all times. Students are encouraged to conduct themselves in a manner consistent with the the Professional Engineers and Geoscientists of Newfoundland and Labrador (PEGNL) code of ethics. MUN has two sets of rules to address inappropriate behaviour by students, one pertains to academic offences and the other to non-academic offences. Both sets of rules can be found in the University Calendar under Regulations. It is strongly recommended that students read and follow these rules because the penalties can be severe, the severest being expulsion from the University.

Organizations typically provide Internet access to their employees and work term students. These organizations often have specific policies governing Internet usage, including personal use. These policies would normally be explained during the job orientation, typically during the first few days at

work. Students must follow these policies and should expect that their employer will monitor usage of the Internet over the duration of the work term. If employers do not address this issue during initial orientation, it is strongly suggested that students ask their supervisor for specific guidance.

Students should also be aware of and follow their employer's rules around the use of products such as recreational or medicinal drugs and alcohol which may be legal to use but may not be permitted by their employer. The use of such products may affect a student's employability.

PLAGIARISM

Plagiarism is a serious academic offence at Memorial University. Cases involving suspected plagiarism in a student's work term communication component will be addressed as per the Procedures for Resolution of Alleged Academic Offences by the Senate Committee on Undergraduate Studies, stated in the University Regulations section of the Memorial University Calendar.

COURSE DESCRIPTION: ENGINEERING 002W

Engineering Work Term 2 requires students, under supervision, to contribute positively to the engineering and problem solving processes practised in the work environment. They are expected to set objectives, take direction, work independently as required, learn professional behaviours, and function as effective team members. An ability to investigate work-related concepts should be demonstrated. Students should become better familiarized with the use of engineering tools, data analysis, prioritization of assignments, and effective communication of technical information.

002W LEARNING OUTCOMES / SKILLS EXPECTATIONS

There are a key set of skills that will be evaluated based on the End of Work Term Feedback Form. These skills are demonstrated in a number of ways, and considered important to an engineer's abilities. The expectations for these skills increase with progression through the engineering education program. During more junior work terms (e.g., work terms 1 and 2), students should demonstrate these skills at a beginner level, working their way to demonstrating the skill at an intermediate level (e.g., during work terms 2 and 3), before demonstrating the skills at a more advanced level in senior work terms (e.g., work terms 4 through 6). Students who meet the expectations listed below would get a rating of 3 on the 1-5 point rating scale. Exceeding these expectations would result in a rating of 4 or 5 for that skill/quality. Conversely, if a student does not meet the expectations they may receive a 1 or 2 rating for that skill/quality. The Skills Expectations for Work Term 2 are listed below:

1. **Initiative:** Take independent action in completing assigned tasks, and show motivation in seeking new work
2. **Organization and Planning:** Prioritize work assignments based on their importance, and plan and use time efficiently and productively to complete work
3. **Quality of Work:** Produce good quality work with few errors, checking own work with minimal assistance

4. **Productivity:** Independently learn new material to consistently complete an assigned amount of work on time
5. **Written Communication:** Communicate ideas and information in writing clearly, concisely, and in an organized way, with some review and editing required
6. **Verbal Communication:** Verbally express ideas and information clearly, concisely, and in an organized way, with minimal clarification required; comfortable speaking to small group
7. **Work Independently:** Work independently on assigned tasks and projects, taking direction and seeking assistance as required
8. **Teamwork:** Be an effective team member by working collaboratively and cooperatively with others and assuming responsibility for tasks
9. **Problem Solving:** Contribute to engineering problem analysis and solution generation
10. **Project Management Techniques:** Demonstrate understanding of project management techniques and incorporate into work as instructed
11. **Safety and Environment:** Understand the purpose of safety procedures, and demonstrate safe work practice
12. **Ethics and Integrity:** Demonstrate knowledge of ethical standards, ethical issues, and ethical decision-making, and display honesty and fairness in interactions with others
13. **Appreciation of Diversity:** Develop an understanding of and appreciate diversity and inclusion in the workplace; demonstrating respect for individual differences
14. **Adaptation to Organization's Rules and Policies:** Recognize, understand, and follow an organization's rules and policies, with minimal guidance
15. **Response to Supervision:** Openly accept direction and feedback and respond positively, incorporating feedback into work as required
16. **Dependability:** Gain the trust of others by being reliable and consistent in completing work and in meeting commitments, while demonstrating a very good work ethic

WORK TERM DELIVERABLES

Students must submit on the date indicated above the following for Work Term 2

Work Term Confirmation

Work Term Objectives

Work Report Outline

Work Term Diary – To be completed but not submitted (see appendix in Work Term 1 Course Outline for details)

Descriptive Technical Report

End of Work Term Feedback Form

WORK TERM CONFIRMATION FORM

The ECEO depends on the Work Term Confirmation Form to confirm that students have arrived safely at work and for all means of contact while they are on their work term. **It is extremely important that the form is completed online in MyMUNLife within a couple of days of starting work.** Although the on-

line form will appear as 'Approved' when the position is created, students must still input the required information. The WTC must be updated whether the student is in a new position, or is returning to a previous employer. If any of the information changes during the term, it should be updated online and the student's ASM-CE (Academic Staff Member in Co-operative Education) notified.

WORK TERM OBJECTIVES

Within the first three weeks of the work term, the student, in consultation with their supervisor will establish performance and personal/professional objectives for the work term. The objectives should also include identification of specific skills the student should develop in order to perform the duties and responsibilities of the position. Through this process, the student will acquire new skills or further develop existing skills required in the workplace. The key ingredient to a successful work term is the student's ability or openness to learn and/or further develop work related skills (see the Student Success Guide for more details on writing SMART Objectives). The student should keep a copy of the objectives and submit a copy to the ECEO for review. Students who start after the official first day of the work term should complete their objectives within the first two weeks of work.

WORK REPORT OUTLINE

The Work Report/Presentation Outline shall be submitted via the form in MyMUNLife for review and topic approval by the stipulated deadline date (typically by the end of the second month of the work term). By that time, students are expected to have developed an appreciation and insight into the operations of their job to identify a potential topic and have it agreed to by the supervisor. The student should select a topic that is relevant, manageable, doable, and commensurate with their level in the engineering program.

The Work Term 2 Work Report Outline shall consist of a title, and a preliminary Table of Contents/Report Outline written with sufficient detail to allow the assigned ASM-CE to provide formative feedback to the student after review.

DESCRIPTIVE TECHNICAL REPORT

The Work Term 2 Descriptive Technical Report and its evaluation criteria are described in the appropriate appendix below.

The Work Report must be submitted in paper format and properly bound, to the ECEO, to the attention of the student's ASM-CE. Students who are unable to submit a physical copy of their Work Term Report by the deadline date may submit them electronically (email) to their assigned ASM-CE by the due date. This must be in the form of a single (one) professionally-created PDF file that includes all required components including cover page, letter of transmittal, appendices, etc. This must be followed up with a printed copy by the date specified by the ASM-CE to avoid penalties for late submissions.

CONTACT DURING THE TERM

On most work terms, students will be interviewed on-site by their assigned ASM-CE. The ECEO combines this activity with an ongoing program of marketing co-operative education to potential employers. These on-site visits are typically scheduled in the middle third of the term. If questions arise early in the work term, students should contact the ECEO right away.

The Work Term confirmation information entered in MyMUNLife by students during the first week of work will allow the ECEO to communicate with students and their supervisors during the term. It may be necessary to provide additional detail later such as a map so the ASM-CE can locate the actual work location.

WORK TERM AWARDS

We encourage all students to give their best effort to all aspects of the work terms, which usually present many opportunities to examine the role and contribution of professional engineering to society. The chance to compare theory from the classroom with practice in the field can be very rewarding.

Work Term awards are an incentive for students to give their best effort each semester and are a way for employers to recognize their students. Employers are encouraged to nominate exceptional students in a variety of awards each semester.

Please refer to the Engineering Co-operative Education Student Success Guide for details on awards that may be relevant.

CONFIDENTIAL REPORTS/PRESENTATIONS

Students should discuss their work report or presentation topics with their supervisors early in the term and determine if any of the material is confidential because all required work term communications components must be submitted to the ECEO as the student's assigned ASM-CE is solely responsible for grading them. When sensitive or proprietary information is involved, the Non-Disclosure Request Form (NDRF) should be submitted. Confidential or proprietary information must not be included in any of the communications requirements unless permission has been received from the employer to submit the confidential material. If there are on-going concerns about confidential material the student should consider changing to a less sensitive topic.

Once the NDRF is submitted, the student's ASM-CE will complete and sign an agreement that provides assurance that no information will be transmitted to any other person. Students should not submit confidential materials unless the ASM-CE has already signed a Non-disclosure agreement. All permitted confidential submissions must be watermarked or stamped "Confidential" on every page, including the front matter.

Some communications components may now be submitted electronically. Note that it is difficult for ECEO to guarantee the appropriate destruction of these electronic files. It is very important for students to discuss electronic submissions with their employers so the employer understands these limitations around confidentiality. If they are not comfortable with electronic submission of a confidential report or presentation package, then students might need to consider amending their topic or the material included.

Following an opportunity to review by the student, the communications component will be destroyed by the ECEO if submitted in paper format, or the ASM-CE will follow MUN Information Technology office's best practices to delete any electronic submissions.

DELIVERABLE SUBMISSIONS

As students progress through the Engineering program they learn that meeting deadlines is part of the role of a professional engineer. In the case of reports and to some extent other work term documents, students should realize there are really two clients involved – the employer and the university, with responsibilities to both. Students are often challenged to meet the expectations of both these clients and this is a further measure of their ability to manage time and resources.

ASM-CEs depend on feedback from supervisors, with the last two weeks of work being a convenient time for the completion of these documents. Students should make an effort to discuss their report and performance during that time. The timely submission of all work term documents is taken into consideration in the performance evaluation. Receipt of the report and feedback documents allows the Engineering Co-operative Education Office to complete overall evaluations and subsequently meet the Registrar's deadline for submission of grades.

It is suggested that a final version of the report or presentation summary/slide package be submitted to the student's supervisor at least two weeks before the work report deadline. After the document is checked and cleared for propriety information it should be submitted to the ECEO in the required format. The absolute deadline is the published end date of the work term, after which documents are considered **late**.

EXIT INTERVIEWS

Often the opportunity to grow and take on an increased level of responsibility comes with returning on a subsequent work term with an employer. This should be balanced by the potential to gain a greater diversity of experiences during the co-op program. If the nature of the work term and the potential for additional learning exists, students are encouraged to consider returning to work with the same employer on a subsequent work term.

At the end of the work term, students are encouraged to arrange an exit interview with their employer and, separately, consult with their ASM-CE in order to review the work term and discuss prospects for the next work term. The employer meeting would normally include both the supervisor and a human resources representative.

CONTACT INFORMATION:

Telephone: 709-864-8816
Fax: 709-864-2537
E-mail: coopeng@mun.ca

Mailing address:
Engineering Co-operative Education
Memorial University of Newfoundland
S.J. Carew Bldg., EN-4021
St. John's, NL A1B 3X5

APPENDIX A WORK TERM EVALUATION

The work term will be evaluated on the basis of the work term communications component and work term performance, as described below.

Communications Component

The written (or oral) communication component is intended to develop the following skills:

- the ability to research the subject appropriately, to conduct the necessary analysis and to effectively substantiate conclusions and recommendations,
- the ability to summarize findings and communicate, in writing or orally, in a professional manner, and,
- the ability to apply concepts learned in the academic environment to learning objectives in the work environment.

The communication component will be evaluated by an ASM-CE or delegate.

Evaluation of the communication component will result in one of the following classifications:

Outstanding - the communication component quality is exceptional; there is clear evidence of the following:

- comprehensive knowledge of the subject matter and principles used,
- high degree of originality and independence of thought,
- superior ability to organize and critically analyze ideas,
- outstanding ability to communicate,
- good planning,
- outstanding effort put into the production of the communication component.

To be considered outstanding, the communication component should have:

- all required sections completed, including letter of transmittal, summary and references,
- very few spelling, grammar and word processing errors,
- a professional presentation, and
- technical content verified by the employer.

Above Expectations - the communication component is of good quality with evidence of:

- substantial knowledge of the subject matter,
- moderate degree of originality and independence of thought,
- good ability to organize and analyze ideas,
- ability to communicate clearly and fluently,
- good planning,
- substantial effort put into communication component production.

Satisfactory - the communication component meets minimum requirements with evidence of:

- acceptable grasp of the subject matter,
- some ability to organize and analyze ideas,
- ability to communicate adequately,
- acceptable planning, and
- acceptable effort put into report production.

Marginal Pass - the written communication component has a number of weaknesses but would meet expectations after modifications are made. The communication component should, as a minimum, demonstrate evidence of:

- adequate knowledge of the subject matter,
- adequate ability to organize and analyze ideas,
- adequate ability to communicate,
- adequate planning, and
- adequate effort put into communication component production.

Fail - the communication component is unacceptable showing evidence of one or more of:

- inadequate knowledge of the subject matter,
- failure to complete required work,
- inability to organize and analyze ideas,
- inability to communicate,
- inability to plan the production of the communication component,
- inadequate effort put into communication component production,
- some or all of the report is plagiarised

At times, an ASM-CE may request that the student revise and resubmit their work report rather than be given a **Fail** grade.

- When a student has been given the opportunity to resubmit the communication component, the student will not be eligible for a grade other than **Fail** or **Marginal Pass**.
- Normally, a student will be given a two-week period in which to resubmit the communication component.
- If the communication component is not revised to an acceptable standard within the specified time, a **Fail** will be recommended.

Work Term Performance

Work term performance is based upon several elements:

- An ASM-CE's assessment of the employer's End of Work Term Feedback Form, which includes feedback on the key set of skills outlined in the Learning Outcomes/Skills Expectations section above, and the ability to meet the objectives, set at the beginning of the work term, taking into account the challenges and opportunities available to the student.
- Information gathered from contact with the student, employer, and others in the workplace.

- Timely receipt of all work term documentation by established deadlines, as the ability to plan and to meet deadlines is essential to a Professional Engineer.

The performance grades below take into account how well the student meets these elements.

Outstanding - the student has successfully completed an excellent work term. Considerations include:

- exceeds employer's expectations in all areas,
- maintains an excellent working relationship with the ECEO,
- all documentation submitted in a timely manner.

Above Expectations - the student has successfully completed a very good work term. Considerations include:

- exceeds or meets employer's expectations in most areas,
- maintains a good working relationship with the ECEO, and
- all documentation received.

Satisfactory - the student has successfully completed a good work term. Considerations include:

- meets employer's expectations,
- maintains an acceptable working relationship with the ECEO,
- most documentation received.

Marginal Pass - the student meets the minimum requirement of the work term. The student will be monitored and is expected to improve in the next work term. Considerations include:

- did not meet all employer's expectations ,
- working relationship with the ECEO needs improvement,
- some of the documentation late or not received.

Fail - the student's performance is unacceptable, demonstrated by one or more of:

- did not meet employer's expectations ,
- poor working relationship with the ECEO, and
- most or all of the documentation not received.

Overall Work Term Evaluation

The overall evaluation of each work term will be based upon the communication component and work term performance and will result in the recommendation of one of the following grades:

Pass with Distinction - to receive a recommendation of *pass with distinction*, a student needs to obtain an evaluation of *outstanding* in both the communication and work performance components of the work term.

Pass - to receive a recommendation of *pass* a student must achieve an evaluation of *marginal pass* or better in both the communication component and the performance component of the work term.

Fail - a student receiving a *fail* in either or both the communication and performance components of the work term will receive a recommendation of *fail*.

For promotion from the work term, a student must obtain ***Pass with Distinction*** or ***Pass***.

A student who receives a grade of Fail on any work term will be required to repeat that work term prior to graduation regardless of whether the work term is mandatory or elective.

Students should be aware of the University's policy on plagiarism. More information can also be found on the Writing Centre's web page <http://www.mun.ca/writingcentre/plagiarism/>

APPENDIX B DESCRIPTIVE TECHNICAL REPORT

Introduction

The technical report is an important document for engineers. Engineers will be expected to write reports throughout their careers. These documents may be written to analyse something, describe an existing process, or to document a decision. During their work terms, students may be expected to complete several different types of reports.

For the Work Term 2 communications component, students are required to prepare a Descriptive Technical Report. The report is typically based on one of the main projects that the student works on over the term. This section describes the general format for a Descriptive Technical Report. The format provides a helpful template for writing a Descriptive Technical Report, but clear thinking and careful planning are also required. Ideas need to be organized and expressed in a precise and concise manner.

Types of Technical Reports

Engineers are often required to prepare technical reports. These may take the form of proposals, project progress reports, trip reports, project completion reports, investigation reports, or feasibility studies. Each of these reports have different content and objectives; however, one common goal of all technical reports is to communicate technical information effectively to a reader.

The Work Term 2 Descriptive Technical Report usually describes some process, subject or project relevant to the student's workplace. Sometimes descriptive reports are used for training purposes or to provide information on some aspect of the job in which the student is working. Students who work on the same project for a significant portion of their term are encouraged to select this project as the focus of their Descriptive Technical Report. Other significant projects may also be considered. The report should demonstrate organization and communication skills and should have a good summary.

Note that a Work Term 2 student may be permitted by their ASM-CE to submit a more analytical type of technical report such as a feasibility study, investigation, or design if this type of report is more relevant to the work conducted on the work term. A user's manual for equipment the student built or used or software they worked with may also be acceptable documentation. Some employers require their students to prepare internal reports for their files or draft reports for the client; these are generally acceptable as work term reports.

Topic

Students should discuss their topic with their employer early in the term as the supervisor may have a particular topic or project that the organization would like documented. Sometimes a report may not be required by the employer, which allows the student the opportunity of exploring a topic of their interest. If the student has difficulty selecting a topic, they should discuss it with their ASM-CE.

An outline of the proposed report should be sent to the Co-op Education Office using the Work Report/Presentation Outline form. This outline should include the title, the purpose of the report, and a brief description of the major topics to be covered. A tentative table of contents would also be useful to include.

The assigned ASM-CE will review this outline and discuss it with the student during the work term monitoring visit. See more information on this submission in the section ‘Work Report Outline’ in the main part of this document.

There are many good reference books available either in a book store or library to assist in report writing. One example is “Writing in the Technical Fields: A Practical Guide”, by Thorsten Ewald, published in 2017. Students are encouraged to select a good reference book and use it throughout their undergraduate career.

General Report Guidelines

Please follow the guidelines listed below:

- The report should be **15-20 double-spaced pages** long (excluding illustrative figures and tables).
- When determining report length, page count begins with the introduction and ends with the concluding statement or recommendations (if included). It does not include the reference list, appendices, or any front-matter.
- Print the report single sided.
- Use 12 point font. Times New Roman and Arial are the two most common choices. The same font should be used throughout the report, including the letter of transmittal.
- Print double spaced, and leave a 1.5” margin on the left for binding, and 1” margin on the other three sides.
- Acronyms should not be used in the Summary and must be introduced the first time they are used in the body of the report even if a List of Acronyms is included.
- Students are expected to write concisely, but grades may be affected for reports that do not meet the required minimum length.
- Reports may be longer than the indicated maximum but students are encouraged to keep within a reasonable number of pages.
- Pages should be numbered, restarting with page 1 for the introduction. Page numbers should be printed on each page.
- Sections and sub-sections should be numbered.
- References/bibliographies/etc. should be sections following the body of the report.
- References should be credited using in-text citations throughout the report.
- Bind the report using a suitable method that protects the cover page and a back cover. This does not include a three-ring binder, duo-tang, or stapling.
- Technical reports written as part of the communications requirements for work terms must be written in a formal technical language style. This means that students should use concise technical language, avoiding vague, meaningless words, redundant phrases, hyperbole, colloquialisms, and jargon, and write from the **third person** point of view.
- Terms such as “I” and “We” should only be used in the letter of transmittal, and contractions are not permitted.

Structure

The structure of a formal report, in the order that the main sections are found, is as follows:

- Cover Page
- Letter of Transmittal
- Title Page

- Summary
- Table of Contents
- List of Illustrations @
- List of Acronyms @
- Statement of Scope@
- Introduction
- Discussion
- Results@
- Conclusions %
- Recommendations %
- List of References
- Bibliography &
- Appendices &

Items marked @ and & above are optional based on the report; other sections are required for most technical reports.

Items marked % above are not expected for WT2 Descriptive Technical Reports. If a student, in consultation with their assigned ASM-CE, decides to write a more analytical type of technical report, these sections may be required, depending on the topic and nature of the report.

Very often parts marked @ above are combined with one of the major parts; for example, the scope and may become part of the introduction. They may also be combined, or they may be eliminated entirely; for example, acknowledgments, statement of scope, and bibliography are often not included. Whether these parts are included as separate items, combined with one of the major sections or with each other or left out entirely depends on the objectives of the writer, the complexity of the report and the needs of the reader. They should not be included unless there is a reason for doing so. Note that Conclusions and Recommendations should remain as separate sections.

Detailed Description of Technical Report Sections

Cover Page (and Report Title)

Provides a binding for the report, and identifies the report title and writer of the report.

Guidelines:

- The cover page of the report may be plain, or specially designed for the project.
- It may be cardstock with the printing on it, or under a protective plastic page.
- It is analogous to the cover of a text book, and limited information is provided.
- Should include the report title, the name of the author, and student number at a minimum.

Report Title

The title is an important feature of the report. Words like evaluation, feasibility, progress, status, and impact are useful in the title.

Guidelines:

- It should provide a window into the subject.
- It should be specific enough to give the reader a good idea of what the report is about but not so long that it is confusing.

- It is acceptable to take certain grammatical liberties in a title if it improves the result. For example, the following title "The Design and Construction of Concrete Structures" may be written as "Concrete Structures: Design and Construction."

Letter of Transmittal

A brief covering letter addressed to the first official reader (usually an ASM-CE).

Guidelines:

- Should be bound into the report after the cover.
- Is addressed to the person for whom the report was prepared (ASM-CE).
- Provides a reference to the reason the report was prepared, the scope of the report, and a brief digest.
- It may draw attention to specific aspects of interest to the intended reader.
- A letter of transmittal must accompany each work term communications deliverable.
- If permitted, a student may choose to use company letterhead or should include the employment address as a return address.

A typical letter is shown on the next page.

Company letterhead (if permitted)

Your address at work

Date of submittal

(Student's ASM-CE this work term)

Co-operative Education Office
Faculty of Engineering and Applied Science
Memorial University of Newfoundland
St. John's, NL
A1B 3X5

Dear Mr./Ms. (ASM-CE's last name):

During this work term (Engineering xxxW), I was employed with _____ as a construction inspector with the Works Department. This was my second work term with the town and this time I was supervised by _____ P.Eng., the town's construction engineer.

Since the town currently has a higher capital budget than normal, the Works Department was required to manage an extensive range of projects. I was fortunate to gain exposure to many of these projects, and when the chief surveyor was on annual leave, I supervised the survey crew.

The enclosed work report titled _____ resulted from a request by _____, the town's environmental officer concerning PCBs which were produced by the town's own operation over the years. I was required to become familiar with the relevant provincial regulations and I designed a small enclosure for the municipal depot which is estimated to cost \$17,800.

If there are any questions concerning this report, I would be pleased to discuss them with you.

Yours truly,

Signature (by hand or electronically)

Your Name

Title Page

Identifies the topic and ownership of the report.

Guidelines:

- The full title of the report should be centered and placed at the top of the page.
- The name of the person for whom the report was prepared and the name of the organization for which the report was prepared is placed under the title.
- The name of the originating organization and name of the person preparing the report is placed third on the page.
- The date the report is presented (or issued) and any other identifying reference, such as a report number, is placed on the bottom of the page.
- The title page should be neat and simply laid out so that the four essential elements listed above are clearly seen.
- The title page should have visual appeal and a professional appearance.

Summary

Provides a **one-page** summary of the entire report. No reference is made to any part of the report; a summary is complete unto itself and is the most widely read section of the report. Many readers rely on it to decide if they need to read the full report.

Guidelines:

- The summary must stand on its own; it is based on the report and should not include any information, conclusions or suggestions not stated in the report.
- To maintain the Summary's ability to stand independently from the report avoid phrases such as 'The report includes...'
- The summary should not cite any references nor refer to any figures or tables.
- The summary is placed after the title page and before the Table of Contents.
- It is the first numbered page of the report, normally numbered Roman numeral 'i'.
- The summary should be on a page by itself and must not exceed one double-spaced page.
- If the material does not require the full page, it is centered top to bottom to give a neat appearance.
- The summary must be brief, but complete; it should present the essentials of the report, and not refer to it.
- The summary should contain a statement of some or all of the following:
 - what the report is about (purpose, scope, problem, background),
 - the work that was undertaken,
 - the results obtained,
 - the main conclusion, and
 - the main recommendations and their costs.
- It is prepared after the report is written.

Table of Contents

Provides a quick guide to the contents and organization of the report and helps the reader locate specific information quickly.

Guidelines:

- A report must contain a Table of Contents.
- It is located just after the Summary as page 'ii' of the report.
- The headings of each main section and subsection are listed according to the page on which they begin.

- Appendices are usually separated from the other contents and are designated by numbers or letters, the appropriate title or heading and the page number.
- A ‘List of Illustrations’ follows the Table of Contents if the report contains many illustrations.

List of Illustrations

If the report uses many illustrations (charts, graphs, pictures, etc.), it is best practice to provide a List of Illustrations after the Table of Contents to help the reader find specific illustrations.

Guidelines:

- The List of Illustrations should include the titles of the illustrations along with the related page numbers.
- The list of Illustrations can also be divided into separate lists: a List of Figures and a List of Tables.
- Citations for the illustration do not need to be included in the List of Illustrations.

List of Acronyms

Easily identifies a large number of acronyms. A report that contains a large number of acronyms may include a list of them at the beginning of the report.

Guidelines:

- This list should be in alphabetical order of the acronym in order to make the acronyms easier to locate.
- Acronyms must still be typed out in full the first time they are presented in the body of the report.

Acknowledgments

Provides a statement of thanks or recognition to those who have assisted in the development of the report.

Guidelines:

- A separate section for acknowledgments can be justified only if there are a great many persons or organizations to be given credit. It is more typically used for books and publications than for reports. Acknowledgments, if given, should be specific.
- Statements like ‘I would like to thank everyone who assisted me with this report’ are meaningless.

Statement of Scope

Provides a statement outlining the limitations or scope of the report that may be imposed by the authority requesting the report or by the person preparing it.

This statement can be related to cost, time, depth of study, methodology, equipment, and any factors to be specifically included or omitted.

A separate statement of scope is sometimes included with reports prepared by consultants for a fee. The scope of the report may also be given in the letter of transmittal, introduction and the summary of the report. A separate statement of scope should not be included unless there is a specific need for it.

Introduction

Introduces the subject of the report, as the reader may be from a different branch of the discipline and may require some orientation to the subject of the report, providing the reader with all the background necessary to properly read the report.

Guidelines:

- The introduction should include general background information that describes the company, department or agency, introduces the subject, describes the circumstances leading up to the decision to prepare a report on this subject, what work has been done on the subject previously and by whom, why the study or project is necessary, and any important limitations of the report.
- A statement of purpose that defines what the study or project (or report) is to achieve, and who authorized it and the specific terms of reference should be included in the introduction.
- The introduction should also include a statement of scope that outlines any limitations imposed on the project and states who imposed them. Factors such as cost, time, depth and extent of study methods, equipment, factors to be included or omitted, should be noted here.
- Page numbering should be re-started with the introduction section as page 1.

Discussion Sections

Presents the evidence (facts, arguments, details, data, test results, etc.) necessary for the purpose of the report. There are no absolute rules regarding the content of the discussion and there is no prescribed organizational structure to follow. Its content and structure are dependent on the scope of the report and the writer's choice in how logically to present the material.

Guidelines:

- Appropriate descriptive titles should be used for each discussion section/subsection; it/they should not be called "Discussion".
- One or more discussion sections may be required to address the subject.
- Information should be presented using a logical and purposeful section and subsection structure to ensure that main points are emphasized and the reader can follow the flow of information.
- The order of the main discussion sections and the order of information within each section (the sub-sections) will determine how easily the reader will follow the text.
- An author must decide what the reader is most interested in knowing, what else the reader needs to know, and must answer any questions that arise.
- The discussion should **address the objectives of the report** and thoroughly discuss each one.
- The discussion should **summarise the results (if any)** and **explain how the results are important**.
- The content should be designed with readability in mind. It is important to determine what content is best presented using a written paragraph, as a list, in a table, or as a figure. See also the Illustrations section below.
- The first discussion section should be started on a new page.
- Further top tier sections may start at the top of a page, or follow on from the previous section. Whichever method is chosen should be used consistently throughout.
- Students must bear in mind the technical knowledge of their readers (their supervisors and the ASM-CE, faculty member or PEGNL volunteer) and prepare the text accordingly. Students should use language and describe concepts in a way that allows the reader to easily follow the report.

Illustrations (include as needed in the discussion)

In technical reports, illustrations are used as required throughout the report to provide vital information that may be difficult to portray using text alone (they do not form a separate section of the technical report). Illustrations do not replace written text; they supplement it. The writer must decide whether to use an illustration and, if so, what type of illustration to use and where to locate it.

They are often referred to in a report as "Tables" and "Figures". Tables present text or numbers in the

form of columns and rows. Figures are any illustration that presents data in a graphic form.

Guidelines:

- Illustrations can include drawings, figures, tables, sketches, schematics, flow charts, diagrams, graphs, and photographs.
- An illustration should be used if it will help the reader understand the material.
- Illustrations meant to assist the reader in understanding the subject belong in the text as close as possible to the point of reference. The narrative at this point must refer to the illustration.
- Each illustration should be numbered sequentially and provided with an appropriate title or caption. Titles should be kept short, and the figure explained in the text.
- The illustration should be simple, neat, clear, easy to read (large enough font size), and easily understood.
- If an illustration is relevant and helpful to the discussion can fit into the body of the report, place it in the body of the report rather than in an appendix.
- Large complex illustrations such as folded drawings or charts belong in an appendix. Down-sized versions or schematics can be placed in the text.
- Illustrations should be referenced using an in-text citation following the text in the caption of the image.
- Each illustration should be referred to in the text to provide context and a reason for inclusion.

Results

Presents the findings of the report based on the information gathered.

Guidelines:

- Should simply state the findings.
- Finding should be stated without bias or interpretation.
- Findings should be arranged in a logical sequence.

Conclusions

Provides a synthesis of the ideas discussed in the report, demonstrates the importance of the ideas discussed and propels the reader to a new or enlightened view of the subject matter.

Note that students completing a WT2 Descriptive Technical Report are not expected to write conclusions for their reports. A “Concluding Statements” section that permits a wrap-up, or area for final comments is encouraged. More analytical types of technical reports may require the inclusion of formal conclusions and recommendations, depending on the topic and nature of the report. If writing an analytical type of report, please see the Conclusions guidelines below.

Guidelines:

- Everything presented in the conclusions must have been discussed in previous sections of the report. That is the function of the discussion section.
- Be as brief as possible with main points drawn from the concluding paragraph or statement of each section of the discussion.
- Be presented clearly and accurately in a neat format, for example, in point form and numbered.
- Satisfy the requirements established in the introduction (background, purpose, scope).
- Never advocate action.

Common Pitfalls:

- Conclusions and recommendations are sometimes inadvertently placed in the same section under the heading Conclusions and Recommendations. This practice is not recommended because there is a danger that a conclusion may be taken for a recommendation or that a recommendation may be stated loosely or weakly.
- Similarly, conclusions and results should not be confused. Results are obtained by applying a method or approach to the problem under consideration. Conclusions are drawn from the results by applying the criteria or guidelines established in the discussion and the introduction.

For example, a study of the condition of all concrete bridges in St. John's might find that some were in poor condition with cracks, exposed reinforcement steel, spalling, etc. These are results, not conclusions. If criteria such as safety, maintenance, and life expectancy are applied, a conclusion might be that certain bridges are in poor condition and have a limited life expectancy.

Recommendations

The recommendations section presents the preferred plan of action.

Note that students completing a WT2 Descriptive Technical Report are not expected to write recommendations for their reports. More analytical types of technical reports may require the inclusion of inclusion of formal conclusions and recommendations, depending on the topic and nature of the report. If writing a more analytical type of report, please see the Recommendations guidelines below.

Guidelines:

- An action plan is presented with several courses of action described, each with attendant advantages, disadvantages, costs, limitations, and ramifications.
- The above-noted items should have all been previously discussed and conclusions are drawn based on the criteria being applied.
- Be specific, definite and clearly stated.
- Be strong and advocate action.
- Satisfy the requirements established in the introduction.
- Follow logically from the conclusions.
- Be presented in a logical order, e.g., by importance, chronologically, functionally.

In the example of the bridge study previously presented, the student may have concluded that it will cost \$1.3 million to replace a badly deteriorated bridge. To repair the same bridge to an acceptable standard will cost \$300,000 now and \$20,000 a year in maintenance. The bridge will have to be replaced eventually. The recommendations should state which option is preferred and, briefly, why.

List of References

Common to all communication components. Please refer to the Referencing Appendix below.

Bibliography

Provides an additional list of related material for further reading, if applicable. A bibliography may be included in a formal report if it is justified, but it should not be confused with the List of References.

Guidelines:

- Bibliography entries are not numbered.
- Entries appear in alphabetic order of authors' names.

Appendices

Appendices contain large, complex drawings, source documents, data, specifications, test results, cost comparisons, etc. This information provides broad base support for what is in the discussion, but the report can be read intelligibly without it.

Guidelines:

- Appendices appear in the order in which they are first referred to in the report.
- Appendices are considered to be individual documents; each may be paginated separately, starting at 'i'.
- Each appendix is given an identifying letter, e.g., "Appendix A", "Appendix B", etc.
- All information provided in an appendix **must** be referred to in the report.

Evaluation

The Descriptive Technical Report will be assessed according to the following:

Structure and Format

Structure

- Cover and Title Page are included
- Letter of Transmittal is included
- Table of Contents is included and appropriately formatted
- List of Figures / List of Tables is included (if sufficient number included in the report)
- List of Abbreviations is included (if the report contains sufficient number)
- If report is confidential, each page is stamped confidential

Format and Organization

- Report folder/binding is appropriate
- Appropriate font used
- Correct use of page numbering
- Length of the report is appropriate to topic and scope; not shorter than minimum requirements
- Layout is easy to read
- Section headings are used and are numbered and named appropriately
- Main sections and sub-sections have a logical order
- Appropriate sections are included
- Sections properly formatted and contain appropriate material
- Tables and figures are properly formatted
- Tables and figures are properly cross-referenced in the text

Technical Quality

- Topic is suitable
- Introduction is thorough (general background, purpose, and scope included)
- Main discussion sections cover the scope of report appropriately/thoroughly
 - sufficient technical discussion/content,
 - information and analysis (if included) is accurate,
 - content is consistent with stated purpose of the report,
 - tables and figures accurate and complete,
 - content of tables and figures is explained to the reader,

- thorough,
- original
- A Concluding Statement is included, or a formal Conclusions section is included; conclusions are drawn from the main discussion points (if required by the content/topic)
- Recommendations are included if required by the content/topic, and are based on conclusions; does not contain material that was not previously discussed
- Appendix/ices are included (if required by the content/topic) and introduced in the discussion

Summary

- Written as a stand-alone piece
- Neither too long or too short
- Key material is included
- No material is introduced that is not discussed in the report
- Includes conclusions and recommendations
- No acronyms are included

Referencing and Resources

- Consistent referencing style is used throughout (e.g., IEEE, APA)
- Number of references listed is sufficient
- Material is consistently/properly referenced
- In-text citations are included where required
- Use of direct quotes is avoided
- Variety of reference material is used
- Reference material is taken from a valid source; has authority

Communication Effectiveness

- Use of I, we, you, etc. is avoided
- Use of contractions is avoided
- Vague language is avoided; material is qualified and quantified
- Ambiguous pronouns are avoided
- Unnecessary wordiness and redundancy are avoided; writing is concise
- Figures of speech are avoided
- Run-on sentences are avoided
- Definitive language is supported with evidence
- Word choices are appropriate
- Formal writing style is used
- Acronyms are correctly defined
- Punctuation is correct
- Spelling is correct
- Grammar is correct
- Parallel construction is used in sentences and lists
- Sentence structure is correct
- Paragraph structure is appropriate (one main concept with supporting details)
- Writing is clear
- Content is written for the appropriate audience
- Tables and figures included where appropriate to support descriptions

APPENDIX C REFERENCING

Introduction

Referencing is the act of acknowledging the sources of material and information used in a document. Not properly including these acknowledgements may be considered plagiarism. Citations and a corresponding reference list is how referencing is achieved. The citation is included in the body of the writing to indicate the exact material that originates from another source, the List of References includes the details on where that source can be found.

Citations and a List of References are used together to provide the appropriate information to indicate what material is from another source, and the details to document the original source. They are required for all sources of information included in the report – print, online, and word of mouth (personal communication). When using material found online, students should be careful to rely only on valid, trustworthy sites. Wikipedia, for instance, can be changed by any user and is therefore not a valid site for obtaining technical information.

There are four main reasons why writers need to reference material within their reports, including:

- 1) It allows proper credit to be given to the authors and/or source of the information cited and allows the reader to distinguish between the writer’s own ideas and the referenced information.
- 2) It demonstrates that the writer has researched the claims and ideas put forth and supports these ideas with evidence and information from other sources.
- 3) It allows the writer to share their information sources with readers so that they can find that same resource material, if needed.
- 4) To avoid concerns around plagiarism, and the possible negative consequences.

General Guidelines

Please follow the guidelines listed below:

- The List of References should only contain entries for works cited directly within the report. That is, each reference in the list must have at least one in-text citation.
- Information from the sources should not be “cut and pasted” but instead paraphrased or summarized to offer support for the writer’s own ideas.
- Even when a citation is included, copying material directly from the source without changing the wording is considered plagiarism if the material is not in quotation marks.
- Technical reports will rarely, if ever, include information enclosed in direct quotes. Direct quotes are only used when the information cannot be paraphrased (re-written in a student’s own words) without altering the meaning.
 - To decide if a direct quote should be used, writers need to ask themselves the following question, “Can I re-write this in another way and still maintain the original message or meaning?”
 - If the answer to this question is yes, don’t quote – paraphrase.
- All diagrams or images that are not the personal creation or capture of the author must be correctly cited.
- Information obtained from conversations or interviews must be cited in the report but these sources do not appear in the reference list. This can be done in one of two ways, as follows:
 - Introduce the paraphrased information similar to this: “In an interview with John Smith on August 22/18, he suggested ...” OR

- Add the following citation at the end of the paraphrased information: “..... (Personal communication, John Smith August 22/18)”.
- The List of References is only for works cited directly within the report.
- A Bibliography is a list of documents that have been read, but not directly or indirectly quoted.
- A Bibliography should only be included as needed, and in addition to the List of References.
- General information that can be considered public knowledge in the field need not be referenced.
- The requirement for precise referencing is greater for academic and scientific reports than for business and other technical reports; however, all reports must be referenced to the level that an interested reader can identify the sources and obtain them if desired.

Additional guidelines on referencing can be obtained from the library or online at:

<http://www.mun.ca/writingcentre/plagiarism/>

https://www.mun.ca/engineering/undergrad/technical_communications/CitingAndReferencing.php

Referencing Using IEEE

While students may choose any referencing style, however for consistency and versatility, the ECEO strongly recommends the IEEE style. For IEEE the List of References is listed in the order the material is first presented in the report.

An example of the IEEE format from the style guide <https://ieeauthorcenter.ieee.org/wp-content/uploads/IEEE-Reference-Guide.pdf> is shown below.

Book

[#] Author(s). Book title. Location: Publishing company, year, pp.

Example:

[1] W.K. Chen. Linear Networks and Systems. Belmont, CA: Wadsworth, 1993, pp. 123-35.

World Wide Web

[#] Author(s)*. “Title.” Internet: complete URL, date updated* [date accessed].

Example

[2] M. Duncan. “Engineering Concepts on Ice.” Internet: www.iceengg.edu/staff.html, Oct. 25, 2000 [Nov. 29, 2003].

E-mail

[#] Author. Subject line of posting. Personal E-mail (date).

Example:

[3] J. Aston. “RE: new location, okay?” Personal e-mail (Jul. 3, 2003).

Non-published sources such internal or unpublished documents

J. K. Author, “Title of report/paper,” unpublished.

Examples:

[4] B. Smith, “An approach to graphs of linear forms,” unpublished

Other non-recoverable unpublished sources such as interviews or phone calls do not require a reference, or citation; however the author or source must still be acknowledged in the text. i.e. “In an interview with John Smith on 22 August, he suggested ...” This is explained in greater detail on the Engineering Technical Communications page as listed above.