ENG 1102: Engineering Design Principles
Winter 2024

Design project guide for Phase 3

IMPORTANT NOTE: Navigating the labour disruption – your rights, your responsibilities, and your options for completing the ENG 1102 team project

Choosing an option for finishing the project

The table on the following page describes two options for finishing the ENG 1102 project. ***Please confirm your decision with the instructor by March 22, 2024 at 12 PM (noon) via eClass***.

This is an <u>individual</u> choice; you do not need to make the same choice as your teammates. If you choose Option 1 (shift weight of Phase 2 to Phase 3 and present Phase 3 as a poster on April 11, 2024), you will continue to work as a team. If you choose Option 2 (delay deliverables until the remediation period), you will be choosing to exit your team and work alone. <u>In either case, it is your responsibility as a member of your team to inform your teammates of your choice as soon as possible.</u>

Your rights

As described in the University Senate policy on the Academic Implications of Disruptions or Cessations of University Business Due to Labour Disputes or Other Causes, students who do not participate in academic activities because a) they are unable to do so owing to a disruption, or b) they choose not to participate in academic activities owing to a strike or lock-out on campus are entitled to:

- Immunity from penalty
- Reasonable alternative access to materials covered in their absence
- Reasonable extensions of deadlines and to such other remedy as Senate deems necessary and consistent with the principle of academic integrity

Your options

As of March 17th, instructors are empowered to make changes to the weight and format of course assessments. We are providing you with the following options for completing your project. Please consider them carefully.

Deliverable	Option 1: Weight of *Phase 2* shifted to *Phase 3* and poster presented to instructors on April 11	Option 2*: *Phase 2* and *Phase 3* shifted to remediation period. All course deliverables to be prepared ***individually***.
Presentation and/or poster	Do not present *Phase 2* (content should be included on Phase 3 poster) *Phase 3* poster presentation worth 20% of final grade (submitted March 31st, presented April 11th)	*Phase 2* main deliverable worth 10% of grade (TBD) *Phase 3* main deliverable worth 10% of grade (TBD)
Logbook	Merge *Phase 2* logbook with Phase 3 logbook *Phase 3* logbook worth 4% of final grade (April 8th)	*Phase 2* logbook worth 2% of final grade (TBD) *Phase 3* logbook worth 2% of final grade (TBD)
Teamwork self-assessment	Do not submit *Phase 2* teamwork self-assessment *Phase 3* teamwork self-assessment worth 2% of final grade (April 15th)	Do not submit *Phase 2* teamwork self-assessment Do not submit *Phase 3* teamwork self-assessment
Final individual reflection	Final individual reflection worth 1% of final grade (April 15th)	Final individual reflection worth 3% of final grade (TBD)

*The format of the project deliverables may turn out to be different if you opt to complete them during the remediation period but they will be equivalent to the original deliverables in scope and difficulty

More information

University Senate policy: https://www.yorku.ca/secretariat/policies/policies/academic-implications-of-disruptions-or-cessations-of-university-business-due-to-labour-disputes-or-other-causes-senate-policy-on-the/

Labour disruption information: https://www.yorku.ca/secretariat/senate/labour-disruption-information/

Labour disruption FAQ: https://www.yorku.ca/disruption-operations/faqs/

INTRODUCTION

In Phase 3 of your design project you will summarize the work that you did in the first two phases and to extend your design process to address implementation considerations and a plan for evaluating your final design. You will be presenting your work in the form of a poster that your group will present to the instructors in-person on April 11th in the BRG Eatery (9 am to 4 pm – full schedule to be posted in early April).

Extra notes:

- Your design must be in line with the United Nations (UN) Sustainable Development Goals and Targets as described in the Phase 1 handout.
- Never forget your stakeholders!
- If you choose to pursue an app-based solution, please refer to the appendix for additional requirements.

PROJECT DELIVERABLES FOR PHASE 3 [Option 1]

At the end of Phase 3, you should present or submit three deliverables:

- Poster
- Team log report (including team contribution table)
- Teamwork self-assessment

A description of each deliverable is provided below.

1 - Group poster presentation

Each team must make a <u>5 minute</u> poster presentation during the poster event on *April 11th, 2024 (9 am to 4 pm - BRG Eatery)*. Each presentation will be followed by a 2 to 3 minute Q&A session with the instructor(s). You will be evaluated by at least two instructors, so you may need to repeat your presentation more than once. The poster and poster presentation will be evaluated according to the rubric in Appendix A.

The poster and poster presentation must address the following items:

a) *Problem finding and problem formulation:*
   a. Your final problem statement
   b. Key tools/methodologies used to develop your final problem statement
b) *Solution development:*
   a. Brief descriptions of your three design solutions in words and with visual aids (original drawings, original photographs, etc.) and how you came up with them
   b. Key tools/methodologies used to develop your three design solutions
c) *Analysis*:
   a. Description of the framework used to evaluate design alternatives
   b. Rationale for the selection of final design solution

d) *Chosen solution*: Provide a detailed description of your final design solution using words and original visual aids

e) *Implementation*: Describe how your chosen design solution addresses the problem statement and at least two of the following implementation considerations:
   a. Design for sustainability
   b. Design for health and design for humans
   c. Design for materials, manufacturing and assembly
f) *Evaluation*: Identify 2-4 success criteria and a plan for evaluating whether your solution has solved the problem that you identified
g) *Delivery*: Coherence, quality of visual aids, and oral presentation quality

We recommend that you structure your poster as follows:

- 1/3 of poster devoted to parts a-c
- 1/3 of poster devoted to part d
- 1/3 of poster devoted to parts e and f

The poster must also include all team members' student names and student numbers.

A list of all resources used to prepare the presentation should be provided on a separate page attached to the poster.

2 – Teamwork log report
At the end of each design phase, each team will create and submit a teamwork log report. The log report is intended to give your team an opportunity to document and reflect on your progress. Only one log report should be submitted per team.

On account of the labour disruption the Phase 2 logbook will be merged with the Phase 3 logbook this year (2024W). In addition to the content from Phase 2, include the following sections in your Phase 3 logbook:

Section 1: Project binder

1. Discussion of your project (approx. 200 words)
   - Provide a brief synopsis of how you developed your chosen design solution, identified implementation considerations, how you adjusted your design to account for these implementation considerations, and how you developed your criteria and plan for evaluating your design after it is implemented.

2. Discussion of engineering design considerations (approx. 200 words)
   - How were you able to apply the principles of engineering design and design thinking from the course to your project?
   - Which concepts and frameworks were useful in this stage of the project?

3. Notes on team interactions to date (approx. 200 words)
   - Provide dates, topics, and discussion points for each design meeting
   - Reflect on how your team worked together, what is working well and what needs to be improved

Appendices: PDF or image of the poster, copies of handwritten notes, meeting minutes, chatbot prompts and answers, and other relevant material.

Section 2: Team contribution table

At the end of each design phase, each team should create and submit a team contribution table as part of their logbook. The team contribution table is a tool that helps you develop *structure* and *clarity and dependability*, and will allow us to assess you on these elements. If there are disagreements, please reach out to your TA or instructor for support.

For details on how to prepare the team contribution table and how it is used to adjust your grades, please refer to the **Appendix D: Guide to Team Contribution Table** at the end of this document. Note that it is best to start to prepare the team contribution table **before** you start working on the phase, instead of after.

3 – Teamwork self-assessment

At the end of each design phase, **each individual** should fill out a teamwork self-assessment questionnaire via eClass. The questionnaire is an opportunity for you to reflect on **your own** teamwork experience and will not be shared with your teammates.

This self-assessment will not directly affect your grade. However, the instruction team may use the information you share in these questionnaires to support your teamwork development. Specifically, it helps the instructors monitor the *psychological safety* of each team and intervene early if there are issues.

4 – Personal reflection

Answer each of the questions below in 100 to 125 words. All subparts of each question have equal weight. Please copy the question directly into the document and write your answer below it. There are no correct answers to these questions – they will be graded based on how insightful and well-written your answers are.

- *The engineering design process (25%)*: What did you learn about the engineering design process during the course and how might you apply it in the future?
- *Team project (25%)*: What did you learn about your project topic during the course and how might you apply what you've learned in the future?
- *Teamwork (25%)*: What did you learn about teamwork during the course and how might you apply what you've learned in the future?
- *Project management (25%)*: If you could have managed one aspect of the project differently, what would you have done and why?

SUBMISSION INSTRUCTIONS

Poster file:

- A PDF of your poster must be submitted via eClass by *March 31ˢᵗ at 23:55 PM* to allow sufficient time for printing. Your poster will be printed in the proper format and brought to the poster event for freeu
- If your submission is late, a standard late penalty of 20% per day will be imposed. Additionally, you will be responsible for printing the poster yourselves and bringing it on April 11ᵗʰ.

- The poster will be printed in the following format: 2' (61 cm) wide by y' (91.5 cm) high. Examples of high quality research posters will be posted on eClass for reference.

Logbook: Teams in all sections must submit their merged Phase 2 / Phase 3 logbooks including their team contribution tables on eClass by _Monday April 8th at 23:55PM_. Only one person per team needs to submit.

Logbooks must use the following syntax when being uploaded to eClass: Team#_phaseX_ENG1102_Logbook.ppt; # is your team number and X is the phase (1, 2 or 3). Standard late penalty applies.

Teamwork self-assessment: Every individual must complete the Phase 3 teamwork self-assessment via eClass _by Monday April 15th at 23:55PM_.

Personal reflection: Every individual must complete and submit a personal project reflection via eClass by _Monday April 15th at 23:55 PM_.

APPENDIX A: Grading rubrics

Poster presentation grading rubric (your poster and poster presentation will be graded in real time by the instructors)

Evaluation criteria	Exceeds expectations (100%)	Meets expectations (75%)	Marginally meets expectations (50%)	Fails to meet expectations (25%)

(a) Problem finding and problem formulation
 	
10 points
	Methods used for problem finding and problem formulation are described clearly and concisely with words and/or visual aids
	
	Results of problem finding process are described clearly and concisely with words and/or visual aids and clearly feed into problem statement
	
	Final problem statement describes a "right size" problem clearly and accurately
		Methods used for problem finding and problem formulation are described
		
		Results of problem finding process are described and clearly feed into problem statement
		
		Final problem statement describes a problem clearly and accurately but the problem is either too small or too big
			Methods used for problem finding are described briefly
			
			Results of problem finding process are described
			
			Final problem statement is provided but is confusing or disorganized way
				One of the following elements is missing from the poster:
				    Methods used for problem finding
				    Results of problem finding process
				
				Final problem statement

(b) Solution development 15 points	Three potential solutions are described concisely with word and high quality original graphics	Three potential solutions are described in words and with original graphics	Three potential solutions are identified	Fewer than three potential solutions are identified
(c) Analysis 15 points	Appropriate criteria for evaluating three potential design solutions are identified and justified The three design solutions are evaluated against the criteria using one of the methods learned in class (Pugh chart or decision matrix)	Criteria for evaluating three potential design solutions are identified The three design solutions are evaluated against the criteria using one of the methods learned in class (Pugh chart or decision matrix)	Criteria for evaluating the potential design solutions are identified but they are inappropriate for the problem/topic The three design solutions are compared but the team does not use any of the methods learned in class	The criteria and/or methods used to compare the solutions are not identified and/or are unclear

	The best design solution is clearly identified			
(d) Development of chosen design solution 30 points	The chosen design is described in detail using high quality graphics and clear and concise text Graphics are appropriate for the type of solution proposed (e.g. process flow diagram for a chemical process, app flowchart for an app, engineering sketch of a building or product)	The chosen design is described in detail using words and/or original graphics Graphics are appropriate for the type of solution proposed (e.g. process flow diagram for a chemical process, app flowchart for an app, engineering sketch of a building or product)	The chosen design is described in using words or graphics Graphics are simplistic, non-original, and/or inappropriate for the type of solution proposed (e.g. process flow diagram for a chemical process, app flowchart for an app, engineering sketch of a building or product)	The chosen design is described in words without any graphics
(e) Implementation 10 points	The chosen design clearly addresses the concept of "design for adoption" At least two of the other implementation considerations identified in the Phase 3 handout are clearly addressed in the design Sufficient information is provided for the evaluator to determine whether the solution could plausibly address the formulated problem	The team clearly identifies whether its design does or does not address the concept of "design for adoption" Two of the other implementation considerations identified in the Phase 3 handout are addressed	The team identifies whether its design does or does not address the concept of "design for adoption" One of the other implementation considerations identified in the Phase 3 handout is addressed to some degree	Implementation considerations are identified but not clearly addressed in the design
(f) Evaluation 10 points	Appropriate success criteria are identified for evaluating the success of the project A clear and feasible plan is provided for evaluating the solution	Appropriate success criteria are identified for evaluating the success of the project A clear plan is provided for evaluating the solution	Success criteria are identified for evaluating the success of the project A plan is provided for evaluating the solution, but the plan is disorganized, infeasible, or confusing	The team fails to provide success criteria OR the team fails to provide an evaluation plan

	The success criteria are clearly linked to the evaluation plan			
(g) Quality of the poster and poster presentation 10 points	Poster was well organized and designed to draw the attention of the audience Team used relevant graphics to communicate key ideas and to capture the audience's attention Poster had no misspellings or grammatical errors Team members maintained eye contact with audience and seldom returned to slides/notes Team members used clear voices and correct, precise pronunciation of terms and demonstrated team effort during the poster presentation	Poster was well organized and helped the audience to follow most of the key ideas Team used relevant graphics to communicate key ideas Poster had no more than two misspellings and/or grammatical errors. Team members maintained eye contact with audience most of the time but occasionally read slides/notes Team members' voices were clear. Members pronounced most words correctly. Most members attempted to present as a team	Poster was somewhat disorganized that made it difficult for the audience to follow the key ideas Team occasionally used graphics or some of the graphics were irrelevant Poster had three misspellings and/or grammatical errors Team members had some eye contact with audience, but read mostly from notes Team members pronounced terms incorrectly and spoke too quietly to be heard clearly or did not present as a team	Poster was poorly organized Team used no graphics or all graphics were irrelevant Poster had four or more spelling errors and/or grammatical errors Team members read all of slides/notes with no eye contact with audience Team members mumbled, pronounced terms incorrectly, spoke too quietly to be heard clearly, did not present as a team

Logbook grading rubric

Exceeds expectations (100%)	Meets expectations (75%)	Marginally meets expectations (50%)	Fails to meet expectations (0 – 25%)
Answers to the three formal questions include meaningful information about the group's activities and experiences.

Practical plans or questions for improvement are included.

Presentation slides are included as an appendix and are attractive and well organized.

Appendices are well-organized and show evidence of effective team/meeting coordination and contribution from all team members. | Answers to the three formal questions include meaningful information about the group's activities and experiences.

Appendices show active organization of meetings and contributions from team members.

Presentation slides are included as an appendix and are of adequate quality. | The three formal questions are answered with some details about what has actually taken place.

Appendices are included, but do not reflect meaningful contribution from all team members, or don't include the presentation slides, or the meeting documents are poorly organized. | Submission does not include the three formal questions to be answered, or the answers contain no meaningful information.

Submission does not include appendices that show evidence of work contributed to the project. |

APPENDIX B: Informed consent for interviews, surveys, and focus groups

What is informed consent?

Informed consent means that the people you talk to during your data collection process know and indicate that they understand:

1. Who you are.
2. Why you are talking to them?
3. What you will do with the information or recordings that they provide.
4. How you will store their information or recordings.

An example of informed consent is the user agreement form that most websites and apps ask you to accept when you register for their services. You do not need to collect formal consent (signatures etc.) from your interviewees or survey respondents for this project but you should make sure that the people who are participating are aware of the four things listed above.

Why is informed consent important?

The people who provide you with information are doing you a service and deserve to know what their information or recordings will be used for and how you will take care of the information or recordings.

How do I get informed consent from participants?

In this course, you do not need to collect formal consent (signatures etc.) from your interviewees or survey respondents. We recommend, however, that you read out or post a brief statement that addresses the four points identified earlier. An example is provided below:

Hello,

We are first year undergraduate engineering students at the Lassonde School of Engineering at York University in Toronto. As part of our term project for ENG 1102: Engineering Design Principles, we have been asked to use engineering design methods to address one of the UN Sustainability Goals. We are collecting information from potential users of this product or solution. This information will be used to guide our design. Your information will be stored digitally and will only be used for this project.

Thank you for contributing to our project,

Don't forget to include your names at the end of the statement! If you choose to record any interviews, this should also be mentioned in your statement.

APPENDIX C: Finding and using reputable secondary research sources

How do I know if a source is reputable?
Reputable sources for background information usually have the following characteristics:
- Created by experts (market or academic researchers, government bodies, NGOs, journalists from high quality news outlets, etc.)
- Peer reviewed (reviewed by experts)

Reputable sources of data related to user needs:
- Data collected from people who are representative of the target group using one on one interviews, focus groups, surveys, and other data collection tools (recommended)
- Data collected from a large enough number of random people that their responses can be analyzed statistically (advanced)

Where can I find reputable sources?
- Surveys of or interviews with target users
- YorkU library (https://www.library.yorku.ca/web/collections/discover-our-collections/)
- Government documents and websites (Statistics Canada, Environment and Climate Change Canada)
- UN websites and documents (https://www.undp.org/content/undp/en/home/sustainable-development-goals.html)
- High quality open data sets (https://researchguides.library.yorku.ca/dataservices)
- Personal communication with experts (your profs and TAs can help)
- High quality news outlets (BBC, CBC, NYTimes, etc.)
- Peer reviewed articles

4.0.   How do I show that my sources are reputable?
Cite them. This means acknowledging where the information, data, or content came from and/or who created it. Learn more here: https://spark.library.yorku.ca/creating-bibliographies-citing-sources-part-of-academic-culture/. In the case of survey and interview data, describe why you surveyed or interviewed the people that you did and explain how you collected and analyzed the data.

4.1.   Where can I learn more?
If in doubt, ask! The YorkU library and YorkU librarians are available online (https://www.library.yorku.ca/web/ask-services/). Your professors and TAs are professional researchers who have ample experience finding and analyzing data and can help guide you.

APPENDIX D: Guide to team contribution table

Teamwork is an essential learning of this course, and good teamwork is essential to your project success. In this class, we will emphasize three elements of teamwork: *psychological safety*, *structure and clarity,* and *dependability,* and we will be assessing your teamwork through three deliverables: [1] Team logbook, [2] team contribution tables, [3] teamwork self-assessment questionnaires. The first two are done as teams, and the last one is done by individuals.

In this document, we will explain how you what team contribution tables are, how you create them, and how they are used to assess you.

1: What is a team contribution table?

At the end of each design phase, each team should create and submit a team contribution table. The Team Contribution Table is a tool that helps you develop *structure* and *clarity and dependability* and will allow us to assess you on these elements. A team contribution table should include four columns: **Name**, **student ID,** c**ontribution**, and **percentage**.

In the **name** and **student ID** columns, list the names and IDs of all the students in the group.

In the **contribution** column, list the contributions made by each student in the group. This could include *design tasks* like research, ideation, interviews, design, prototyping, report writing as well as *teamwork tasks* like hosting meetings, managing time, facilitating conversations, resolving conflicts.

In the **percentage** column, estimate the percentage of the total contribution made by each student. The sum of the rows in this column should be 100%.

2: An example
Below is an example of a team contribution table:

Name	Student ID	Contributions	Percentage
Alice	xxxxxxxxx	Research, ideation, writing	23%
Bhavesh	xxxxxxxxx	Ideation, hosting meetings, writing	21%
Chen	xxxxxxxxx	Ideation, design	10%
David	xxxxxxxxx	Research, facilitating conversations	22%
Elena	xxxxxxxxx	Ideation, design, documentation, art	22%

3: How to create the team contribution table as a team
At the beginning of each phase, meet and discuss how you are going to work together and what each of you will do to contribute to the project. Plan things out and then fill out the team contribution table without assigning percentages.

After the completion of the phase, meet and discuss how what each of you did and how you worked together as a team. Revise the contribution column of the table and fill out the percentage column together.

If there is disagreement regarding the percentage, you should reach out to your TA/instructor.

4: How the team contribution table will affect your grade
We do not expect the contribution percentage to be exactly equal since it's only an estimate. However, we do expect students to contribute to the best of their abilities and for the contributions to be *equitable* and **inclusive**.

In the table above, Alice, Bhavesh, David, and Elena would receive the same grade.

In the table above, we would ask the team "why did Chen contribute significantly less than others?"
- If there is a valid reason to accommodate, we will assess Chen based on the situation in a case-by-case way.
- If there are no valid reasons to accommodate, Chen would receive lower grade than the rest of their teammates for the phase based on the percentage difference.
- Valid reasons include:
  - Illness
  - Family emergency
  - Accommodation letters from SAS

5: Be respectful, Be professional, Be collaborative
Most importantly, we expect all students to behave respectfully, professionally and collaboratively within teammates. If you observe or experience unprofessional and/or exclusionary behaviour within the team, such as sexism, racism, or harassment, please inform the instructor **as soon as possible**. If confirmed, the perpetrator of unprofessional behaviour will face severe grade penalty to their project, as well as other potential disciplinary actions.

APPENDIX E: Requirements for app-based solutions

If your chosen design solution is an app you must provide the following items to describe the design of the app and how users will interact with it:

1. <u>App flowchart</u>: Describes the elements of your app and how they interact with one another (the function of the app)
2. <u>App wireframe or UX flow diagram</u>: Describes how a user will move through your app (the user experience of the app)

You are not required to create a prototype of your app for this project, though you are certainly welcome to!

Lastly, you should do a search on Apple and Google App Store first to make sure there aren't already other apps doing similar things. If there are, you will need to explain why your app is different and better effectively.

Additional resources:

https://simpleprogrammer.com/flowcharts-for-programmers/

https://www.sketch.com/blog/wireframe-examples/

https://miro.com/templates/wireframe/

https://miro.com/templates/user-flow/

https://balsamiq.com/learn/articles/mobile-app-wireframing-guide/