MEMORIAL UNIVERSITY
Faculty of Engineering and Applied Science

ENGI 9821
Project Brief
Adam Noel
adam.noel@mun.ca

Winter 2025

Engineering 9821: Design of Digital Signal Processing Systems

1 Project Brief v1

This briefing describes the expectations for your project and how it will be assessed. The project is intended to be open-ended. You should treat this as an opportunity for you to explore a digital signal processing topic of your choosing, with the expectation that you demonstrate knowledge that is within the scope of this course.

1.1 Version History

- v1: This is the original version of the Project Brief

2 General Expectations

Your project should be designed and conducted with the following in mind:

- **Group Composition** – For students enrolled in Engineering 9821, the project must be completed *individually*. You **cannot** complete the project in a group.
- **Project Topic** – You are free to be creative and select any project topic that satisfies ***all*** of the following:
  1. You use discrete-time data that you synthesize yourself **or** access from a publicly-available source (e.g., weather data, market prices, sports scores, YouTube, research repository).
  2. You model the data as input to **and/or** output from a *linear time-invariant (LTI)* discrete-time system or systems.
  3. Your topic is consistent with the course's expectations on inclusion and equity (i.e., be collegial and respectful across disciplinary, cultural, and personal boundaries). This is intended as a "catch-all"; contact the Instructor if you are unsure.
- **Project Scope** – You should consider a scope that enables you to complete the project, including preparation of the deliverables, within about 50 hours of dedicated work. The following suggestions can help you narrow your scope:
  1. You should have a clear question that you intend for your project to address.
  2. (Unique for Engineering 9821) Some element of your project should be informed by recent research literature.
  3. You can focus on features of the data and/or features of the system.
  4. You should choose the appropriate domain(s) for your analysis and make use of corresponding figures.
  5. You should carefully evidence your work, including documentation of sources and coding.
- **Deliverables** – No matter how much time and effort you put into your project, you will be assessed according to your deliverables, so they should not be neglected.

- **Academic Integrity** – The work that you submit must be your own and not that of another person or AI-based tool. Cite any sources of data or ideas that are not your own.

3 Suggested Topics

Here is a list of suggested topics with ideas to develop a proposal for a Engineering 9821 project. You may choose one of these as a starting point, but (unique for Engineering 9821) some element of your project should be informed by recent research literature.

- **Communication system** – simulate a communication system operating over noisy channels. Propose a transmission scheme, characterize the transmitted signal(s), and compare different detector designs.
- **Image processing** – choose an application requiring automated image filtering (e.g., home security, manufacturing, smart vehicles, sports replays). Characterize a set of images and design filters to identify images of interest (or subregions therein)
- **Control systems** – model an industrial or utility process as an LTI system. Design and simulate controls for safe and reliable operation in the presence of malfunctions or unauthorized access.
- **Audio synthesizing** – develop tools to combine and mix sounds in a creative way. Characterize the impact over different frequency ranges and with different inputs.

4 Assessments

4.1 Proposal

In short, the proposal declares the topic that you will work on. The proposal should have the following **structure**:

1. Introduction
2. Project Definition
3. Planned Data, Methodology, and Results
4. References

The proposal will be **assessed** according to the following criteria:

1. How clearly is the project defined (motivation, objectives, aims) and is it of a suitable scope for Engineering 9821?
2. Will appropriate data be used?
3. Is the methodology suitable for the project and will it demonstrate knowledge that is within the scope of the course?
4. Are the planned results suitable to satisfy the project objectives?
5. How effectively were sources used to inform the decision-making or support the methodology?
6. Is any aspect of the project particularly creative or novel?

The proposal must meet the following **formatting requirements**:

- No more than 1 letter-sized page of single column text, 1-inch margins.
- Title, course name, student name(s) and IDs at the top of the page

- Times New Roman font no smaller than size 12.
- Figures may be included but be mindful of the limited space.
- Referencing and bibliography in IEEE format. References list font must be no smaller than size 10.

Note: It is normal for projects to change over time and a successful project can diverge from the initial proposal. Please contact the Instructor during the term if you make major changes to ensure that the project is still suitable for Engineering 9821.

The proposal must be submitted in **PDF format** to Brightspace by **5pm on Monday, February 3rd**. The link for submissions will be open by Monday, January 27th. Late proposal submissions will be subjected to the "Late Assignment Policy" in the syllabus.

4.2 Final Report

The final report is the main assessment for the project. The report should have the following **structure**:

1. Abstract
2. Introduction and Project Definition
3. Data and Methodology
4. Results and Discussion
5. Conclusion
6. References
7. Appendices as needed (e.g., datasets, code repositories, extended derivations)

The final report will be **assessed** according to the following criteria:

1. How effective is the abstract at summarizing the key details of the project?
2. Is the project motivated within a suitable context (i.e., when compared with the state-of-the-art or in the context of the topics that are covered in Engineering 9821)?
3. Does the report reflect a unified project, i.e., is there a consistent narrative to meet the project objectives?
4. How well does the applied methodology and used data demonstrate competence in digital signal processing?
5. Are the results appropriately chosen and clearly presented?
6. How relevant and insightful is the discussion to analyze the results and draw conclusions?
7. How effectively were sources used to inform the decision-making, support the methodology, or place the results in context?
8. Are appendices appropriately used to include supplementary information? *Note:* Every Appendix must be mentioned in the body of the report.
9. Is the report coherently written and follow the article template?
10. Are there any elements of the project that demonstrate a particularly creative or insightful achievement?

The final report must meet the following **formatting requirements**:

- Follow the IEEE article template for transactions and journals. A copy of the template in Word and LaTeX formats can be found on Brightspace.
  - Please **use the templates on Brightspace** and not elsewhere online. They have already had unnecessary portions removed (e.g., index terms, details about publishing figures, author biographies)
- No more than **5 letter-sized pages of double-column text** (excluding the appendices, which could be in any suitable format and length).

The final report must be submitted as a **single file** in **PDF format** to Brightspace by **5pm on Friday, March 21st**. The link for submissions will be open by Monday, March 17th. Late proposal submissions will be subjected to the "Late Assignment Policy" in the syllabus.

4.3 Presentation

The presentation is an opportunity for you to briefly share your project with the rest of the class. You will have a **maximum of 5 minutes** (+ 1 minute for a clarifying question from the Instructor or TA) to

- Explain your motivation
- Describe your project
- Summarize your methodology with emphasis on 1 or 2 details
- List a few highlights from your results
- Summarize your learning experience

The presentation must meet the following **formatting requirements**:

- No more than 5 minutes. You will be timed and asked to stop when your time elapses.
- Up to 3 slides in **PDF format** which must be submitted by **5pm on the day before your presentation is scheduled** (*exact submission process, i.e., via email or Brightspace, is to-be-confirmed*). The Instructor or TA will progress your slides at your request during the presentation. It is possible to present with no slides. Late slide submissions will **not be accepted**; if you do not submit slide(s) by the deadline then it is assumed that you will present without slides.

The presentations will be scheduled over a period of two weeks (March 24th to April 4th). An unbiased random process will be used to generate the presentation order; the order will be published by March 10th.

The presentation will be **assessed** according to the following criteria:

- How well do you create interest in your project?
- How well do you describe your project?
- How clearly do you summarize your methodology?
- How effective is the summary of your results?
- Do you articulate your learning gain?

5 Marking

The course project is worth 25 % of the final course mark. The components have the following mark distribution:

Component	Deadline	Value of course mark
Proposal	February 3	5%
Final Report	March 21	15%
Presentation	Last 3 weeks of semester	5%