

# 98-106 StuCo: Intuitive Quantum Computing

## Final Presentation

### Introduction

The final project for this class is a **presentation** on a **quantum computing topic of your choice**. It can be a new topic, or one that was already covered in class. If you choose to present an already-covered topic, you **must present it in a novel way** that adds something new to supplement what we spoke about in class. The goal is to develop some interesting visual, activity, or similar to explain a concept in quantum computing, similar to the lectures of this course. As with this course, your target audience is assumed to have a moderate (1-2 years undergraduate) computing background with only this course as prior quantum computing experience. The presentation may be demonstrated live in front of the class, recorded as a video, or in the form of a short blog post that includes visuals of some form. The project is worth 20% of your overall grade and is graded on correctness, creativity, and presentation clarity. The project will be **due at the start of class on December 3rd**.

### Choice of Topic

You can present on **any topic that relates to quantum computing**, such as quantum algorithms, quantum communication, quantum simulation, quantum physics, qubit implementations, quantum programming languages, control hardware, quantum or post-quantum cryptography, quantum error correction, etc. Below is a list of some example topics, but you are welcome to pick any topic you find interesting.

- Any topic already covered in class
  - If you do this, you must add something new in your explanation!
- Diagrammatic reasoning (the ZX-calculus)
- The Deutsch-Jozsa algorithm
- The Quantum Fourier Transform
- VQEs
- Quantum machine learning
- Physical qubit implementations (hardware types)
- History of quantum computing
- Survey of industry leaders in quantum
- Quantum complexity classes (BQP, QMA, etc.)
- Superdense coding
- Post-quantum cryptography
  - NIST standardized algorithms

## Choice of Medium

You may choose the medium in which you present your final project.

### Live Presentation

A live presentation in front of the class, similar to the lectures of this course. You may prepare slides, use the whiteboard, or simply do an activity with the class. You will be graded based on the clarity of your presentation, your ability to engage your classmates, and the creativity of your delivery. Aim for your presentation to take between 5 and 10 minutes (more information TBD on strict time limits once everyone has decided on a medium, we need to be able to fit all live presentations into a 50 minute class period).

### Recorded Video

A recorded video that you post somewhere accessible to the class to watch. You may present slides, speak into the camera, or even make some sort of animation. You will be graded based on the clarity of your presentation, the composition of the video (is it easy to see/hear you, are there mistakes that could have been cut from the final recording, etc.), and the creativity of explanation. If you take this approach, **make use of the fact that you are making a recording**. The video medium should in some way add to your presentation and you should not simply be reading off of a script or doing a live presentation into a camera. The target length for this video should be roughly 5 minutes, but you may make something slightly shorter or much longer.

### Text-Based

A web-page, blog post (e.g. on Piazza), or otherwise primarily text explanation of your topic. This explanation should include pictures, diagrams, or some interactive component to complement the text. The text itself should be at least 1000 words. An example of a reading in this course which makes excellent use of the text-based medium is [AlgAssert: YOU versus Bell Tests and the No Communication Theorem](#). You do not need to live up to the high standards of Craig Gidney, but this type of presentation should be the goal.

### Other

If you have some clever idea that doesn't fit into one of these forms, that's okay too! Just let me know and we can come up with some way to make your chosen medium work. For example if you wanted to make something similar to my [Shor's Algorithm Playground](#), that would also be a great project.

## Working in Groups

You may complete this project **either solo or in small groups**. Groups of 2 have no restrictions, but groups of 3 or more may be asked to produce a longer or more well-polished piece of work. **Aim to present in pairs**, and if you would like to have more people, please let me know.

## Grading & Rubric

This project is **graded out of 20 points**. It will be graded on a scale of 1-4 on the categories of correctness, clarity, creativity, relevance, and simplicity. Below is the rubric that will be used to evaluate your presentation. For groups, each member will be evaluated individually. Each group member must contribute to both the creation of any materials and also the execution of the presentation itself (though you may divide up the work how you wish, as long as each person contributes *something* to each part).

<b>Grading Criterion</b>	<b>Excellent (4)</b>	<b>Good (3)</b>	<b>Adequate (2)</b>	<b>Poor (1)</b>	<b>No Credit (0)</b>
<b>Correctness</b>	The content of the presentation has very few or no factual errors, and the errors do not impact one's ability to understand the content.	The content of the presentation has minor factual errors, which do not significantly impact one's ability to understand the content.	The content of the presentation has several factual errors, but they do not significantly impact one's ability to understand the content.	The content of the presentation has several factual errors, which impact one's ability to understand the content.	The content of the presentation has significant or frequent factual errors.
<b>Communication Skills / Clarity</b>	The delivery of the presentation is well done. If live, it is consistently engaging, if it is a video it's well rehearsed and clear, or if it is text-based, the structure and grammar is solid and understandable.	The delivery of the presentation is mostly well done. If live, it is engaging, if it is a video it's mostly well rehearsed and clear, or if it is text-based, the structure and grammar is mostly solid and understandable.	The delivery of the presentation is adequate. If live, it has minor delivery hiccups, if it is a video it's somewhat rehearsed and clear, or if it is text-based, the structure and grammar have only minor errors.	The delivery of the presentation detracts from the content. If live, it has major delivery hiccups, if it is a video it's clearly unrehearsed and/or unclear, or if it is text-based, the structure and grammar have significant errors that make comprehending the text difficult.	The delivery of the presentation has major issues that prevent one from understanding the content.
<b>Creativity</b>	The presentation contains visual or interactive elements that illustrate something about the chosen topic.	The presentation contains some visuals or interactive elements that slightly help illustrate something about the chosen topic.	The presentation contains visuals or interactive elements, but they do not significantly help illustrate anything about the chosen topic.	The visual or interactive elements of the presentation do not aid in understanding the chosen topic.	The presentation does not contain any visuals or interactive elements.
<b>Relevance</b>	The presentation is consistently well-focused on a topic which is related to quantum computing, technology, communication, or cryptography.	The presentation is mostly focused on a topic which is related to quantum computing, technology, communication, or cryptography.	The presentation touches on a topic which is related to quantum computing, technology, communication, or cryptography.	The presentation touches on a topic which is indirectly related to quantum computing, technology, communication, or cryptography.	The presentation does not discuss any topics related to quantum computing, technology, communication, or cryptography.
<b>Simplicity</b>	The presentation simplifies the content to be accessible to its target audience. It avoids the use of advanced jargon and techniques.	The presentation simplifies the content to be accessible to its target audience. It has instances of advanced jargon or techniques.	The presentation makes an attempt to simplify the content to be accessible to its target audience, but has some overly technical portions.	The presentation makes an attempt to simplify the content to be accessible to its target audience, but remains overly technical throughout.	The presentation makes no attempt to simplify the content to be accessible to its target audience.