Title: Quantum Computing Systems & Architecture
Level: EECS 498/598
Credits: 4
Prerequisites: EECS 470 or permission of the instructor

Description: With a number of quantum machines already available to researchers and scientists, the big question is when and how these machines will find their way into the mainstream. The challenge lies in improving these systems to be large enough, fast enough, and accurate enough to solve problems that are intractable for classical computers. This course will primarily focus on architectural and microarchitectural advancements that pertain to quantum error correction and control. In that regard, we will review recent literature on these topics, identify challenges that remain unsolved, and investigate potential solutions.

Grading:

1. **Paper presentation/lecture** (**20% of the overall grade**): Every team, consisting of two to four students, is expected to lead up to two lectures. Each of these lectures will focus on discussing one or two papers. The presentation should cover both the material presented in the paper, as well as necessary background information and an overview of the related work. The goal is to learn the state of the art and teach each other.
2. **Paper review** (**20% of the overall grade**): Students are expected to study and analyze the papers assigned for each lecture and submit their reviews.
3. **Class participation** (**10% of the overall grade**): Students are expected to actively participate in class by raising questions and providing helpful insights of their own.
4. **Final project (50% of the overall grade):**
    a. **Project proposal** (**10% of the overall grade**): Each team is expected to submit a final project proposal. The project may range from the replication and extension of existing publication results to the investigation of new ideas related to quantum system architectures. In each case, the team should clearly define their criteria for success.
    b. **Project implementation (25% of the overall grade**): Each team is expected to complete a final project and write an extended (2-page) abstract. Each implementation will be judged based on the success criteria described in the team's project proposal. Teams that pursue ambitious projects and fall short of the success criteria will not be penalized if they coordinate with the instructor.
    c. **Project presentation (10% of the overall grade**): Each team is expected to give a 20-minute in-class presentation about their final project.
    d. **Peer project review (5% of the overall grade):** Students are expected to review other teams' project abstracts and give meaningful feedback.