This syllabus serves to establish the rules of the course and provides a rough course outline.
   Note that some aspects may evolve as the quarter progresses.

Course Description: The purpose of this course is establish the foundations of (leading order) perturbative QFT. Our main goal is to derive the Feynman diagram expansion from the path integral. We will work extensively with scalar fields so that the physics of QFT is not obscured by the complications that arise when including spin. We will introduce the photon and couple it to a charged scalar. This course is designed to be the first third of a full year sequence.

Course Objectives: students will develop knowledge of the following topics:

1. Canonical quantization of scalar fields and gauge bosons
2. Path integrals for fields
3. LSZ reduction, the S-matrix, and cross sections
4. The Feynman diagram expansion
5. Application to physical processes (cross sections and decay widths)
6. Scalar QED and the Higgs mechanism

Prerequisite: Quantum mechanics and special relativity.

Credit Hours: 4
General Course Policies and Statement of Inclusion

- This is a graduate course, so you are responsible for your own learning. If you want to learn QFT, expect to spend between 10-20 hours per week on this course. That includes reading, doing HW, chatting with me and your classmates about the material, and doing your best to avoid being overwhelmingly confused.
- I will communicate with you by Slack and email. I will disseminate course material using Dropbox.
- All class and office hour interactions will occur virtually via zoom.
- Open inquiry, freedom of expression, and respect for difference are fundamental to a comprehensive and dynamic education. We are committed to upholding these ideals by encouraging the exploration, engagement, and expression of divergent perspectives and diverse identities.

Graded Assignments

- Although many solutions can be found online, but as with any subject in physics, you will not learn the material if you do not put some sweat into the course.
- HW will be assigned periodically. The due date will be clearly stated. It should be turned in at the beginning of class. Please be sure your work is legible and organized (no need to write on the back of paper, start a problem on a new page, etc.).
- 24 hour late policy: Late assignments will be accepted up to 24 hours late. You get one free late waver. Each additional late assignment results in a grade level reduction (A+ → A, etc.).
- I reserve the right to assign homework during dead week.
- Detailed instructions for the presentation assignment will be provided later.