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 to apply the methodology established in QFT part 1 to theories of charged fermions coupled to a photon. Then we will begin to explore QFT beyond leading order. This course is designed to be the second third of a full year sequence.

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

1. Theory of Lie Groups
2. Canonical quantization of fermions
3. Path integrals for fermions
4. Charged fermions interacting with a photon
5. QED beyond leading order and renormalization
6. Renormalization group evolution

Prerequisite: PHYS 634 QFT 1

Credit Hours: 4
Required Text: *QFT and the Standard Model*, 1st Edition  

Supplementary Text: *QFT*, 1st Edition  

Supplementary Text: *An Introduction to QFT*, 1st Edition  


Grade Distribution:  
Homework assignments 85%  
Presentation (at the end of the quarter) 15%

Letter Grade Interpretation:  
Mastery: ≥ A-  
All (or virtually all) assignments done correctly and turned in on-time. Presentation is clear, organized, and questions are adequately addressed.

Pass: ≥ B-  
Solid attempt on virtually all assignments and turned in on-time. Presentation is clear, organized, although questions posed some challenges.

Fail: ≤ C+  
Habitually late HW (one or more missed HW set) and/or several incorrect problems on several HW sets. Presentation is unclear, not organized, and questions cannot be addressed.

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.