Course Rubric & Title:
PHYS 582 Quantum Field Theory

Course Description:
Part of a two semester sequence covering the basic properties of quantum field theory systems. Lecture topics given below.

Prerequisites:
Graduate quantum mechanics courses, the equivalent of PHYS 580 and 581.

Credit Hours: 3

Course Instructors:
FA2024: R.G. Leigh

Course Website (current):
https://courses.physics.illinois.edu/phys582/fa2024/

Texts and Supplies:
lecture notes will be provided, so there is no required text, but a list of useful texts is available on the *Lectures* page of the course website. Additional reference material will be distributed on website as required.

Academic Integrity
All activities in this course are subject to the Academic Integrity rules as described in Article 1, Part 4, Academic Integrity, of the Student Code.
Infractions include, but are not limited to:

- Cheating, plagiarism, fabrication
- facilitating infractions of academic integrity.
- academic interference
- computer-related infractions
- unauthorized use of university resources
- sale or distribution of class materials or notes, or upload of any such materials to any Internet site

Violations of any of these rules will be prosecuted and reported to the student's home college in compliance with the Student Code: Article 1, Part 4, Academic Integrity, of the Student Code.
All aspects of the course are covered by these rules, including:

- exercises
- problem sets
- exams
- documentation submitted for petition for an excused absence

Course Grading:

Course grading will proceed in compliance with University policy as given in Article 3, Part 1 of the Student Code. Students will be able to view their grades on all components of the course using the course grade book, a link to which may be found on the course website. All Assignments will be accessed at the course's Gradescope channel, and all student work will be uploaded in pdf format to the Gradescope site for grading. It is expected that students use TeX to write up their solutions to exercises and problem sets.

Students are responsible for reporting any discrepancies found in their student grade book to the attention of their instructor immediately.

Grading

Course Component	Number of Assignments	Number Dropped per Semester	Maximum Points per Semester
Exercises	14	0	100
Problem Sets	6	0	600
Final Exam	1	0	300

In addition, students are expected to attend all lectures and to participate in class discussions.

Final Grade

The following table will be used to assign final grades. Small adjustments to the table may be made at a later date

Final Grade	Minimum Points
A+	950
A	915
A-	895
B+	880
B	860
B-	820
C+	790
C	760
C-	720
D+	680
D	640
D-	600
F	<600

Course Completion and Irregular Attendance

In compliance with the Student Code, the instructor of this course determines the amount of coursework which must be completed to pass. Attendance is required to meet the requirements.

Course Attendance & Make-Up Assignments

All lectures will be given in person.

Regardless of the type of absence, weekly exercises ***cannot be made up***. Late exercise papers will not be accepted. There is a short grace period for late problem sets (with penalty). Students should contact their lecturer about making up missed problem sets. Details may be found on the Gradescope channel.

Absences

Excused absences will be granted and documented in accordance with University policy as described in Article 1, Part 5 Class Attendance, of the Student Code.
Excused absences fall into the following categories as defined by the code:

- illness
- emergency beyond the student's control (e.g. an auto accident or death in the family)
- required attendance at a University event (e.g. varsity athletics)
- religious observance or practice
    - Requires request for accommodation for religious observances form.
    - Form must be uploaded to the Excused Absences application ***no later than two weeks after the first day of class***.
    - More information available from the Office of the Dean of Students.
- serving as a volunteer emergency worker

Students should request an excused absence using the Excused Absences application. The application will guide students through the procedure for documenting missed classes, including the effects of the absence on students' grades.

Course Component Breakdown:

Lectures: 2 per week for 15 weeks (80 minute lectures)

Course Topics and Learning Objectives:

Topics covered in lectures will include

1. Review of classical mechanics structures: Hamiltonian and Lagrangian formalisms, phase space, symplectic structure and their extension to the field theory context.
2. Symmetries and conservation laws.
3. Poincaré group and representations.
4. Canonical quantization.
5. Functional integral quantization.
6. Quantization of gauge theories.

The number of lectures on each of these topics will be determined in response to class interactions. Topics not addressed in Fall semester will be carried over to 583 in Spring 2025.

Disability Access
(https://www.disability.illinois.edu/academic-support/instructor-information/examples-disability-statements-syllabus)
The Department of Physics is committed to being an open and welcoming environment for all of our students. We are committed to helping all of our students succeed in our courses.
To obtain disability-related academic adjustments and/or auxiliary aids, students with disabilities must contact the course instructor and the Disability Resources and Educational Services (DRES) as soon as possible. To contact DRES, you may visit 1207 S. Oak St., Champaign, call 333-4603, e-mail disability@illinois.edu or go to the DRES website. If you are concerned you have a disability-related condition that is impacting your academic progress, there are academic screening appointments available on campus that can help diagnosis a previously undiagnosed disability by visiting the DRES website and selecting "Sign-Up for an Academic Screening" at the bottom of the page.

If you are interested in obtaining information to improve writing, study skills, time management or organization, the following campus resources are available to all students:

Writer's Workshop
Undergrad Library
217-333-8796
http://www.cws.illinois.edu/workshop
https://www.disability.illinois.edu/strategies
http://www.counselingcenter.illinois.edu/self-help-brochures/
Also, most college offices and academic deans provide academic skills support and assistance for academically related and personal problems. Links to the appropriate college contact can be found by going to this website and selecting your college or school: http://illinois.edu/colleges/colleges.html
If you are experiencing symptoms of anxiety or depression or are feeling overwhelmed, stressed, or in crisis, you can seek help through the following campus resources:

Counseling Center
206 Fred H. Turner Student Services Building
7:50 a.m.-5:00 p.m., Monday through Friday
Phone: 333-3704

McKinley Mental Health
313 McKinley Health Center
8:00 a.m.-5:00 p.m., Monday through Friday
Phone: 333-2705
McKinley Health Education offers individual consultations for students interested in learning relaxation and other stress/time management skills, call 333-2714.