

Quantum Field Theory Part I : Phys 731

1 Course Outline:

Course: Quantum Field Theory I - Phys 731

Instructor: Dr Alakabha Datta

Office: 209 Lewis Hall

Meeting: TTH 11.00 am to 12.15 pm at Lewis 104

Office Hours: By Appointment

Email: datta@olemiss.edu, datta@phy.olemiss.edu

Phone: (662) 915-5611

Course homepage: Check Blackboard.

2 Book

- Book : Quantum Field Theory: Mandl and Shaw, 2nd Edition

2.1 Reference Books

- An Introduction to Quantum Field Theory by M. Peskin and D. Schroeder.
- Quantum Field Theory by Lewis H. Ryder.
- Quantum Field Theory and the Standard Model by Matthew Schwartz.
- Many other books - do your own research.

Course Goals: Course Goals: Learning basic canonical quantization of the scalar, Dirac and the Electromagnetic field. S matrix and the perturbation theory. Tree level calculation of Feynman graphs in Q.E.D..

Independent study: The course will also involve solving problems that will require students to research material on published journals to complete the project. The purpose of this is to help the student acquire skills to pursue independent research. The students will also complete a report on a topic of current research interest

3 Topics Covered will be taken from the list below:

- Non Relativistic Quantization of the Electromagnetic Field
- Symmetries and Conservation Laws - Noether's Theorem.
- Scalar Field and Quantization.
- Dirac Field and Quantization, Majorana Spinors.

- Electromagnetic Field and Quantization, Massive Vector Field.
- Scattering Matrix
- Feynman Rules and Cross section.
- QED processes at lower order.
- Brief ideas about Radiative corrections and renormalization.

4 Marking

- Homework: 55 % .
- Mid Term Report: 20%.
- Final Take Home Exam: 25% .

An overall course average of the following percentages will guarantee the corresponding letter grade:

90%	A
80%	B
70%	C
60%	D

5 HW policy:

There will be short homework assigned almost everyday to be turned in the next class or in less than a week time. Longer homework will be assigned after a chapter is completed. You will have 3 weeks to complete those assignments. There is no late homework submission unless you provide a valid reason.

6 Attendance:

There is no attendance requirement. However, if you miss an exam or cannot turn in HW on time because of illness I will require a doctor's note. If you will away on other reasons inform me prior to your absence and get a note if applicable. I might take random roll-call and give extra credits to students who have good attendance.

7 Academic Integrity:

We will follow the University policy of academic integrity (M-book). Violations of these policies will result in a failing grade and other disciplinary actions.