

Standard Model : Phys 749

1 Course Outline:

Course: Standard Model
Instructor: Dr Alakabha Datta
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Meeting: MWF 10 am to 10.50 am at Lewis 109
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Course homepage: Check Blackboard.

2 Books

We do not have a prescribed book for this course. A lot of the material will be from Quantum Field Theory by Mandl and Shaw used in Quantum Field Theory 1. Other books that will be used are:

- The Standard Model A Primer by Cliff Burgess and Guy Moore.
- Gauge Theories of the Strong, Weak and the Electromagnetic Interactions by Chris Quigg.

3 Topics Covered will be taken from the list below:

- Review of basic Lie Groups and Algebras used in SM like $SU(2)$ and $SU(3)$.
- Introduction to Gauge symmetries and Gauge Theories: Yang-Mills Theories.
- Introduction to Spontaneous Symmetry Breaking (SSB) Goldstone Bosons and the Higgs Mechanism.
- The Lagrangian of the Standard Model (SM).
- Phenomenology of the SM: Z , W and H Decays.
- Weak Decays of the leptons.
- Scattering of Leptons.
- Ideas of Renormalization and running coupling constants.
- Introduction to strong Interactions.
- Weak Decays involving quarks: The CKM mixing.

- Neutrino mixing and masses.
- Brief description of beyond the SM Theories.

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:

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

5 Academic Integrity:

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