**Instructor:** Prof. Nausheen R. Shah

**Office:** 362 Physics

**E-mail:** nausheen.shah@wayne.edu

**Office Hours:** F 2:30-3:30 pm or by appointment (subject to change).

**Class Details:** 01/07/19 - 04/30/19

**Location and Time:** 312 Physics Bldg, Tu, Th 11:30 - 12:45 PM

**Assigned Texts:**

**There is no assigned textbook for the course. However, I plan on mostly following** Paul Langacker, The Standard Model and Beyond (2nd Edition).

**I will post papers and lectures on Canvas as needed. Below I list a few good reference books.**

**Reference Texts:**

David Griffiths, Introduction to Elementary Particles

Michael Peskin, <http://www.slac.stanford.edu/~mpeskin/Physics152/theBook.pdf>

Peskin and Schroder, An Introduction to Quantum Field Theory

Paul Langacker, Can the Laws of Physics be Unified?

**Grading:**

* Homework Quizzes (70% of total grade)
  + Weekly assignments will be posted on Blackboard Thursday (starting second week of classes, Jan 17th 2019) and you will have one week to attempt the problems. These assignments will not be collected or graded. Instead, at the beginning of each Thursday lecture we will have a ~10-15 minute quiz which will be a randomly selected problem (or part of one) from the assignment that week. There will not be any make-up quizzes.
* Final Project (30% of total grade)
  + The final project will consist of a short paper ~ 5 pages + 15 minute talk at the end of semester. You can choose your own topic, after confirming with me. You should decide on the topic of the final project by the end of the spring break (i.e. Monday March 18th 2019).

**Grade determination:**

**A : 90+ %,**

**A - : 85-89%**

**B + : 80-84%,**

**B : 75-79%,**

**B - : 70-74%**

**C+ : 65-69%,**

**C : 60-64%,**

**F : below 60%**

**Topics:**

I am planning the course to be roughly divided into three parts:

* Fast review of basics (like the Klein-Gordon Eq. etc) followed by our understanding of the Standard Model (SM).
* SM shortcomings, or why we need physics beyond the SM (BSM). We will review neutrino masses, flavor, matter-antimatter asymmetry, dark matter etc.
* Introduction to the most compelling (for my point of view) BSM theories we have. Will include SUSY, extra dimensions/compositeness etc.

I may also have a short interlude about numerical tools for collider studies depending on interest.