

PHYS 528 Syllabus

Lectures

WF, 9:30-11:00am

TRIUMF MOB 220/Remote Connection (Zoom)

Instructor

David Morrissey

TRIUMF

604-222-7697

dmorri@triumf.ca

Office Hours

Remote on Zoom or at TRIUMF

(email me to make an appointment)

Grading

75% homework assignments

25% end-of-term report and presentation

Outline

1. Notation and Background
2. Review of QFT
3. Symmetries in Particle Physics
4. Spontaneous Symmetry Breaking and the Higgs Mechanism
5. Generalizing QED: Non-Abelian Gauge Theories
6. QCD, from High to Low Energies
7. Electroweak Physics
8. Flavour Mixing and CP Violation
9. Low-Energy Tests of the Standard Model
10. The Standard Model at High Energy Colliders
11. Higgs Hunting
12. Neutrino Oscillations
13. Beyond the Standard Model

This course will cover elementary particle physics with a focus on the Standard Model. The primary goal is to provide the background necessary for experimental and theoretical graduate research in the field. Starting with a review QED (which the student should know at the level of the basic Lagrangian and Feynman rules), we will build up to the non-Abelian gauge theories that underlie the strong and weak forces. Next, we will discuss spontaneous symmetry breaking and the Higgs mechanism. Putting these pieces together

will allow us to present the Standard Model in all its glory. With the SM in hand, we will turn to its observational consequences including weak decays and scattering, the strong force at low and high energies, and physics of the Higgs boson. Time permitting, we will also go beyond the Standard Model and examine neutrino masses and dark matter.