

Physics 594 Spring 2022

Introduction to Particle Physics

Section 594003 (*3 credit hours*)

Time: TR 8:10 – 9:25 am

Room: Nielsen 608

Instructor: Stefan Spanier

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Tel: 974 - 0597

Office: Tue 11am – 12pm (or time by appointment)

Web-page: online.utk.edu (Canvas)

Synopsis

This course is a stepping stone course for High Energy Particle Physics—a very introductory course to prepare senior undergraduate and graduate students for higher level graduate courses. It will cover several basic aspects such as special relativity, some accelerator and detection methods, basics about Feynman diagrams and fundamental forces between elementary particles, as well as phenomenological particle interaction models. You will also learn about newest developments and experiments in the field.

While no pre-requisites are listed, you will need a basic knowledge of electrodynamics to benefit from this course.

The list of subjects to be addressed (is subject to change that will be announced during class and on Canvas):

- Introduction/History
- Relativistic Kinematics
- Elementary Particle Dynamics
- Accelerators and Detectors
- Symmetries
- Feynman Diagrams
- Quantum Electrodynamics
- Interactions with Quarks
- Weak Interactions
- Gauge Theories
- Higgs Mechanism
- Neutrino Oscillations
- Physics Beyond the Standard Model

The grade in this course is derived from

- 80% homework
 - 8 assignments (deadlines on homework)
 - need to solve 80% of the assignments
- 20% presentation project (last two lecture dates at end of semester)

Recommended Textbooks

D. Griffith, Introduction to Elementary Particles

Review of Particle Properties, online at pdg.lbl.gov

C. Amsler, Nuclear and Particle Physics, IOP Expanding Physics, also as e-book

D.H.Perkins, Introduction to High Energy Physics

Further reading:

F. Halzen and A. Martin, Quarks and Leptons: An Introductory Course in Modern Particle Physics

J.R. Aitchinson and J.G. Hey, Gauge Theories in Particle Physics

Students with disabilities

If you need course adaptations or accommodations because of a documented disability, please contact the Office of Disability Services at 2227 Dunford Hall (telephone/TTY 865-974-6087; e-mail ods@utk.edu). This will ensure that you are properly registered for services.

Academic Honesty

All work submitted by a student is expected to represent his/her own work. Students are expected to enter their own homework without assistance from others. Students are expected to perform all work in conformance with the University policies regarding Academic Honesty.