## PHYS 4500: Relativistic Quantum Fields and Particles

***3 Credit Hours***

*Prerequisite: PHYS 3710 and MATH 2203*

This course is an introduction to relativistic quantum mechanics, quantum field theory, elementary particle physics, and gauge theory. Students will learn how the combination of the two revolutionary physics theories of the first half of the 20th century, relativity and quantum mechanics, leads us to the concept of quantum fields and the description of the fundamental forces and particles in the universe. Students will see how electromagnetism, the strong and weak nuclear interactions, and even gravity, can be described in a unified way as gauge theories.

## PHED 3372: Physics Education Research Methods

***3 Credit Hours***

*Prerequisite: Grades of "C" or better in (PHYS 2212 or PHYS 1112) and EDSM 2010*

Students begin this course with a general investigation into various qualitative and quantitative research studies as well as key articles from physics education. Next, students will select a topic and conduct a literature review in that area. Finally, students will design, conduct and disseminate the results of a small scale study they conducted. The goal of this course is to help students learn how to conduct research in their own classroom to gauge instructional effectiveness.

## PHED 3421: Classroom Interactions

***2 Credit Hours***

*Prerequisite: EDSM 1102 and PHYS 2212 and Admission to Teacher Education.*

*Corequisite: SCED 3010, ITEC 3300, INED 3305, and INED 4435*

This course examines teachers, students, content, and interactions that lead students to develop conceptual understandings of physics. Science teacher candidates design and implement instructional activities informed by their understanding of science learning, then assess student learning. This course includes a 29 hour field experience as introduction to the adolescent learner, the equity imperative and science education reform. This course is restricted to participants in the UTeach program.