# Physics 280: Particle Physics Short Course (1 hr)
# Spring (12) 2016
# Course Information

**Instructor:** Mark Taylor **Office:** Gerstacker 118 **Phone:** (330) 569-5241 (office)
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**Office Hours:** MWF 4:15-6:00, Tues. 9:00-12:00, Thurs. 1:00-2:00, 4:00-5:00, Sunday 3:00-6:00.
Also, feel free to stop by at other times, call me, or send me email.

**Physics Study Session:** Thursday evenings 6:30-9:30, Gerstacker 123.

**Meeting Times:** Monday 7:00-8:00, Gerstacker 123

**Textbook:** The New Cosmic Onion by Frank Close (on library reserve)

**Other References:** Particle Physics: A Very Short Introduction by Frank Close
Introduction to Elementary Particles by David Griffiths

**Course WebPage:** http://www.hiram.edu/majors-and-minors/physics/courses/particle-physics
[and Moodle Site for reading question submission]

**Course Overview:** In this short course we will explore the standard model of particle physics. In this model all matter is built from quarks and leptons which interact via the exchange of gauge bosons. Thus, the electromagnetic, weak, and strong interactions are mediated by the photon, W and Z, and gluon, (and described by QED, electroweak theory, and QCD), respectively. A unifying theme in the development of the standard model has been the identification of patterns or symmetries in the microworld, including the identification of certain broken symmetries (of which the Higg's mechanism is an example). Although theoretical particle physics requires the full machinery of relativistic quantum mechanics, this short course will be accessible to anyone with some exposure to physics. Our focus will be on particle phenomenology as opposed to detailed calculations (i.e., we will learn how to construct Feynman diagrams but we will not actually evaluate them). We will also discuss, to a lesser extent, experimental methods and detector physics. And who knows, perhaps some non-standard model supersymmetric particle will be discovered during the course! So, as James Joyce says, "Three quarks for Muster Mark!".

**Class Preparation and Format:** Class sessions are intended to be largely "discussion" based, so everyone must come ready and willing to engage with the physics. For this format to work, it is critical that everyone keep up with the reading. I certainly hope the material is compelling enough to hold your interest! Our text will be our primary source of information, but I will attempt to clarify and expand upon the presentation with short lectures on specific topics. This course should be viewed as a collaborative venture (or adventure?) in which we all share the effort in trying to elucidate some of the complexities of modern particle physics. To this end, one of your jobs for each session will be to pose a well formulated question on the reading.

**Pre-Class Questions:** I will post a few questions on Moodle (and the course web-page) before each class session. <u>You will need to submit your answers (and your "well formulated question" from the reading assignment) no later than 5:00 PM each Monday</u>.

**Homework:** Weekly reading and pre-class questions.
**Exams:** None.
**Grading:** This is a credit/no credit course.
To get credit you must:
1) answer each weeks reading questions;
2) attend (and participate in) each class session [one absence allowed].