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| **PHY 431** | **Nuclear and Particle Physics** | **Spring 2020** |

**Instructor:**

* Professor Concha Gonzalez-Garcia,  
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  Office hrs: W 10:00-11:00 am or by appointment

**Place and Time:**

* Tuesday and Thursday 8:30-09:50 in Physics Room Earth and Space 183
* First Lecture: Tuesday Jan 28 2020
* This homepage: http://insti.physics.sunysb.edu/~concha/PHY431/S20/phy431\_S20.html

**Prerequisites:**

* Quantum Mechanics PHY 308. Modern Physics PHY 251 is also recommended.

**Objectives:**

PHY 431 is an introductory physics course which offers comprehensive survey of particle and nuclear physics. The goal of the course is to give an overview of these diverse and exciting fields. We will discuss our present knowledge of particle interactions -- The Standard Model--. Rigorous field theory approach will be avoided and more phenomenological approach will be taken. Aplications of quantum mechanics and the role of symmetry principles are stressed.

**Syllabus (Temptative):**

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| **Topics** |
| 1. Introduction: Overview of Elementary Particle Physics |
| 2. Relativistic Kinematics |
| 3. Particle Sources: Particle Accelerators |
| 4. Symmetries in Particle Physics |
| 5. Wave functions for Relativistic Particles |
| 6. The Feynman Calculus |
| 7. Quantum Electrodynamics |
| 8. Strong Interactions: From Nuclear Forces to QCD |
| 9.\*(if time allows) Weak Interactions and neutrino physics |

**TextBook:**

* D. Griffiths, Introduction to Elementary Particle Physics, Wiley 1987

**Supplementary Books/materials:**

* F. Halzen and A. Martin, Quark and Leptons. Wiley 1984
* D. Perkins, Introduction to High Energy Physics, Addison Wesley, 2004
* R.N. Cahn and G. Goldhaber, The Experimental foundations of particle physics, Cambridge University Press, 1991.
* Notes Chapter 8 [[pdf ]](http://insti.physics.sunysb.edu/~concha/PHY431/S19/notes_chapter8.pdf)

**Useful Links:**

* [Particle Data Group](http://pdg.lbl.gov/)
* [Particle Adventure](http://particleadventure.org/). Wonderful interactive web-based tutorial on particle physics for general audience.

**Course Instructions:**

Communication of homework assignments, schedules, and other informations will be done via this web site as well as in the lecture. This page can be reached from the instructor's homepage, from the Physics department home page (http://www.physics.sunysb.edu) and from the university Instructional Computing Course infomation page.

**Homework:**

Homework will be assigned each week. It will be collected for grading in the following week. **Homework must be written by hand.**Homework assignments will be posted on the web. Although cooperative learning is encouraged, you are required to solve the problems on your own and to consult others only after giving it a serious try yourself. The final calculations and solutions have to be done by you alone. Copied or late homeworks will not be accepted and will count as zero.

**Examinations:**

There may be one or two midterm exams in class and a final exam.

**Grading:**

Your final grade will be determined as follows:  
Homework 50%; Tests, Attendance and Participation 50%

**Special Notes:**

Any excuses (medical or otherwise) are to be documented, and discussed with the instructors in a timely manner. If you have a physical, psychiatric, medical, or learning disability that may impact on your ability to carry out assigned course work, I urge that you contact the staff in the Disabled Student Services office (DSS), Room 133 Humanities, 632-6748. DSS will review your concerns and determine, with you, what accommodations are necessary and appropriate. All information and documentation of disability is confidential.

**Accademic Integrity:**

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person’s work as your own is always wrong. Any suspected instance of academic dishonesty will be reported to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at http://www.stonybrook.edu/uaa/academicjudiciary/