Introduction to Nuclear and Particle Physics: Spring 2019

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Class Website (select 4511) http://www.physics.umn.edu/classes/
This is the main website for all postings, announcements, and homework.

Introduction
The goal of the course is to survey particle and nuclear physics at the upper division undergraduate and first year grad student level. In order to give a broad exposure to the various topics in these fields, it will be impossible to go into full detail on every topic. However, a general understanding of the concepts should be obtained, with the interested student being encouraged to seek a deeper understanding with future courses in topics such as Quantum Field Theory. The course explores the common roots and tools of nuclear (medium energy) and particle (high energy) physics. The main objective is to develop an understanding of the Standard Model of quarks, leptons, and the fundamental interactions of the universe. Specific topics include the techniques of particle and nuclear experiments, properties and simple models of nuclei, fundamental interactions and their mediators, quarks and leptons, symmetries and tests of conservation laws, and indications of physics beyond the Standard Model.

Mathematical rigor is not an essential feature, but the ability to do calculations of particle and nuclear phenomena is an important goal. The knowledge and skills learned in Physics 4101 are assumed, but competence at the level of Physics 2601/2605 is generally adequate.

Required Texts:
3. PDG Handbook: http://pdg.lbl.gov/ I have pre-ordered the short booklets for you and will hand them out in class. You must bring them to all quizzes, the final exam and most classes too.

Lectures: MWF from 12:20 – 1:10 in Tate B85

Final Exam: This is a 3-hr exam on Saturday, May 11 from 1:30 – 4:30 pm
**Midterms:** There will be two midterm exams, which will consist of a few conceptual questions plus worked problems. The problems will closely resemble the homework problems.

Scheduled on Monday, February 25 and Wednesday, April 3

**Homework:** There will be problems assigned on a regular basis, but due on different days depending on the size of HW set. Some should take a week, but some are longer. The answers will be posted a day after they are due, so late homework is not accepted. Hand in what you have by the due date, even if you are not finished. Homework is an important part of your grade. You are welcome to collaborate on it with other students, but in the end you need to write it up on your own. Copied papers will lose points. Your papers will be returned the following week.

**Presentations:** Each student will present a 15 min talk on a pre-selected (we will have a sign-up sheet later) experiment. There will be a template you need to adhere to and you will be graded.

**Grading:**

Homework = 20%
Presentation = 15%
Each Midterm = 15%
Final Exam = 35%

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**Responsibilities:**

Students are responsible for all information disseminated in class and all course requirements, including deadlines and examinations. Derivations similar to what can be found in your textbooks and examples on the board will not be transcribed, scanned, and posted online, although powerpoint presentations will be posted. Therefore, class attendance is very important. While I have assigned office hours, you should feel free to make an appointment outside of those hours if you are having problems or if you have questions.

**DEPARTMENTAL POLICIES**

The University of Minnesota assumes that all students enroll in its programs with a serious learning purpose and expects them to be responsible individuals who demand of themselves high standards of honesty and personal conduct. All students are expected to behave at all times with the utmost respect and courtesy toward all of their fellow students, their instructors and are expected to have the highest standards of honesty and integrity in the academic performance of its students. Any attempt by a student to present work that she or he has not prepared, or to pass an examination by improper means, is regarded by the faculty as a serious
offense, which may result in the immediate expulsion of the student. Aiding and abetting a student in an act of dishonesty is also considered a serious offense.

ATHLETES must provide their official University of Minnesota athletic letter containing the approved competition schedule to their instructor and the staff in Tate 130. Accommodations will be made for official university sports only (i.e. no accommodations will be made for intramurals, club sports, etc.)

DISABILITY SERVICES: If you have accommodations for this course, please provide the staff in Tate 130 with a copy of your accommodation letter for the current semester. Exams will be arranged according to accommodations and sent to the testing center for administration.

STUDENT CODE OF CONDUCT: You should be familiar with the student code of conduct http://regents.umn.edu/sites/default/files/policies/Student_Conduct_Code.pdf

STUDENT RESPONSIBILITIES: You should understand your responsibilities as a student. https://policy.umn.edu/education/studentresp

PERSONAL ELECTRONIC DEVICES: Using personal electronic devices in the classroom setting can hinder instruction and learning, not only for the student using the device but also for other students in the class. To this end, the University establishes the right of each faculty member to determine if and how personal electronic devices are allowed to be used in the classroom.

MAKEUP WORK: Students will not be penalized for absence during the semester due to unavoidable or legitimate circumstances. Such circumstances include verified illness, participation in intercollegiate athletic events, subpoenas, jury duty, military service, bereavement, and religious observances.