Physics 733: Elementary Particle Physics
Spring 2021

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Office: Lewis 105
Office Hours: MW 12:00 - 1:00 pm
and by appointment

Class Time: MWF 11:00-11:50 am

Class Location: Lewis 104

Course Description

This one-semester introduction to elementary particle physics will be presented primarily from a phenomenological and experimental perspective, meaning the concepts will be introduced in a context that explains experimental results rather than starting from field theory. Topics to be covered include but are not limited to fundamental particles and interactions, symmetries and conservation laws, calculations of cross sections and decay rates, and experimental techniques of particle physics. Particular emphasis will be placed on topics relevant to ongoing research at Ole Miss.

Texts

I will draw from several texts and other resources for lecture material, including, but not limited to

- ***Introduction to High Energy Physics, 4th Ed.***, by Donald H. Perkins. A standard review of particles and interactions. A bit more advanced than *Introduction to Elementary Particles* by Griffiths.
- ***Quarks and Leptons: An Introductory Course in Modern Particle Physics***, by F. Halzen and A. D. Martin. Somewhat dated regarding experiment, but good presentation of theory, including Feynman diagrams, cross sections, etc.
- ***Modern Particle Physics***, by M. Thomson. A bit more recent and nice figures, doesn't assume a lot of QFT knowledge.
- ***Particle Data Group: Review of Particle Physics***, available online at pdglive.lbl.gov. An important complement to any text to get present-time information in a often rapidly changing field. Includes some very good reviews and collections of useful information.

Assessments

Homework (50%) Homework will be assigned approximately once per week and will be graded both for correctness and clarity. Late homework will be accepted with a 20% reduction in score for each week beyond the due date. As scientists normally work in groups, students are encouraged to work together on homework. However, each student is responsible for understanding all details of a problem solution.

Quizzes (20%) Brief quizzes will be given occasionally. The lowest quiz grade will be dropped.

Exam (30%) One comprehensive, non-collaborative, take-home exam will be given at the end of the semester.

Grading Scale

- $85\% \leq \text{A} \leq 100\%$
- $70\% \leq \text{B} < 85\%$
- $55\% \leq \text{C} < 69\%$
- $40\% \leq \text{D} < 55\%$
- $\text{F} < 40\%$

Policies

Academic Integrity
Every student of the University of Mississippi, by virtue of choosing to be part of the university community agrees to abide by the University of Mississippi Creed and the UM Academic Integrity Policy which covers academic integrity. Please consult the M-Book, Academic Integrity document for details on university policy and the academic creed.

Cheating is forbidden and will result in a zero grade on the assignment. If a second case of cheating occurs, this will result in an F for the entire course.

UM Creed The University of Mississippi is a community of learning dedicated to nurturing excellence in intellectual inquiry and personal character in an open and diverse environment. As a voluntary member of this community:

- I believe in respect for the dignity of each person
- I believe in fairness and civility
- I believe in personal and professional integrity
- I believe in academic honesty
- I believe in academic freedom
- I believe in good stewardship of our resources
- I pledge to uphold these values and encourage others to follow my example

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Disability Access and Inclusion:
The University of Mississippi is committed to the creation of inclusive learning environments for all students. If there are aspects of the instruction or design of this course that result in barriers to your full inclusion and participation, or to accurate assessment of your achievement, please contact the course instructor as soon as possible. Barriers may include, but are not necessarily limited to, timed exams and in-class assignments, difficulty with the acquisition of lecture content, inaccessible web content, and the use of non-captioned or non-transcribed video and audio files. If you are approved through SDS, you must log in to your Rebel Access portal at https://sds.olemiss.edu to request approved accommodations. If you are NOT approved through SDS, you must contact Student Disability Services at 662-915-7128 so the office can: 1. determine your eligibility for accommodations, 2. disseminate to your instructors a Faculty Notification Letter, 3. facilitate the removal of barriers, and 4. ensure you have equal access to the same opportunities for success that are available to all students.

Audio and video recording

Audio and/or video recording of class lectures is not allowed unless explicit permission is given by the instructor. Permission will only be given if the student has a Student Disability Services request. In such cases, recordings may only be used by the student to whom permission is given and all recordings must be deleted at the end of the semester. Recordings may not be distributed online or elsewhere.

Important Dates

See the academic calendar (**http://registrar.olemiss.edu/spring-2021**)