Physics 440: Nuclear and Particle Physics
Spring 2021, On-line
Wednesday 10:30 - 11:45

Instructor:	Phil Rubin
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Office Hours:	By appointment
Website:	`http://physics.gmu.edu/~rubinp/courses/440-540/`

Please note:

- All e-mail communication from the instructor concerning this course will be to GMU accounts only.
- If you are a student with a disability and you need academic accommodations, please see me **and** contact the Office of Disability Resources at 703.993.2474. All academic accommodations must be arranged through that office.

Course Goal:

1. To gain a basic familiarity with sub-atomic physics and its methods.

Suggested References:

- *Quarks & Leptons: An Introductory Course in Modern Particle Physics*, F. Halzen and A. Martin
- *Introduction to High Energy Physics*, D. Perkins
- *Introduction to Elementary Particles*, D. Griffiths
- *Nuclear and Particle Physics: An Introduction*, B. R. Martin [Recommended to me, but I'm unfamiliar with it]
- *Particle Physics*, B. R. Martin [Recommended to me, but I'm unfamiliar with it]

Reading Resources:

- Undergraduate: `http://physics.gmu.edu/~rubinp/courses/440-540/undergrad/`
- Graduate: `http://physics.gmu.edu/~rubinp/courses/440-540/grad/`
- Nobel Prize Lectures: `http://physics.gmu.edu/~rubinp/courses/440-540/nobel/`

Expectations:

Students are expected to complete assigned exercises independently in advance of weekly (Wednesday) meetings. Working with others to get started or overcome difficulties is encouraged, but the final results must be those of the individual student. The weekly meetings will be conducted in a tutorial style, in which students take turns presenting their results. Performance in these tutorial sessions account for half the final grade. Minimual session time will be spent discussing concepts. Such discussions may take place at scheduled, individual office hours. No one is required to connect at the agreed-upon hour, but the time is reserved should it be desired. Other times may not be available.

A final exam or a final project will account for the remaining half of the final grade.

Grading:

- Exercises, 50%; final exam or paper 50%

A+ = 100-93.33%	A = 93.32-86.67	A- = 86.66-80
B+ = 79.99-73.33	B = 73.32-66.67	B- = 66.66-60
C+ = 59.99-53.33	C = 53.32-46.67	C- = 46.66-40
	D = 39.99-20	
	F < 20	

Tentative Schedule:

Date	Topic
27 Jan	Dimensions and units
03 Feb	Four-momentum
11 Feb	Nuclei
18 Feb	Nuclear Stability and radiation
24 Feb	Interaction of radiation with matter
03 Mar	Detectors
11 Mar	Accelerators
18 Mar	Relativistic kinematics
24 Mar	Symmetries, conservation laws, and group theory
31 Mar	Standard Model
07 Apr	Gauge theories
14 Apr	Quantum electrodynamics
21 Apr	??
28 Apr	??

Final Examination: Cumulative, take-home exam, open-notebook, open notes. No living, breathing being may be consulted in any way. Due in my Inbox by Wednesday, 5 May, at 13:15 (1:15 pm). No late exams will be accepted.

Project: Develop a 90-minute lesson on a topic of choice related to sub-atomic physics. The lesson must consist of lecture notes, homework, and homework solutions. Work on the project must be done independently, and must be original work. Everything is due in my Inbox by Wednesday, 5 May, at 13:15 (1:15 pm). No late submissions will be accepted.

Attendance and Tardiness: Preparation for and on-time attendance at weekly sessions required. One-third of the credit for a session will be deducted for tardiness. Two-thirds will be deducted for lack of preparation. All credit will be lost for a missed session.

Disruptive Behavior: It is expected that you will engage constructively at the weekly session, prepared to offer and explain solutions to the exercises assigned.

Honor Code Violations: The work you present must be your own. Plagiarism and cheating will be punished with failing grades and trial by the honor committee. It's important to appreciate that science is impossible when dishonesty, in any manifestation, exists.

The GMU Honor Code: `https://oai.gmu.edu/mason-honor-code/`