

Syllabus

Course Lectures

Lecture Dates	Lecture Topics (Click topic for PPTX - Old Lectures Folder (https://canvas.wisc.edu/courses/288710/files .)	Suggested Reading	Suggested Homework (no deadlines)
2022-01-26	Introduction (https://canvas.wisc.edu/courses/288710/files/24277585?wrap=1) ↓ https://canvas.wisc.edu/courses/288710/files/24277585/download?download_frd=1	Peskin Chapter 1, Thomson Chapter 1	<none>
2022-01-31	Relativistic Kinematics (https://canvas.wisc.edu/courses/288710/files/24384626?wrap=1) ↓ https://canvas.wisc.edu/courses/288710/files/24384626/download?download_frd=1	Peskin Chapter 2, Thomson Chapter 2	Peskin 2.1-2.2, Thompson 2.1-2.14, Homework 2 (https://canvas.wisc.edu/courses/288710/files/24276442?wrap=1) (https://canvas.wisc.edu/courses/288710/files/24276442/download)
2022-02-02, 07	Waves, Particles, Anti-particles & Fields (https://canvas.wisc.edu/courses/288710/files/24415641?wrap=1) ↓ https://canvas.wisc.edu/courses/288710/files/24415641/download?download_frd=1	Peskin Chapter 3.1-3.3, Thomson 2.3, 4.1	Peskin Ch.3 and Thompson Ch.4, Homework 1 (https://canvas.wisc.edu/courses/288710/files/24276441?wrap=1) ↓ https://canvas.wisc.edu/courses/288710/files/24276441/download?download_frd=1
2022-02-07, 09	Symmetries and Quantum Numbers in Particle Physics (https://canvas.wisc.edu/courses/288710/files/24513135?wrap=1) ↓ https://canvas.wisc.edu/courses/288710/files/24513135/download?download_frd=1	PDG Section 15 (https://pdg.lbl.gov/2020/reviews/rpp2020-rev-quark-model.pdf) , Peskin Chapter 5, Thompson Chapter 9	Peskin 2.3-2.4, Thompson 9.1-10
2022-02-14, 16, 21, 23, 28, 03-02	QFT Lite (https://canvas.wisc.edu/courses/288710/files/24991688?wrap=1) ↓ https://canvas.wisc.edu/courses/288710/files/24991688/download?download_frd=1	I used Aitchison & Hey, IOP Publishing Chapter 3 of Peskin and Chapter 3 of Thompson include part of the content regarding calculations.	1) Verify step-to-step in the material presented. Some steps require work. If you are mathematically inclined I recommending calculating the propagator using your Green Function knowledge. 2) Peskin Chapter 3 or Thompson Chapter 3 problems.
2022-03-03	Gauge Principle (https://canvas.wisc.edu/courses/288710/files/24991699?wrap=1) ↓ https://canvas.wisc.edu/courses/288710/files/24991699/download?download_frd=1 (make up on Thursday evening)	Distributed in various sections - stick to slides	Homework 3 (https://canvas.wisc.edu/courses/288710/files/24276440?wrap=1) ↓ https://canvas.wisc.edu/courses/288710/files/24276440/download?download_frd=1
2022-03-07, 09, 10	Quantum Electrodynamics, Electron-Proton Scattering, Deep Inelastic Scattering (https://canvas.wisc.edu/courses/288710/files/25303834?wrap=1) ↓	Thompson 17.2, Peskin 8, 9	Enjoy the Spring Break

	https://canvas.wisc.edu/courses/288710/files/25303834/download?download_frd=1		
2022-03-21,23,28,30	No lectures - self study all of above and try to complete homework		A) Calculate $e^+ e^- \rightarrow f^+ f^-$, where f represents allowed fermions at that center of mass energy. Use ultra-relativistic limit for both initial and final state particles. or B) Use Madgraph to generate events for electron-positron and proton-proton interactions at high energy. Chose a process of interest, say production of muon-pairs at 91 GeV com for electron-positron and 13 TeV for proton-proton. Compare cross sections.
2022-04-04, 06	<u>Quantum Chromodynamics</u> https://canvas.wisc.edu/courses/288710/files/25599741?wrap=1 ↓ https://canvas.wisc.edu/courses/288710/files/25599741/download?download_frd=1	Peskin Chapter 11 and 12	
2022-04-11, 13, 18, 20, 25	<u>Electroweak Interactions and Higgs Mechanism</u> https://canvas.wisc.edu/courses/288710/files/25884968?wrap=1 ↓ https://canvas.wisc.edu/courses/288710/files/25884968/download?download_frd=1 https://canvas.wisc.edu/courses/288710/files/25599790?wrap=1	Peskin Section 3.3, Thompson Appendix E, Part of Appendix F, Peskin Chapter 15, 16, 17, 21	
2022-02-12, 19	<u>Interaction of Particles with Matter</u> https://canvas.wisc.edu/courses/288710/files/25886696?wrap=1 ↓ https://canvas.wisc.edu/courses/288710/files/25886696/download?download_frd=1	PDG Booklet	
2022-04-25, 05-02	<u>Neutrino Physics</u> https://canvas.wisc.edu/courses/288710/files/26163122?wrap=1 ↓ https://canvas.wisc.edu/courses/288710/files/26163122/download?download_frd=1	Seminar on Neutrino Physics	
2022-05-04	<u>Dark Matter</u> https://canvas.wisc.edu/courses/288710/files/26163126?wrap=1 ↓ https://canvas.wisc.edu/courses/288710/files/26163126/download?download_frd=1	Seminar on Dark Matter : CMS & LZ	