

| Prof. Yuri Kamyshkov | | | P626 Syllabus | | Fall 2021 |
|----------------------|-----|--------|--|--------|------------------------------|
| kamyshkov@utk.edu | | | Note, syllabus can be modified | | Modified August 13, 2021, YK |
| L# | Day | Date | Topic | HW due | Comments |
| 1 | W | 18-Aug | 1.Intro. Constants. Natural Units | | |
| 2 | F | 20-Aug | 2.1 Special Relativity refresher | | |
| 3 | M | 23-Aug | 2.2 Special Relativity refresher | | |
| 4 | W | 25-Aug | 3.1 Lagrangian. Scalar field. Complex scalar | HW1 | |
| 5 | F | 27-Aug | 3.2 Complex scalar | | |
| 6 | W | 1-Sep | 4.1 Interactions. Feynman rules | HW2 | |
| 7 | F | 3-Sep | 4.2 Feynman rules, Crossing Sym | | |
| 8 | M | 6-Sep | 5. Gauge Invariance | | |
| 9 | W | 8-Sep | 6. Isotope Spin. Non-Abelian Gauge Theories | HW3 | |
| 10 | F | 10-Sep | 7. Spinors and Dirac Equation | | |
| 11 | M | 13-Sep | 8.1 5-bilinear covariants, C,P,T for fermions | | |
| 12 | W | 15-Sep | 8.2 C,P,T for fermions, Left-Right fermions | HW4 | |
| 13 | F | 17-Sep | 9. \mathcal{L} for fermions. \mathcal{L} of Standard Model | | |
| 14 | M | 20-Sep | 10. Standard Model \mathcal{L} - discussion | | |
| 15 | W | 22-Sep | 11. Leptons and Quarks first generation | HW5 | |
| 16 | F | 24-Sep | 12.1 Higgs Mechanism | | |
| 17 | M | 27-Sep | 12.2 Higgs Mechanism | | |
| 18 | W | 29-Sep | 13. More on Higgs Mechanism | HW6 | |
| 19 | M | 4-Oct | 14. S-Matrix, Probability, Decays | | |
| 20 | W | 6-Oct | 15. Scattering, Cross Sections | HW7 | |
| 21 | F | 8-Oct | 16. Decay of W and Z | | |
| | Sun | 10-Oct | Mid-term take-home Test due Oct 10 at 11:59 pm | | |
| 22 | M | 11-Oct | 17. Muon decay. Parameters of SM. | | |
| 23 | W | 13-Oct | 18. e^+e^- Collider. Hadron Collider. | HW8 | |
| 24 | F | 15-Oct | 19. Quantum numbers for hadrones. | | |
| 25 | M | 18-Oct | 20. ν number, sources, detection, oscillations. | | |
| 26 | W | 20-Oct | 21. ν mass, Majorana, $2\beta 0\nu$, hierarchy, MSW, CPV | HW9 | |
| 27 | F | 22-Oct | 22. Coherent scat, relic ν , sterile ν , Beyond SM. | | |
| 28 | M | 25-Oct | 23. Quark States and Numbers | | |
| 29 | W | 27-Oct | 24. Neutron β decay | HW10 | |
| 30 | F | 29-Oct | 25. Quark decays, CKM matrix | | |
| 31 | M | 1-Nov | 26. Radiative corrections | | |
| 32 | W | 3-Nov | 27. BSM. Running Coupling Constants | HW11 | |
| 33 | F | 5-Nov | 28. Supersymmetry | | |
| 34 | M | 8-Nov | 29. Grand Unifications, PDK | | |
| 35 | W | 10-Nov | 30. Mechanisms Beyond Standard Model | HW12 | |
| 36 | F | 12-Nov | 31. Anomalies, BV, LV, (B-L)V | | |
| 37 | M | 15-Nov | 32. CPV, CPTV searches | | |
| 38 | W | 17-Nov | 32. Neutron Oscillations | HW13 | |
| 39 | F | 19-Nov | 33. Dark Matter | | |
| 40 | M | 22-Nov | 34. Mirror Matter | | |
| 41 | M | 29-Nov | 35. String theory | | |
| 42 | W | 1-Dec | Reserve | HW14 | |
| | M | 6-Dec | Final Exam 10:30 am - 12:45 pm | | |

Recommended resources and books: http://volweb2.utk.edu/~kamyshko/P626/P626_Resources_Books.pdf