

**PHYSICS 6313**  
Elementary Particle Physics  
FALL 2005  
University of Texas at Dallas

- INSTRUCTOR Roberto Vega  
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Telephone: 214-768-2498
- OFFICE HOURS Wednesdays 4-6 pm, and by arrangement.
- TEXT *Gauge Theories in Particle Physics* by I.J.R. Aitchison and A.J. Hey, Third Edition.
- GRADING The final course grade will be based entirely on homework problems.
- HOMEWORK Although homework is graded you are encouraged to help each other out and discuss the problems among yourselves.

**List of Topics**

1. Historical Review
2. The Role of Symmetries in Physics
3. Gauge Invariance and Electromagnetism
4. Particles and the Representations of the Poincare Group
5. The Action Principle and Path Integrals
6. Conservation Laws and Symmetries
7. The Standard Model Lagrangian
8. The Feynman Rules
9. Tree Level Calculations
10. Spontaneous Symmetry Breaking and the Higgs Particle
11. Future Outlook.

## References

1. A. Pais, "Subtle is the Lord", Chapter VI, Oxford Univeristy Press, New York, 1982. (A great historical reference on the developments and discoveries in particle physics.)
2. Pierre Ramond, "Field Theory, A Modern Primer", Benjamin/Cummings, 1981. (A very nice and condensed introduction to the basic ideas of Quantum Field Theory, we will be using material from the first four chapters.)
3. S. Weinberg, "The Quantum Theory of Fields", Cambridge, 1995. (The definitive reference on why Quantum Field Theory is the way it is. Weinberg starts with the basic postulates of Quantum Mechanics adds the requirements of special relativity and develops in a logical and progressive manner the formalism of QFT.)