SYLLABUS PHYS 1301 IDEAS OF MODERN PHYSICS

The deepest ideas of physics explained for non-scientists, without advanced math

Learn about things that go backwards in time or even stop time, that pass through walls or become invisible, about the beginning and end of the universe, how there is no force of gravity, no mass, no objective reality or absolute certainty in science.

Math requirements: Arithmetic (no algebra or calculus).

Physics requirements: None.

Language requirement: A good command of academic English.

Satisfies: Science requirement of the General Education Curriculum. Level I Pure & Applied Science Pillar and a Quantitative Reasoning Proficiency & Experience of the University Curriculum.

(The QR proficiency is taught through practical lab work; no advanced math is needed and all training in data analysis is provided on the course)

lecture: MW 1pm 158 FOSC lab: F 1pm/3pm 060 FOSC

Text: Ideas of Modern Physics (Kendall-Hunt), by S. Dalley

Objectives: *Upon successful completion of this course, students will be able to*

1) demonstrate basic facility with the methods and approaches of scientific inquiry
2) explain how the concepts and findings of modern physics shape our world
3) collect, organize and analyze data from a variety of sources
4) communicate and represent quantitative information or results numerically, symbolically, aurally, visually, verbally, or in writing.
5) test hypotheses and make recommendations or predictions based on results

Date	HW	Reading
Fri 1/17		LAB - **Math Workshop** **1.1** Numbers in Science
Mo 1/20		*MLK day - no class*
We 1/22		**Scientific Discovery**
Fr 1/24		LAB - **Measurement and Error** (manual)
Mo 1/27		**Classical Physics** **2.1** Space, Time, Motion
We 1/29		**Classical Physics** **2.2** Gravity
Fr 1/31		LAB - **Magnetic Particle Accelerator** (manual)
Mo 2/3	**A**	**Classical Physics** **2.3** Electricity & Magnetism
We 2/5		**Classical Physics** **2.4** Light: Into the Modern Era

Fr 2/7		LAB - **Speed of Light** (manual)
Mo 2/10	**B**	**Special Relativity** **3.1** Space, Time, Motion, Revisited
We 2/12		**Special Relativity** **3.2** Paradoxes (not)
Fr 2/14		LAB - **Introduction to Special Relativity** (manual)
Mo 2/17	**C**	**Special Relativity** **3.3** Energy and $E = mc^2$
We 2/19		**Special Relativity** **3.4** Space-Time
Fr 2/21		LAB - **More with Special Relativity** (manual)
Mo 2/24	**D**	**General Relativity** **4.1** Equivalence Principle
We 2/26		**General Relativity** **4.2** Time Dilation and Light Bending
Fr 2/28		LAB - **Free Fall** (manual)
Mo 3/3	**E**	**General Relativity** **4.3** Curved Space-Time
We 3/5		**General Relativity** **4.4** Structure of the Universe
Fr 3/7		LAB - **Hubble's Law** (manual)
	Spring Break	
Mo 3/17	**F**	**Quantum Mechanics** **5.1** Wave-Particle Duality of Light
We 3/19	**F**	**Mid-term In-class Essay**
Fr 3/21		LAB - **Diffraction** (manual)
Mo 3/24		**Quantum Mechanics** **5.2** Probability & Uncertainty
We 3/26		**Quantum Mechanics** **5.3** Matter Waves
Fr 3/28		LAB **- Probability** (manual)
Mo 3/31	**GH**	**Atoms** **6.1** Structure and Properties
We 4/2		**Atoms** **6.2** Quantized Energy
Fr 4/4		LAB **- Hydrogen Spectrum** (manual)
Mo 4/7	**I**	**Atoms** **6.3** The Nucleus
Tu 4/8	*Drop date*	
We 4/9		**Atoms** **6.4** Condensed Matter
Fr 4/11		LAB **- Radioactivity** (manual)
Mo 4/14	**J**	**Quantum Mechanics** **5.4** Quantum Measurements
We 4/16		**Final In-class Essay**
Fr 4/18	*Good Friday - No Class*	
Mo 4/21		**Synthesis** **7.1** Space-Time Revisited
We 4/23		**Synthesis** **7.2** Particles and Force-Fields
Fr 4/25		LAB - **"Copenhagen" movie** (wikipedia)
Mo 4/28	**K**	**Synthesis** **7.3** The Standard Model
We 4/30		**Synthesis** **7.4** Unsolved Mysteries
Fr 5/2		LAB - **Particle Identification** (webpage)
Mo 5/5	**L**	Review
Sa 5/10		**Final Exam 11:30am-2:30pm**