Class List

Mechanics Courses

Physics 1250H: Honors Mechanics and Conservation Laws; Special Relativity **AU 2022**

Instructor(s): Roland Kawakami and Richard Leonard *5 cr.*

- Topics: *Study of classical mechanics including Newton's laws, conservation laws, and introduction to special relativity.*
- Textbook: `Six Ideas that Shaped Physics: Unit C, Unit N, Unit R` by Thomas A. Moore.

Physics 2300: Intermediate Mechanics I **AU 2023**

Instructor(s): Michael Lisa and Andrew Dougherty *4 cr.*

- Topics: *Vectors and kinematics; foundations of Newtonian mechanics; momentum, work, and energy; conservative and nonconservative forces; potentials; angular momentum; rotation about a fixed axis; rigid body motion. Introduction to Mathematica.*
- Textbook: `Introduction to Classical Mechanics` by David Morin, `Basic Training in Mathematics: A Fitness Program for Science Students` by Ramamurti Shankar.

Physics 2301: Intermediate Mechanics II **SP 2024**

Instructor(s): Antonio Boveia *4 cr.*

- Topics: *Generalized angular momentunm; inertia tensors; precession; fictitious forces. The special theory of relativity; relativistic kinematics; relativistic momentum and energy. Introduction to general relativity. More rigorous use of Mathematica.*
- Textbook: `Introduction to Classical Mechanics` by David Morin, `Basic Training in Mathematics: A Fitness Program for Science Students` by Ramamurti Shankar.

Electricity and Magnetism Courses

Physics 1251H: Honors E&M; Thermal Physics, Waves, and Quantum Physics **SP 2023**

Instructor(s): Samir Mathur and Richard Leonard *5 cr.*

- Topics: *Electricity and magnetism including Maxwell's equations, thermodynamics, quantum mechanics.*
- Textbook: `Six Ideas that Shaped Physics: Unit E, Unit Q, Unit T` by Thomas A. Moore.

Physics 5400H: Honors Intermediate Electricity and Magnetism I **AU 2024**

Instructor(s): Alexandra Landsman *4 cr.*

- Topics: *Electrostatic fields; dielectrics; boundary-value problems; magnetic fields of steady currents; induction; Maxwell's equations; plane waves.*
- Textbook: `Introduction to Electrodynamics` by David Griffiths.

Quantum Courses

Physics 5500H: Honors Quantum Mechanics I **AU 2024**

Instructor(s): Samir Mathur *4 cr.*

- Topics: *Quantum mechanics and its history; the Schrödinger equation; solutions of one-dimensional scattering; Bound state problems; Dirac notation.*
- Textbook: `Introduction to Quantum Mechanics` by David Griffiths and Darrell Schroeter.

Lab Courses

Physics 3700: Experimental Physics Instrumentation and Data Analysis **SP 2024**

Instructor(s): K. K. Gan and Richard Leonard *3 cr.*

- Topics: *Construction, simulation and statistical analysis of data from advanced experiments in nuclear processes. Introduction to advanced instrumentation and computer controlled data acquisition.*
- Lab Topics: *Uncertainties and propagation of errors; Radioactive liquids and solids with NaI Calorimeter; Spectroscopy; Probability Distributions; Statistical analysis of collected data; Experiment through computer simulation.*
- Textbook: `An Introduction to Error Analysis` by John Taylor. Various lecture notes: `https://www.asc.ohio-state.edu/gan.1/teaching/spring24/3700.html`.

Physics 5680: Big Data Analytics in Physics **AU 2024**

Instructor(s): Richard Hughes *3 cr.*

- Topics: *Introduction to machine learning and advanced algorithms. Emphasis on practical physics-based applications, using publicly available data sets.*
- Lab Topics: *To Be Announced*
- Textbook: `Hands-on Machine Learning With Scikit-learn, Keras, and Tensorflow by Aurélien Géron`.

Astrophysics Courses

Astronomy 2291: Basic Astrophysics and Planetary Astronomy — AU 2024

Instructor(s): Krzysztof Stanek — *3 cr.*

- Topics: *Motions and physical nature of objects in the solar system; electromagnetic radiation, telescopes, and astronomical detectors*
- Textbook: `Foundations of Astrophysics by Barbara Ryden and Bradley M. Peterson`.