Raphael Esquivel

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Transcript of Mathematics and Physics Coursework

Lecture notes for some classes can be found at:
http://raffle.github.io/notes.

Harvey Mudd

Mathematics — Algebra

A **MATH 196**, *Algebraic Geometry: Scheme Theory*, Fall 2025, Dagan Karp

Readings in graduate algebraic geometry. Introduction to the language of schemes and properties of morphisms. Sheaves, construction of schemes and morphisms between them, affine and projective schemes.

Textbook: Vakil's *Rising Sea* (1-11).

A **MATH 171**, *Abstract Algebra I*, Fall 2025, Haydee Lindo

Groups, group actions, rings/ideals, isomorphism theorems, Sylow's theorem, representations.

Textbook: Dummit & Foote (1-5, 7-9).

Mathematics — Analysis

A **MATH 165**, *Numerical Analysis*, Fall 2025, Jamie Haddock

Numerical stability, nonlinear/linear solver theory, spectral decomposition algorithms, polynomial and Fourier approximation, Gaussian quadrature.

Textbook: Burden & Faires' *Numerical Analysis*.

Mathematics — Probability & Statistics

MATH 157, *Intermediate Probability*, Spring 2026, Harrison Li

Continuous random variables, distribution functions, joint density functions, marginal and conditional distributions, functions of random variables, conditional expectation, covariance and correlation, moment generating functions, law of large numbers, Chebyshev's theorem, and central-limit theorem.

Physics

PHYS 187, *Quantum Field Theory*, Spring 2026, Kevin Setter

PHYS 172, *General Relativity and Cosmology*, Spring 2026, Rahulkumar Solanki

The principle of equivalence, Riemannian geometry, and the Schwarzschild and cosmological solutions of the field equations.

Arizona State University

Physics

A+ **PHY 302**, *Mathematical Methods in Physics II*, Fall 2024, Tanmay Vachaspati

Vector calculus, complex analysis, partial differential equations, Sturm-Liouville theory, special functions, numerical methods.

Textbook: None.

A+ **PHY 361**, *Introductory Modern Physics*, Fall 2025, Ricardo Alarcon

Special relativity and introductory quantum theory with applications drawn from atomic, nuclear, and solid-state physics.

Textbook: None.

A **PHY 311**, *Classical Particles, Fields, and Matter II*, Spring 2025, Damien Easson

Electrostatics, potential problems in 3D, boundary value problems, Poisson and Laplace equations, multipole expansion, magnetic fields and materials, magnetic induction, Faraday's Law, displacement current, Maxwell's equations.

Textbook: Griffiths (1-7).

A+ **PHY 315**, *Quantum Physics II*, Spring 2025, Siddarth Karkare

General principles of quantum mechanics, 3-dimensional bound and scattering problems, approximation methods, time-dependent perturbation theory, spin, angular momentum, relativistic corrections, many-particle systems.

Textbook: Griffiths (7-12).