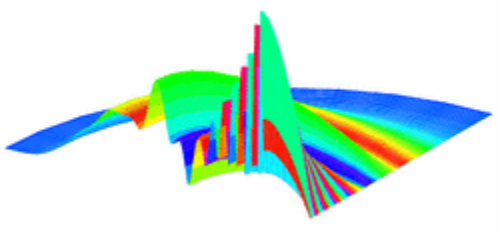
Physics 566 Quantum Dynamics

Spring 2026 (Tu, Th 2:00-3:20)

Instructor: Tom Weinacht A102, 2-8163

thomas.weinacht@stonybrook.edu



This course covers quantum mechanics from a dynamical perspective – i.e. solutions to the *time dependent* Schrödinger equation. It explores how measurements of time dependent systems are made, and develops approaches to solving the time dependent Schrödinger equation for arbitrary potentials and driven systems.

Topics

Atomic and Molecular Structure
Light Matter Interaction
Numerical Solutions to the Time Dependent Schrödinger Equation
One Dimensional Dynamics (Wave Packets)
Measuring One Dimensional Dynamics (Time Resolved Spectroscopy)
Multidimensional Dynamics (Dephasing, Decoherence...)
Strong Field Light Matter Interactions (Adiabatic elimination, Multiphoton coupling)

Textbooks

Time Resolved Spectroscopy: An Experimental Perspective, by Brett Pearson and Thomas Weinacht
Introduction to Quantum Mechanics: A Time Domain Perspective, by David Tannor

Grading

Homework - 40%
Midterm Exam - 20%
Project - 10%
Final Exam - 30%

The problem sets and exams will consist of both analytical problems as well as computer based assignments involving simulations and numerical solutions to coupled differential equations.

If you have a physical, psychological, medical, or learning disability that may impact your course work, please contact the Student Accessibility Support Center, Stony Brook Union Suite 107, (631) 632-6748, or at sasc@stonybrook.edu. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty is required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Professions, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty please refer to the academic judiciary website at http://www.stonybrook.edu/commcms/academic_integrity/index.html

Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Student Conduct and Community Standards any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures. Further information about most academic matters can be found in the Undergraduate Bulletin, the Undergraduate Class Schedule, and the Faculty-Employee Handbook.