Spring Semester, 2019

PHYSICS 619 - Modern Computational Physics

Instructor:	S. A. Chin
Office:	MPHY 407
Office Hours:	Mon 2-5; Tues 2-4 pm and by appointments
Phone/email:	845-4190, chin@physics.tamu.edu
Website:	http://faculty.physics.tamu.edu/chin/
Dept. phone:	845-7717

Require textbook: None.

Recommended Reference:

Computational physics : problem solving with computers R. H. Landau, 1997
Online access via Evan; C and Fortran program examples
Computer Simulation Methods, 3rd ed., by H. Gould and J. Tobochnik, free online.

Grades: Weekly project assignments: 100%

Course description

This course seeks to introduce students to a unified, physics-based, numerical approach for doing important computations in all areas of simulation and research. Programming in Fortran, C, Java or other languages can be learned at the same time.

Weekly course schedule:

Classical Dynamics

week	1 :	Trajectory simulation - The Kepler Problem
week	2 :	Symplectic algorithms
week	3 :	The restricted 3-body problem and chaos
week	4 :	Magnetic field trajectories
week	5 :	Molecular dynamics simulations.

Stochastic Dynamics

week	6 :	Integration and MC integrations.
week	7 :	Importance sampling and Markov processes.
week	8 :	Metropolis algorithms and VMC
week	9 :	Langevin algorithms and VMC

Quantum Dynamics

week	10:	The radial Schrodinger equation as classical dynamics.
week	11:	Solving the time-dependent Schrödinger equation.
week	12:	Diffusion Monte Carlo algorithm
week	13:	Path Integral MC algorithm.
week	14:	Quantum Computation
week	15:	The Shor and Grover algorithms

ADA statement

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Department of Student Life, Services for Students with Disabilities, in Room B118 of Cain Hall or call 845-1637.

Academic Integrity Statement:

The Aggie Honor Code is "An Aggie does not lie, cheat, or steal or tolerate those who do." For more information, refer to the Honor Council Rules and Procedures on the web at http://www.tamu.edu/aggiehonor.