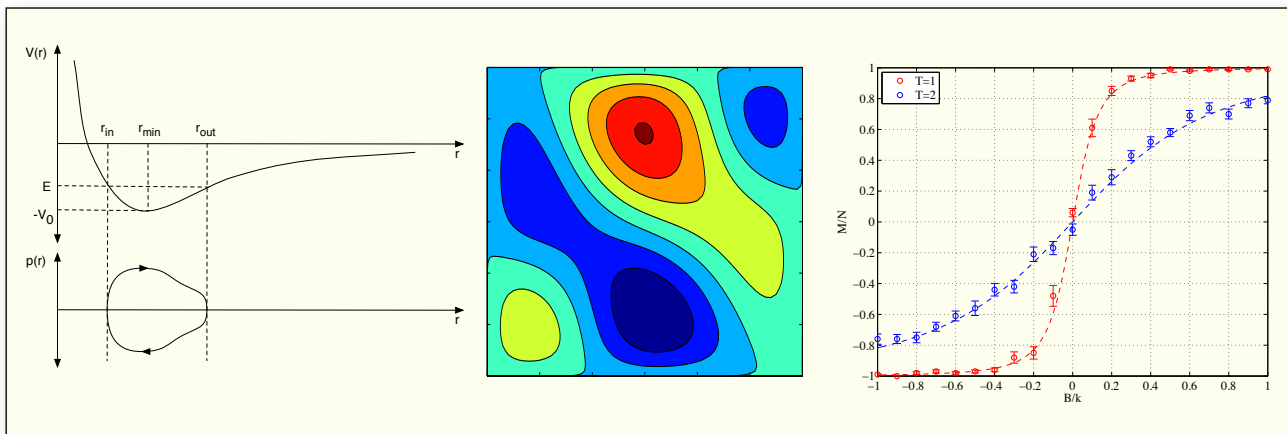


Phys 496 - Computational Physics

Fall 2011



Course description: There are certain types of problems in physics which do not have trivial analytical solutions but can be easily solved using numerical methods. In this course, you will learn how to approach these kinds of problems using computational methods, which can be applied to science and engineering in general.

Instructor: Taylan Akdoğan (KB 331K, taylan.akdogan@boun.edu.tr)

Topics to be covered:

- Linear algebraic equations,
- Matrix inversion,
- Numerical integration,
- Numerical solution of ODE,
- Root finding,
- Minimization-maximization of generalized functions,
- Eigensystems,
- Modeling of data - least square fitting,
- Interpolation and extrapolation in multi-dimensions,
- Random numbers and introduction to the Monte Carlo methods.
- Introduction to finite element method.

Example applications to be covered:

- Semiclassical quantization of molecular vibration,
- Statistical systems: Ising model in 1D and 2D.

Course load: We will meet twice every week. About 3/4 of the classes will be discussed on the board and/or through the computer projector, the rest will be dedicated for hands-on exercises. Total of 13 homework and 2 term projects will be assigned. No in-classroom exams will be given.

Prerequisites and admission: Basic knowledge of any programming language is required. Phys 221, Phys 311 and Phys 325/326 are recommended but not required. You have to see the instructor before requesting consent, otherwise it will be declined. Up to 12 students will be allowed to take this course such that one-to-one study will be feasible.

Schedule: To be arranged according to your schedules.