## PHY 381C COMPUTATIONAL PHYSICS SYLLABUS (tentative)

# (tentative)

# Fall 2019 Unique #: 55060 T-TH 2:00-3:30 p.m., RLM 5.120

**INSTRUCTOR:** Prof. Alex Demkov, office RLM 13.206, Phone: (512) 471-8560 E-mail: <u>demkov@physics.utexas.edu</u> **OFFICE HOURS:** Monday 2-4 p.m. and by appointment

#### Course web page: <a href="https://web2.ph.utexas.edu/classes/demkov/phy381C/">https://web2.ph.utexas.edu/classes/demkov/phy381C/</a>

### Textbook:

• Tao Pang, "An Introduction to Computational Physics", 2<sup>nd</sup> edition, Cambridge University Press, 2006.

### **Reference Books:**

- P. Harrison, "Computational methods in physics, chemistry and biology", Wiley, 2001.
- R. H. Landau and M.J. Pàez, "Computational Physics", Wiley, 2<sup>nd</sup> Ed. 2007.
- M.P. Allen and D.J. Tildesley, "Computer simulation of liquids" Clarendon Press, 1992.
- A. Gilat, and V. Subramanian, "Numerical Methods for Engineers and Scientists", Wiley 2007.
- D. M. Smith, "Engineering Computation with MATLAB", Pearson Education, 2008.
- W. H. Press, S.A. Teuklosky, W.T.Vetterling, B.P. Flannery, "Numerical Recipes in Fortran 90", 2<sup>nd</sup> edition, Cambridge University Press, 1996.

### Grading:

Two in-class midterms: X% each Two projects: X% each A project will be used for a final exam: X%

#### Homework:

A few homework assignments will be given. HW will not be graded.

#### Languages: MATLAB

# Syllabus:

Lecture 1	Introduction
Lectures 2&3	Fitting and Interpolation
Lectures 4&5	System of Linear Equations
Lectures 6&7	Linear System and Matrices
Lectures 8&9	Matrix Computation
Lecture 10	Matrix Computation
	Lecture 1 Lectures 2&3 Lectures 4&5 Lectures 6&7 Lectures 8&9 Lecture 10

## **October 3, First Midterm**

The week of October 6	Lectures 11&12	Numerical Calculus
The week of October 13	Lectures 13&14	Optimization
The week of October 20	Lectures 15&16	Ordinary Diff. Equations
The week of October 27	Lectures 17&18	Ordinary Diff. Equations
The week of November 3	Lectures 19&20	Partial Diff. Equations

## November 12, Second Midterm

The week of November 10	Lecture 21	Partial Diff. Equations
The week of November 17	Lectures 22&23	Molecular Dynamics
The week of November 24	Lecture 24	Molecular Dynamics
The week of December 1	Lectures 25&26	Special Topics

## November 12, Final Project is announced

## December, Final Project is due

**Projects (announced September 11):** 

Project 1 due October 9 Project 2 due November 6