King Saud University
College of Sciences
Physics and Astronomy Department

Syllabus

Computational Physics

PHYS-400

Textbook: Introductory Computational Physics, Andi Klein and Alexander Godunov, 2006, Cambridge university press.
References: Computational Physics with Python, Eric Ayars, 2013, California State University.

List of Topics	No. of Weeks
1. Introduction o The need for computers in science. o What is computational physics? o Operating systems and programming languages.	2
2. Interpolation o Linear interpolation o Polynomial interpolation o Lagrange interpolation	2
3. Numerical differentiation o Forward difference o Central difference and higher order methods o Higher order derivatives	2
4. Numerical Integration o Rectangular method o Trapezoid method o Simpson method	2
5. Solution of nonlinear equations o Bisection method o Newton's method o Method of secants	2
6. Differential equations o Euler method o Numerical errors and instabilities o Runge-Kutta method	3
7. Monte-Carlo methods o Random number generators o Distribution functions	2
Total	15