

Master Course Syllabus
School of Engineering and Computer Science
Washington State University Vancouver
CS 330
Numerical Computing
3 Semester Hours
(3 lecture hours)

Catalog Description

Power and limitation of numerical solutions; design, analysis and implementation of numerical algorithms; visualization and rendering.

Prerequisite Courses

- Math 172 (or Math 182) with a C or better
- Math 220 with a C or better and
- CS 261 with a C or better or
- CS 251 with a C or better

Prerequisite Topics

- Experience with the C programming language
- Use of Unix environment for coding, compilation, debugging and testing
- Differential and integral calculus, Taylor's Theorem
- Systems of linear equations and matrix operations

Measured Course Outcomes

Students taking this course will:

1. Identify the sources of error in numerical programs and algorithms. (Contributes to performance criterion 1-b.)
2. Demonstrate understanding of various numerical methods. (Contributes to performance criterion 6-c.)

Covered Course Outcomes

Students taking this course will also:

1. Estimate error in numerical calculations (Relevant to performance criteria 6-a)

Required Textbooks

Numerical Mathematics and Computing, by Ward Cheney and David Kincaid, Thomson.

or

Numerical Methods: Algorithms and Applications, by Laurene Fausett

Reference Material

GNU Plotting Utilities online documentation.

Major Topics Covered in the Course

1. Machine representation of numbers
2. Sources of error, solution stability and convergence
3. Curve fitting and approximation
4. Two dimensional plotting
5. Finding roots of equations
6. Interpolation and numerical differentiation
7. Numerical Integration
8. Solving systems of linear equations
9. Solution methods for ordinary and partial differential equations

Projects

Programming Project Area	Weeks
(Small Assignments, See Below)	

Design, Implementation, and Analysis

This course requires the student to correctly implement 5-8 numerical algorithms. The student must also analyze numerical operations to identify sources of error and place bounds on total numerical error.

CS2013

This course provides coverage of CS2013 knowledge areas. Values listed are minimum course hours dedicated to the topic, percentages indicate the fraction of CS2013 knowledge area topics covered (acceptable values are: <25%, 25-75%, >75%, or 100%).

Area	Tier 1	Tier 2	Elective
AL/Advanced Data Structures Algorithms and Analysis			2 (<25%)
AR/Machine Level Representation of Data		1 (25-75%)	
CN/Modeling and Simulation			1 (<25%)
CN/Processing			1 (<25%)
CN/Numerical Analysis			12 (100%)

Course Coordinator:	Paul Bonamy
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