

**CST-302**

**COURSE DESCRIPTION**

<b>Course code number</b>	CST-302	<b>Course Title</b>	Mathematics of Computing III
<b>Semester hours</b>	4 hours	<b>No. of Credit Units</b>	3
		<b>Course Coordinator</b>	

**Course Description**

This course covers matrices, vectors, determinants, linear systems, matrix eigenvalue problems, mathematical software design considerations, rudiments of floating point arithmetic, systems of linear equations, interpolation and data fitting, integration and quadrature, linear least squares and regression.

**Course Outcomes**

Students will be able to:

1. Know the important characteristics of matrices, concepts of vector spaces and properties of special categories of matrices.
2. Know how to use characteristics of a matrix to solve a linear system of equations or study properties of a linear transformation.
3. Acquire a working knowledge of algorithms for approximating solutions of scientific computing problems.

**Major Topics Covered in the Course**

1. Matrices, Vectors, Determinants. Linear Systems
2. Matrices Eigen Value Problems
3. Solution of Equations by Iteration
4. Interpolation
5. Numeric Integration and Differentiation

**Assessment Plan for the Course**

<b>Class Attendance and Participation</b>	-	10%
Quizzes	-	10%
Assignment	-	10 %
Test	-	10%
Final Exam	-	60%

## **Class Attendance and Participation Policy:**

- **Attendance**

Class attendance is **mandatory**. Most of the material you will learn will be covered in the lectures, so it is important that you not miss any of them. You are expected to show up **on time** for class, and **stay for the whole lecture**. Students are expected to attend each class, to complete any required preparatory work (including assigned reading) and to participate actively in lectures, discussions and exercises.

- Mobile phones **must** be silenced and put away for the entire lecture unless use is specified by the instructor. You may not make or receive calls on your cell phone, or send or receive text messages during lectures.
- You are responsible for all material sent as email. Ignorance of such material is no excuse. You are responsible for all materials presented in the lectures.
- Your conduct in class should be conducive towards a positive learning environment for your class mates as well as yourself.

- **Quizzes, assignments, tests and Exam**

Your performance in this class will be evaluated using your scores for attendance, quizzes, homework assignments, two tests and one final examination. There are no planned extra credit projects or assignments to improve your grade.

We will take a short quiz for every lecture.

There will be 12 homework assignments, roughly one per week. Please show all your work and write or type your assignments neatly. Credit cannot be given for answers without work (except on true-false, always-sometimes-never, or other multiple choice questions).

Test will start after two or three chapters finished and the coordinator will announce the date for the test.

Any assignment or quiz or test is simply missed, regardless of the reason why (e.g. illness, work, traffic, car trouble, computer problems, death, etc.), and **earns a grade of zero**. You are strongly encouraged to complete all assignments and attend all quizzes so that you can check that you understand the material and can throw out bad grades, or grades for which you had to miss an assignment or quiz for a valid reason. **Late submissions will not be accepted for any graded activity for any reason.**

- **There are no extra credit opportunities.**

Students may not do additional work nor resubmit any graded activity to raise a final grade.

- **Exam**

The exam will be conducted on-campus, in a classroom. The dates/times/locations will be posted on Board as soon as possible.

For this course, the following additional requirements are specified:

All work submitted for a grade must have been prepared by the individual student. Students are expressly prohibited from sharing any work that has been or will be submitted for a grade, in progress or completed, for this course in any manner with a person other than the instructor and teaching assistant(s) assigned to this course). Specifically, students may not do the following, including but not limited to:

- Discuss questions, example problems, or example work with another person that leads to a similar solution to work submitted for a grade.
- Give to, show, or receive from another person (intentionally, or accidentally because the work was not protected) a partial, completed, or graded solution.
- Ask another person about the completion or correctness of an assignment.
- Post questions or a partial, completed, or graded solution electronically (e.g. a Web site).
- All work must be newly created by the individual student for this course. Any usage of work developed for another course, or for this course in a prior semester, is strictly prohibited without prior approval from the instructor.
- Posting or sharing course content (e.g. instructor provided lecture notes, assignment directions, assignment questions, or anything not created solely by the student), using any non-electronic or electronic medium (e.g. web site, FTP site, any location where it is accessible to someone other than the individual student, instructor and/or teaching assistant(s)) constitutes copyright infringement and is strictly prohibited without prior approval from the instructor.

### Tentative Lesson

No	Topics	Week	Remark
I	<b>Chapter 7 Linear Algebra: Matrices, Vectors, Determinants. Linear Systems</b>		
1	7.1 Matrices, Vectors: Addition and Scalar Multiplication	Week 1	
2	7.2 Matrices Multiplication		Assignment 1
3	7.3 . Linear Systems of Equations. Gauss Elimination	Week 2	Assignment 2
4	7.4 Linear Independent. Rank of a Matrix. Vector Space	Week 3	Assignment 3
5	7.6 For Reference : Second- and Third-Order Determinants	Week 4	
6	7.7 Determinants. Cramer's Rule		Assignment 4
7	7.8 Inverse of a Matrix. Gauss-Jordan Elimination	Week 5	Assignment 5
II	<b>Chapter 8 Linear Algebra: Matrices Eigen Value Problems</b>		
8	8.1 The Matrix Eigenvalue Problem. Determining Eigenvalues and Eigenvectors	Week 6	Assignment 6
9	8.3 Symmetric, Skew-Symmetric and Orthogonal Matrices	Week 7	
	<b>Test I</b>		<b>Test I</b>
III	<b>Chapter 19 Numerics in General</b>		
10	19.1 Introduction	Week 8	
11	19.2 Solution of Equations by Iteration		Assignment 7
12	19.3 Interpolation	Week 9	Assignment 8
13	19.5 Numeric Integration and Differentiation	Week 10	Assignment 9
IV	<b>Chapter 20 Numeric Linear Algebra</b>		
14	20.2 Linear Systems: LU-Factorization, Matrix Inversion	Week 11	Assignment 10
15	20.3 Linear Systems: Solution by Iteration	Week 12+13	
16	20.4 Linear Systems: Ill-Conditioning, Norms		Assignment 11
17	20.5 Least Squares Method	Week 14	
18	20.6 Matrix Eigenvalue Problems: Introduction		
19	20.7 Inclusion of Matrix Eigenvalues		Assignment 12
20	20.8 Power Method for Eigenvalues	Week 15	
	<b>Test II</b>		<b>Test II</b>