University of Computer Studies
B.C.Sc. / B.C.Tech. (Third Year)

CST-302

COURSE DESCRIPTION

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

Course Description

First part of the course covers Fourier Series, Arbitrary Period. Even and Odd Functions. Half-Range Expansions, Fourier Integral, Fourier Cosine and Sine Transforms.

Second part of the course covers Complex Numbers and Their Geometric Representation, Polar Form of Complex Numbers. powers and roots, Derivative. analytic function, Cauchy–Riemann Equations. Laplace's equation, exponential function, trigonometric and Hyperbolic Functions. Euler's Formula, Logarithm. General Power. Principal Value.

Last part of the course covers data representation: average, spread, experiments, Outcomes, Events, probability, permutations and combinations, random variables. probability distributions, mean and Variance of a distribution, binomial, Poisson, and Hypergeometric distributions, normal distribution.

Course Outcomes

After completion of Fourier Analysis, students will be able to:

1. Know how to derive a Fourier series of a given periodic function by evaluating Fourier coefficients.
2. Understand the nature of the Fourier series that represent even and odd functions and how derivation of a Fourier series can be simplified in this way.
3. Expand an odd or even function as a half-range cosine or sine Fourier Series.
4. Obtain the complex exponential Fourier series of a function and know how the complex Fourier coefficients are related to the Fourier cosine and sine coefficients.
5. Understand that if a Fourier Series is constructed to represent an arbitrary function over a given range then the series represents that function periodically extended beyond that range.

After completion of Complex Analysis**,** students will be able to:

1. Justify the need for a Complex Number System and explain how is related to other

existing number systems

2. Define a function of complex variable and carry out basic mathematical operations withcomplex numbers.

3. Know the condition(s) for a complex variable function to be analytic and/or harmonic.

4. State and prove the Cauchy Riemann Equation and use it to show that a function is analytic.

After completion of Probability and Statistics, students will be able to:

1. Understand the concepts of a random variable and a probability distribution.

2. Distinguish between discrete and continuous random variables.

3. Compute and interpret the expected value, variance, and standard deviation for a discrete random variable.

4. Compute probabilities using a binomial probability distribution and a Poisson probability distribution.

5. Understand the difference between how probabilities are computed for discrete and continuous random variables.

6. Know how to compute probability values for a continuous uniform probability distribution and be able to compute the expected value and variance for such a distribution.

7. Compute probabilities using a normal and an exponential probability distribution. Understand the role of the standard normal distribution in this process.

Assessment Plan for the Course

Class Attendance and Participation	-	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 11 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.

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Tentative Lesson

No	Topics	Week	Remark
I	**Chapter 11 Fourier Analysis**		
1	11.1 Fourier Series	Week 1	Assignment 1
2	11.2 Arbitrary Period. Even and Odd Functions. Half-Range Expansions	Week 2+3	Assignment 2
3	11.7 Fourier Integral	Week 4	Assignment 3
4	11.8 Fourier Cosine And Sine Transforms	Week 5+6	Assignment 4
II	**Chapter 13. Complex Numbers and Functions. Complex Differentiation**		
5	13.1Complex Numbers and Their Geometric Representation	Week 7	
6	13.2 Polar Form of Complex Numbers. Powers and Roots		Assignment 5
7	13.3 Derivative. Analytic F unction	Week 8	
8	13.4 Cauchy-Riemnn Equations. Laplace's Equations		Assignment 6
9	13.5 Exponential Function	Week 9	
10	13.6 Trigonometric and Hyperbolic Functios. Euler's Formula, Review Problems.		
	Test I		
III	**Chapter 24 Data Analysis. Probability Theory 1011 Probability and Statistics**		
11	24.1 Data Representation. Average. Spread	Week 10	
12	24.2 Experiments, Outcomes Events		Assignment 7
13	24.3 Probability	Week 11	
14	24.4 Permutations and Combinations		Assignment 8
15	24.5 Random Variables. Probability Distributions	Week 12	Assignment 9
16	24.6 Mean and Variance of a Distribution	Week 13	Assignment 10
17	24.7 Binomial, Poisson, and Hypergeometric Distributions	Week 14	Assignment 11
18	24.8 Normal Distribution	Week 15	
	Test II		
	Revision		