Mathematics 4 Course Specifications

Faculty: Computer and Informatics
Department: Scientific Computing

Program(s) on which the course is given	:	Bachelor in Computer and Information Sciences
Major or Minor element of programs	:	All majors
Department offering the program	:	Scientific Computing
Department offering the course	:	Basic Sciences
Academic year / Level	:	second Year./B.Sc.
Date of specification approval	:	

A. Basic Information

Title: Mathematics 4   **Code:** BSC 228

Lectures: 4 hrs/week   **Tutorial:** 3 hrs/week   **Practical:** ---

Credit Hours: ---   **Total:** 7 hrs/week

B. Professional Information

1. Overall Aims of Course:

The aim of the course is to provide students and graduates to the Integral Calculus, infinite Series, and ordinary differential equations, and their applications..

2. Intended Learning Outcomes of Course (ILOs):

a. Knowledge and Understanding:

a1. Be familiar with the different methods and rules of integration including finite and improper integrals
a2. Define the limit of a sequence.
a3. Find the limit of a wide class of sequences.
a4. Decide on convergence or divergence of a wide class of series.
a5. Know that a power series has a radius of convergence, and to know how to find it.
a6. Understand the methods of solving different classes of ordinary differential equations and their applications.
a7. Demonstrate basic knowledge and understanding of a core of analysis, algebra, applied mathematics and statistics.
a8. Demonstrate strong knowledge of computational methods.

b. Intellectual Skills:

    b1. Analyze and apply the methods of integration, series summations and tests of convergence

    b2. Apply to analyze, compare, and select appropriate techniques to solve ordinary differential equations

    b3. Defining problems in precise scientific way.

    b4. Summarizing problems, proposed solutions and their results.

c. Professional and Practical Skills:

    c1. Use techniques of integration, infinite Series, and ordinary differential equations in solving practical problems

    c2. Explore, and where feasible solve, mathematical problems, by selecting appropriate techniques.

    c3. Use of standard numerical recipes and mathematical libraries in problem solving.

d. General and Transferable Skills:

    d1. Manage time effectively.

    d2. Present a clear, logical argument.

    d3. Work independently.

    d4. The ability to evaluate systems in terms of general and specific quality attributes.

e. Attitude:

    e1- A knowledge and respect of ethics and ethical standards in relation to a major area of study.

    e2- Relationship Emphasis a successful with other students.

    e3- Learn how to make relation with other, and the limit of this relation.

3. Contents:

Topic	No. of hours	Lecture	Tutorial/Practical
Second and higher-order differential equations. Applications of second-order differential equations with constant coefficients (Part I)	7	4	3
Second and higher-order differential equations. Applications of second-order differential equations with constant coefficients (Part II)	7	4	3
Second and higher-order differential equations. Applications of second-order differential equations with constant coefficients (Part III)	7	4	3
Systems of linear differential equations . Series solutions . (Part I)	7	4	3
Systems of linear differential equations . Series solutions . (Part II)	7	4	3
Laplace transforms . Special functions. (Part I)	7	4	3
Laplace transforms . Special functions. (Part II)	7	4	3
Laplace transforms . Special functions. (Part III)	7	4	3
Fourier series and integrals (Part I)	7	4	3
Fourier series and integrals (Part II)	7	4	3
Partial differential equations . Boundary value problems (Part I)	7	4	3
Partial differential equations . Boundary value problems (Part II)	7	4	3
Diffusion , potentional and wave equations in rectangular , cylindrical , and spherical coordinates (Part I)	7	4	3
Diffusion , potentional and wave equations in rectangular , cylindrical , and spherical coordinates (Part II)	7	4	3