

# TEMPLATE FOR COURSE SPECIFICATION

## HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

### COURSE SPECIFICATION

**COURSE DESCRIPTION AND RATIONALE:** The students in this course will study Numerical analysis with the following main topics:

- Error Analysis and precision values
- Solutions of Non-Linear equations
- Numerical Integrations
- Numerical Differentiation

1. Teaching Institution	Ministry of Higher Education and Scientific Research
2. University Department/Centre	Al-Nahrain University/Computer Science
3. Course title/code	Applied Numerical Methods
4. Programme(s) to which it contributes	Bsc
5. Modes of Attendance offered	Two hours Theoretical Each Week
6. Semester/Year	First Semester/ 2022-2023
7. Number of hours tuition (total)	2 Hours in each 15 weeks
8. Date of production/revision of this specification	16/10/2022
9. Aims of the Course	<ul style="list-style-type: none"><li>• The course introduces the fundamentals of applied numerical methods, which is essential background for other courses, such as information security.</li><li>• There is a practical sessions in this course, however, tutorial sessions will be held to gain some practice of solving mathematical problems and related applications.</li></ul>

## 10. Learning Outcomes, Teaching ,Learning and Assessment Method

### A- Knowledge and Understanding

**Completion this course will outcomes a student to be able to solve problems, which have discrete items, linear and non-linear equations-differentiation and integration.**

### B. Subject-specific skills

- a) Math I.
- b) Math II.

### Teaching and Learning Methods

#### 10. TEACHING METHODS

**Lectures : 15 Weeks, Two Theoretical Hours for Each week with two hour practical for each Week**

### Assessment methods

1. ASSESSMENT METHODS and ASSESSMENT DETAILS will be shown in the following table

	Test	Date	Mark	Learning Outcome	
1	Test I	Week 6	15 %	1,2	
2	Quiz I	?	3 %	3	
3	Test II	Week 12	15 %	3,4	
4	Quiz II	?	3 %	4	
5	Attendance	All	4 %	-	
6	Final Exam	Week 17-18	60 %	1,2,3,4	
	Total Marks		100 %		

C. Thinking Skills

C1.- Understanding discrete problems.

C2.- solving mathematical problems and related applications. .

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1. Mathematics

D2. Probability

Assessment Method	Teaching Method	Unit/Module or Topic Title	Hours	Week
	Power Point slides with Tut.	Introduction to numerical methods	2	1
Quiz	Power Point slides with Tut.	<ol style="list-style-type: none"> <li>1. Solution of Equations with single Variable by Iterations</li> <li>2. Fixed Point Method</li> <li>3. Newton-Raphson Method</li> </ol>	2	2
	Power Point slides with Tut.	Solution of Equations with single Variable by Iterations Bisectional Method	2	3
Test	Power Point slides with Tut.	Numerical Integration Trapezoidal Rule Simpson's Rule	2	4
	Power Point slides with Tut.	Applications of Numerical Integration	2	5
Mid Exam.1	Power Point slides with Tut.	System of Linear Equations Gauss-Seidal Method Jaccobi Method	2	6
	Power Point slides with Tut.	Some Applications for Systems having linear Equations	2	7
Quiz	Power Point slides with Tut.	First Order Differential Equation Euler Method Runge-Kutta Method	2	8
	Power Point slides with Tut.	Applications for First Order Differential Equation	2	9
	Power Point slides with Tut.	Numerical Differentiation Difference Formula Two-Point Evaluation	2	10
	Power Point slides with Tut.	Applications of Numerical Differentiation	2	11
Mid Exam 2.	Power Point slides with Tut.	Numerical Solution of Nonlinear system	2	12

	Power Point slides with Tut.	Examples of Numerical Solution for Nonlinear systems	2	13
	Power Point slides with Tut.	The accuracy of calculation and percentage error in numerical methods	2	14
	Power Point slides with Tut.	Implementation of numerical methods with fixed resolution arithmetic	2	15

12. Infrastructure	
<b>Required reading:</b> · CORE TEXTS · COURSE MATERIALS · OTHER	<b>Text book:</b> Numerical analysis for scientists and engineers <b>Author :</b> Joe Hoffman <b>Edition &amp; Year public :</b> 2004
<b>Special requirements (include for example workshops, periodicals, IT software, websites)</b>	<b>Web Site</b> • <a href="http://www.mhhe.com/rosen">http://www.mhhe.com/rosen</a>
<b>Community-based facilities (include for example, guest Lectures , internship , field studies)</b>	

13. Admissions	
Pre-requisites	<b>a) Compulsory prerequisites: Math I, Math II</b> <b>b) Recommended prerequisites : Discrete Mathematics</b>
Minimum number of students	25
Maximum number of students	30