Course specification

(2101 Mathematics 3)

Faculty:	*HICIT- **Higher Institute for Computers & Information Technology**-El Shorouk Academy*
Programme(s) on which the course is given:	Under graduate program in Computer Science
Major or minor element of programme:	Core
Department offering the programme	Department of Computer Science
Department offering the course:	Department of Computer Science
Year / Class	2nd Year – 1st semester
Date of specification approval	1/8/2022

A- Basic Information

Title: Mathematics 3	***Code:*** 1201		
Weekly Hours:			
Lecture: 4	**Exercise: - 2**	**Practical:**	**Total:** 6

B- Professional Information

1- Course Aims :

- How to solve Problems on First-Order Differential Equations and its applications. And use the numerical method to get the solution.
- Solving problems on Higher-Order Differential Equations and its applications.
- Solving problems on Systems of Linear First – Order Differential Equations including advanced concepts on Matrices.
- Applying the concepts of Differential Equations on real problems.

2- Program ILOs Covered by Course

Program Intended Learning Outcomes			
Knowledge and understanding	**Intellectual Skills**	**Professional and practical skills**	**General and Transferable skills**
A1, A4	**B1, B7, B8**	**C16**	**D1, D2**

3 - Intended learning outcomes of course (ILOs)

After completing this course, the student should be able to:

a- Knowledge and Understanding

a1. Identity the essential concepts related to Matrices and Determinants relevant to computer science [A1, A4].
a2. Define the essential concepts on Differential Equations relevant to computer science [A1, A4].
a3. Clarify the different applications that need the different concepts of the course [A4].

b- Intellectual skills

b1. Solve a wide range of problems related to the construction and Implementation of computer systems related to differential equations and matrices [B1, B7, B8].

b2. solve any problem on any different concepts of the course that needs deep thinking skills [B1, B7, B8].

c- Professional and practical skills

c1. Solve differential equations problems necessary for different courses [C16].

c2. Solve Matrices & Determinants necessary for different courses [C16].

d- General and transferable skills

d1. Communicate effectively by oral, written and visual means [D1].

d2. Work effectively as an individual and as a member of a team [D2].

d3. Develop Creativity and imagination skills, Self-assessment ability and Critical thinking and analytic ability [D1, D2].

4- Contents

Topics	Hours	Lec.	Exc.
Overview on Mathematics1 &2, that will serve the concepts of this course.	6	4	2
Introduction to Differential Equations, Initial – value problems, and Differential equation as Mathematical Models	12	8	4
First – Order Differential Equations: Separable variables, Linear Equations, Exact Equations, Solutions by Substitutions.	12	8	4
Numerical solutions for first -order Des	6	4	2
Higher – Order Differential Equations: Linear higher order DEs, Initial –Value problem , Homogeneous Equations, and Non homogeneous Equations, linear dependence / independence and Wronskian .	12	8	4
Reduction of order, and Homogeneous Linear Equations with Constant Coefficients.	6	4	2
Numerical solution of ordinary differential equations	6	4	2
Elementary concepts in Matrix theory ,	7	5	2
Selected topics (Systems of Linear first -order differential equation : Preliminary Theory , Homogenous linear systems with constant coefficient (characteristic equation of square matrix, Eigenvalue of a matrix , Eigenvectors general solutions of homogenous linear system))	5	3	2
General Revision	6	4	2

5- Teaching and learning methods

Teaching and learning methods	Used
Active Learning	
Lectures (blending learning – online learning using virtual classroom)	√
Tutorial Exercises (hybrid learning – online learning)	√
Practical Lab (blending learning– online learning)	-
Exercises	√
Discussions.	√
Self – Learning strategy	
Reading material	√
Websites search	√
Research and reporting	√
Self-studies	√
Experimental strategy	
Group work	-
Presentation	-
Problem solving strategy	
Problem solving/problem solving learning based	-
Case study	-
Synchronous E-Learning	
Virtual lab	-
Virtual class	√
Chat Room	√
Video lectures	√
Asynchronous E-Learning	
E-Learning	√

6 -Student assessment methods

Methods	Assessment	Used
Electronic Midterm Exam	To assess the knowledge and understanding achieved by the student during the previous weeks. (online on e-learning hub)	√
Pencil-to-Paper Final Exam	To evaluate what the student gain at the end of the course, and to assess: the knowledge and understanding, general skills, and intellectual skills.	√
Course Project	To allow students work in team, and to evaluate knowledge, understanding, intellectual, and transferable skills. (online on e-learning hub , FTF)	-
Electronic Course Work & Quizzes	To keep the student always in the course, and to evaluate knowledge, understanding, intellectual, and transferable skills.(online on e-learning hub)	√

Practical Exam	to measure the ability of students to design and implement a software program(FTF).	-
Partipation	To assess the knowledge and understanding achieved by the student during the previous weeks.	√

Assessment Schedule

Assessment	Week #
Participation	**3-14**
Electronic Mid Term Exam	**8**
Final Exam	**16**
Course Work &Quizzes	**2-14**

Assessment Weight

Assessment	Weight %
Participation	**10%**
Electronic Mid Term Exam	
Final Exam	**80%**
Course Work &Quizzes	**10%**
Total	**100**

Course Work &Quizzes: (Short Exams, Assignments, Researches, Reports, Presentations, Class/Project discussion)

7 -List of references

Essential books (text books)	• Zill, D. G. (2023, May 1). A First Course in Differential Equations with Modeling Applications, Loose-Leaf Version. • Calculus, M., & Jayaprada, M. (2018, March 17). Calculus: 285+ Worked Out Examples.
Periodicals, website	**PowerPoint presentations of all course materials** **[]**

8- Required Facilities

a. E-learning hub: Microsoft Teams platform for online lectures and sections

b. **Teaching facilities:**

	Lecture	*class*	*Lab*
Whiteboard	-	used	-
Pc/laptop	used	-	-
Data show	used	-	-
Webinars	MS TEAMS	-	-
Social Media	-	-	-
Chatroom	used	-	-
Videos	used	-	-
Website	MOODLE	-	-

9-Course Matrices

9.1-Course Content/ILO Matrix

Course Contents	Knowledge & understanding			Intellectual skills		Professional and practical skills		General		
	a1	a2	a3	b1	b2	c1	c2	d1	d2	d3
Overview on Mathematics 1 &2	√		√	√	√		√			
Elementary concepts in matrix theory	√		√	√	√		√			
First–Order Differential Equations		√	√	√	√	√				
Higher–Order Differential Equations		√	√	√	√	√				
Systems of Linear First–Order Differential Equations		√	√	√	√	√				
Selected topics		√	√	√						

9.2-Learning Method /ILO Matrix

Learning Methods	Knowledge & understanding			Intellectual skills		Professional and practical skills		General		
	a1	a2	a3	b1	b2	c1	c2	d1	d2	d3
Lectures	x	x	x	x	x	x	x			
Tutorial Exercises	x	x	x	x	x	x	x			
Discussions.				x	x	x	x	x	x	x

9.3-Assessment Methods /ILO Matrix

Assessment Methods	Knowledge & understanding			Intellectual skills		Professional and practical skills		General		
	a1	a2	a3	b1	b2	c1	c2	d1	d2	d3
Electronic Mid Term Exam	x	x	x	x	x					
Final Exam	x	x	x	x	x					
Course Work &Quizzes	x	x	x	x	x	x	x	x	x	x

10. Course ILOs Vs Program ILOs

Course ILOs \ Prog ILOs		K&U		Int.			P.&P.	General	
		A1	A4	B1	B7	B8	C16	D1	D2
K&U	a1	√	√						
	a2	√	√						
	a3		√						
Int.	b1			√	√	√			
	b2			√	√	√			
P.&P.	c1						√		
	c2						√		
General	d1							√	
	d2								√
	d3							√	√

Course Coordinator: Dr**. Nesreen Yaseen ( )**
Head of Department: Dr. Ahmed El-Abbassy **( )**
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