Kurdistan Region - Iraq
Cihan University –Sulaymaniyah
Collage of Science
Department of Computer Science

إقليم كوردستان – العراق
جامعة جيهان – السليمانية
كلية العلوم
قسم علوم الحاسوب

Program Curriculum (2024-2025)

Bachelor's level -Honors Bachelor Degree in Computer Science

Inspired by Bologna Process

Collage of Science
Department of computer science
Cihan University Sulaimaniya

Mathematics (CUE68001)

1. Information on the Programme

1.1. Higher Education Institution	*Cihan University – Sulaimaniya*
1.2. College	*Science*
1.3. Department	*Computer*
1.4. Field of Study	*Mathematics*
1.5. Cycle of Study[1]	*1*
1.6. Specialization/ Study Programme	*CUE68001*
1.7. Form of Education	*Full Time*

2. Information on the Discipline

2.1. Discipline Name				*Mathematics*				
2.2. Code				*CUE68001*				
2.3. Language:				*English*				
2.4. (Theory) Lecturer **E-mail:** **Tel:** **Webpage, Google Classroom**				*Lway Faisal Abdulrazak* *Lway.faisal@sulicihan.edu.krd* *+9647700616304*				
2.5. Practical/Seminar/ Laboratory/ Project Lecturer **e-mail:** **Tel:** **Webpage, Google Classroom**				*Lway Faisal Abdulrazak* *Lway.faisal@sulicihan.edu.krd* *+9647700616304*				
2.6. Year of Study	**1st**	**2.7. Semester**	**1**	**2.8. Assessment Type2**	Exam	**2.9. Discipline Status**	**Content3** **Compulsory**	*CD* *MD*

3. Total estimated time (Teaching Hours per Semester)

Total Contact Hours:	**38**
Total Self Study Hours:	**70**
Total No. Hours:	**108**
ECTS:	**4.00**

No. of Weeks	**Contact Hours**					**Self-Study**					
	Theoretical	**Practical**	**Lab.**	**Project**	**Visit**	**Quiz**	**Reading**	**Assignment**	**Report**	**Midterm Exam.**	**Final Exam.**
1st Week (Registration)	-	-	-	-	-	-	-	-	-	-	-
2nd Week	2						2			6	12
3rd Week	2			1			2	2			
4th Week	2			1		2	2				
5th Week	2			1			2	2			
6th Week	2			1		2	2				
7th Week	2			1			2				
8th Week	2			1		2	2			6	
9th Week	2			1			2	2			
10th Week	2			1		2	2				
11th Week	2			1			2	2			
12th Week	2			1		2	2				
13th Week	2			1			2				
14th Week	2			1			2	2			
15th Week (Final Exam.)		-	-	-	-	-	-	-	-	-	-
16th Week (Final Exam.)	-	-	-	-	-	-	-	-	-	-	-
TOTAL	**26**	**0**	**0**	**12**	**0**	**10**	**26**	**10**	**0**	**12**	**12**

4. Prerequisites (if applicable)

4.1 Curriculum-Related	*Mathematics*
4.2 Skills-Related	*Principles of Mathematics*

5. Conditions (if applicable)

5.1. For the Theoretical	***Students must:*** 1. ***Read and comprehend the textbook material.*** 2. ***Attend all the classes and take notes on class discussions.*** 3. ***Actively participate in class discussions and activities.*** 4. ***Submit all the assignments and the project on time.*** 5. ***Pass tests and quizzes.***
5.2. For the Practical/ Laboratory/ Project	*The students required to complete the exercises have been given to them and practice all the Mathematical tools discussed in the class.*

6. Cumulated Specific Competences

Competencies Professional	*Complex Numbers: definition of a complex number, operations on complex numbers. Differential equations (DE): definition of first order differential equation. Solution of: Separable Variables DE, Homogeneous Coefficients, Non-Homogeneous Coefficients, Exact, and Non-Exact. Second Order Linear Homogeneous Constant Coefficients Differential Equation. Sequences: limits of a sequence, convergence of sequences, partial sums of sequences. Finite and infinite series, power series, convergence of series, sum of series. Polar Coordinates: Definition, Graphing in Polar Coordinates, Cartesian – Polar Transformation.*
Transversal Competences	*The course aims to provide sufficient knowledge of complex numbers, and to give an understanding of the solution of differential equations of first order and that of the linear differential equations of the second order. The course also introduces the student to the concept of sequences and series, in particular the infinite and power series. The convergence and divergence of sequences and series are to be appreciated. The student will, also, understand the polar coordinates and how to transform Cartesian coordinates into polar coordinates and vice versa.*

7. Discipline Objectives (Based on the cumulated specific Competences)

7.1. General Objective	***The objective of this course is to provide students with the foundation of Mathematics and prepare students for numerical analysis and advance mathematics mostly used in varied applications in computer science.***
7.2. Specific Objectives	*The course aims to provide sufficient knowledge of complex numbers, and to give an understanding of the solution of differential equations of first order and that of the linear differential equations of the second order. The course also introduces the student to the concept of sequences and series, in particular the infinite and power series. The convergence and divergence of sequences and series are to be appreciated. The student will, also, understand the polar coordinates and how to transform Cartesian coordinates into polar coordinates and vice versa.* *By the end of the course, students should be able to:* 1. *Understand the meaning of a complex number.* 2. *Be able to do arithmetic operations on complex numbers and to represent these numbers on the Argand diagram.*

	3. *Understand what is meant by a differential equation, types, order, linearity, . . . , etc* 4. *Understand how to recognize the different types of first order differential equations, and be able to use the appropriate method of solution.* 5. *Be able to solve a second order linear differential equation with constant equation.* 6. *Understand the concept of limit of sequence.* 7. *Compute limits, where they exist, of sequences which involve products and quotients and perhaps some elementary functions.* 8. *Compute formulas for the sum to n terms of a sequence.* 9. *Compute the limits, if they exist, of some simple infinite series.* 10. *Use the comparison, the ratio test and the absolute convergence test, to check convergence of series* 11. *Find its radius of convergence of a power series using the ratio test* **12.** *Find the Taylor and Maclaurin series of the functions e(x); sin(x); cos(x); log(x); .Sum series using standard Maclaurin.*

8. Content

8.1. Theoretical- ***Number of Hours***	***Teaching methods***	***Observation***
First week Definition of the complex number, their addition, subtraction, multiplication, the complex conjugate. Examples. Division, theorems on conjugate numbers.	Lecture	***1 lecture = 2 hour***
Second week More examples on complex numbers. The Argand diagram, graphing, distances between complex numbers (modulus) Science. Using polar form to calculate powers of numbers.	Lecture	***1 lecture = 2 hour***
Third week Definition of Ordinary differential equation. Solution of first order differential equation of separable variables. Homogeneous coefficients DE	Lecture	***1 lecture = 2 hour***
Fourth week Solving non-homogeneous, Solving Exact DE,	Lecture, Quiz	***1 lecture = 2 hour***
Fifth week • Solving non exact first order DE	Lecture	***1 lecture = 2 hour***
Sixth week • Solution of second order constant coefficients linear DE. • More examples of second order DE.	Lecture, Quiz, Assignment	***1 lecture = 2 hour***

Seventh week Complex solution of second order DE.	Mid-Term Exam	***1 lecture 2 hour***
Eighth week • Introduction to finite series: the geometric series. • Sequences: examples.	Lecture	***1 lecture = 2 hour***
Ninth week • Sequences: intuitive tests and sums. • Finite Sum of sequences.	Lecture	***1 lecture = 1 hour***
Tenth week • Convergence and divergence theorems. • Examples of Convergence and divergence of sequences.	Lecture, Quiz	***1 lecture= 1 hour***
Eleventh week • Sum of finite series. Geometric series(Infinite). • Root tests.	Lecture	***1 lecture = 1 hour***
Twelfth week • Splitting the Alternating series • Taylor and Maclaurin series • Applications of power series	Lecture, Quiz, Assignment	***1 lecture = 1 hour***

Thirteenth week ***Mid-Term Exam***	***Lecture***	***1 lecture = 1 hour***
Fourteenth week •	Lecture	***1 lecture = 1 hour***

8.2. Practical Works– ***Number of Hours***	***Teaching methods***	***Observation***
First week	Lecture	***1 lecture = 1 hour***
Second week	Lecture	***1 lecture = 1 hour***
Third week	Lecture, Assignment	***1 lecture = 1 hour***
Fourth week	Lecture, Quiz	***1 lecture = 1 hour***
Fifth week	Lecture, Assignment	***1 lecture = 1 hour***
Sixth week	Lecture, Quiz	***1 lecture = 1 hour***

Seventh week	Mid-Term Exam	***1 lecture = 1 hour***
Eighth week	Lecture, Quiz	***1 lecture = 1 hour***
Ninth week	Lecture, Assignment	***1 lecture = 1 hour***
Tens week	Lecture, Quiz	***1 lecture = 1 hour***
Eleventh week	Lecture, Assignment	***1 lecture = 1 hour***
Twelfth week	Lecture, Quiz	***1 lecture = 1 hour***
Thirteenth week	Mid-Term Exam	***1 lecture = 1 hour***
Fourteenth week	Lecture, Assignment	***1 lecture = 1 hour***

Compulsory Bibliography: ***Key references:***

1. ***Calculus, 7th edition (2002), Howard Anton, I. Bivens and S. Davis, John Wiley.***
2. ***Advanced Engineering Mathematics, Erwin Kreyzigl.***

Optional Bibliography:

Check available books at the library related to Mathematics.

9. Assessment

Type of Activity	*9.1. Assessment Criteria*[2]	*9.2. Assessment Type*
9.4. Theoretical	Mid-term (20%)	***Exam***
9.5. Practical/ Seminar/Laboratory	Final-Exam (50%)	***Exam***
9.6. Activity during Semester	Quizzes (15%) + Assignment (10%) + Attendance (5%)	***Exam***

Minimum performance Standards: Math background

Approved by the Curriculum development Committee:

Head of the Department/ Dean	***Ass. Pro.Dr. Lway Faisal Abdulrazak***