Course Description Form

1. Course Name: Numerical Analysis II

2. Course Code: CE 3201

3. Semester / Year: 2st / 2023-2024

4. Description Preparation Date: 13/3/2024

5. Available Attendance Forms: Attending lectures in the department's classrooms.

6. Number of Credit Hours (Total) / Number of Units (Total): 30Hours/ 2 Units

7. Course administrator's name (mention all, if more than one name)

Name: Assist. Prof. Yousra Abd Mohammed
Email: Yousra.a.mohammed@uotechnology.edu.iq

8. Course Objectives

Course Objectives	• To study the principles of Numerical Analysis and its applications. • Teaching students how to use programming to solve complicated problems. • Gain knowledge about how to solve Ordinary Differential Equations, interpolation, and curve fitting problems by attrition.

9. Teaching and Learning Strategies

Strat	Theoretical lectures using PPT & PDF, and Video lectures. The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple tutorial involving some sampling activities that are interesting to the students.

10. Course Structure

W e	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method

ek					
1	2 theoretical	A ,B, and C	Methods for 1st order Ordinary Differential Equations, Euler method	ppt, pdf, & Video lectures	Quiz , Discussion & Exam
2	2 theoretical	A ,B, and C	Improved Euler method, Backward Euler method	ppt, pdf, & Video lectures	Quiz , Discussion & Exam
3	2 theoretical	A ,B, and C	Heun's method: trapezoidal method,	ppt, pdf, & Video lectures	Quiz , Discussion & Exam
4	2 theoretical	A ,B, and C	Runge-Kutta method	ppt, pdf, & Video lectures	Quiz , Discussion & Exam
5	2 theoretical	A ,B, and C	Adams-Bashforth methods, Adams-Moulton methods.	ppt, pdf, & Video lectures	Quiz , Discussion & Exam
6	2 theoretical	A ,B, and C	Linear & Quadratic interpolation	ppt, pdf, & Video lectures	Quiz , Discussion & Exam
7	2 theoretical	A ,B, and C	N- interpolation degree	ppt, pdf, & Video lectures	Quiz , Discussion & Exam
8	2 theoretical	A ,B, and C	interpolation, Interpolation by Newton polynomial	ppt, pdf, & Video lectures	Quiz , Discussion & Exam
9	2 theoretical	A ,B, and C	approximation by Chebyshev polynomial	ppt, pdf, & Video lectures	Quiz , Discussion & Exam
10	2 theoretical	A ,B, and C	interpolation by Cubic spline	ppt, pdf, & Video lectures	Quiz , Discussion & Exam
11	2 theoretical	A ,B, and C	Hermite interpolating polynomial.	ppt, pdf, & Video lectures	Quiz , Discussion & Exam
12	2 theoretical	A ,B, and C	Straight line fit (a polynomial function of first degree),	ppt, pdf, & Video lectures	Quiz , Discussion & Exam
13	2 theoretical	A ,B, and C	Polynomial curve fit(a polynomial function of higher degree),	ppt, pdf, & Video lectures	Quiz , Discussion & Exam
14	2 theoretical	A ,B, and C	Exponential curve fit and other functions. Finite differences	ppt, pdf, & Video lectures	Quiz , Discussion & Exam
15	2 theoretical	A ,B, and C	=.	ppt, pdf, & Video lectures	Quiz , Discussion & Exam

11. Course Evaluation

Term Tests As(30%)	Quizzes As(10%)	Final Exam As(60%)

12. Learning and Teaching Resources

Required textbooks (curricular books, any)	-

Main references (sources)	• Applied Numerical methods using MATLAB, W. Y. Yang, a John Wiley and Sons. • Advance Engineering Mathematics. E. Kreyszing, 9th Edition, 2006.
Recommended books and references (scientific journals, reports...)	Advanced Engineering Mathematics By Erwin Kreyszig · 2020
Electronic References, Websites	https://www.sanfoundry.com/best-reference-books-numerical-methods/

Course Description Form

13. Course Name:	
Engineering Analysis	
14. Course Code:	
CE 3102	
15. Semester / Year:	
Semester 1/ 3rd	
16. Description Preparation Date:	
17/3/2024	
17.Available Attendance Forms:	
Attendance	
18.Number of Credit Hours (Total) / Number of Units (Total)	
4 hrs./Week	
19. Course administrator's name (mention all, if more than one name)	
Name: Dr. Mustsfs Sami Ahmed Email: mustafa.sa.ahmed@uotechnology.edu.iq	
20. Course Objectives	
Course Objectiv	• **To develop problem solving skills and understanding of , Eign values and E vectors through the application of techniques.** • **To understand the Definition of Z−Transform , Region of convergence a Application of ZT.**
21. Teaching and Learning Strategies	
Strategy	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of sampling activities that are interesting to the students.

22. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1;2;3;4	16	1. We start with a basic and thorough introduction to eigenvalue problems in week 2 and explain with several simple matrices. This is followed by a section devoted entirely. We show you these diverse examples to train your skills in modeling and solving eigenvalue problems. Eigenvalue problems for real symmetric, skew-symmetric, and orthogonal matrices are discussed in week 3, and their complex counterparts (which are important in modern physics) in week 3. In week 4 we show how by diagonalizing a matrix, we obtain its eigenvalues. 2. The z-transform, which extends the DTFT to the analysis of discrete-time systems. 3. algebraic methods can solve the linear ODEs with constant coefficients, and their solutions are elementary functions known from calculus. For ODEs with variable coefficients, the situation is more complicated, and their solutions may be nonelementary functions. Legendre's, Bessel's, and the	**Fourier Transform** Fourier transforms and inverse. Properties, convolution theorem power spectral density and convolution signals and linear system applications. Discrete Fourier Transform (DFT), Inverse DFT. Fast Fourier Transform (FFT), and IFFT. Applications in electrical engineering.	Attendance	**Quizze** LO #(1&2), (5&6), (9&10) and (12&13)**s**
5;6;7	12	**The Z-Transform:** Definition of Z-Transform (ZT), ZT of some elementary functions, properties of Z-transform, Region of convergence, The inverse of Z-Transform; partial fraction inversion, power series inversion, Application of ZT to difference equation.	Attendance	**Assignments** LO # 1-13
	4	**Mid-term Exam**	Attendance	LO # 1-7
9;10;11	12	**Matrix Analysis Review of matrix theory, linear transformation, Eign values and Eign vectors, Laplace transform of matrices, vector spaces, orthogonal transformations and matrices, unitary matrix, complex vector space, diagonalization of a matrix, Cayley –**	Attendance	

		hypergeometric equations are important ODEs of this kind. Since these ODEs and their solutions, the Legendre polynomials, Bessel functions, and hypergeometric functions play an important role in engineering modeling, we shall consider the two standard methods for solving such ODEs. The transition from “real calculus” to “complex calculus” starts with a discussion of complex numbers and their geometric representation in the complex plane. We then progress to analytic functions in week 12. We desire functions to be analytic because these are the “useful functions” in the sense that they are differentiable in some domain and operations of complex analysis can be applied to them. The most important equations are therefore the Cauchy–Riemann equations in week 13 because they allow a test of the analyticity of such functions	**Hamilton theorem, Quadratic form, and application of matrices to electric circuits.**		
12;13;14;15	12		**Solution of differential equations by power series** Idea of the power series method, Theory of the power series method, operations on power serie, general solution. Bessel function of the first and second order's equation, Legendre kinds, and Bessel function properties.	Attendance	

23. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

24. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	1- Kellaway, F. W. "Advanced Engineering Mathematics. ByErwin Kreyszig. Pp. xx, 899. 68s.(Wiley.)." The Mathematical Gazette 53.386 (1969): 444-444. 2- Ambardar, Ashok. *Analog and digital signal processing*. BOSTON, MA: PWS, 1995. Chapter (9).

Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

25. Course Name:	
Control Engineering I	
26. Course Code:	
CE 3103	
27. Semester / Year:	
First	
28. Description Preparation Date:	
10/4/2024	
29. Available Attendance Forms:	
Actual attendance	
30. Number of Credit Hours (Total) / Number of Units (Total)	
30	
31. Course administrator's name (mention all, if more than one name)	
Name: Email:	
32. Course Objectives	
Course Objectives	1. Evaluation of mathematical model, time responses and response analysis. 2. Analysis of time responses and stability. 3. Evaluating system stability.
33. Teaching and Learning Strategies	
Strategy	A1: Empower the student to become familiar with ways to find the mathematical model of different physical system using transfer function and state space representation. A2: Understanding the first, second and higher order time response analysis. A3. Evaluating system stability.

34. Course Structure

11. Course Structure (first term)					
Week	Hours	ILOs	Unit/Module or TopicTitle	Teaching Method	Assessment Method
1	2	1. Importance of control system in advancement of engineering and science in addition to its extreme importance in space vehicle missile guidance and aircraft-piloting system 2.advance in the theory and practice of automatic control 3. themethods used in control system 4.some definitions used in conrol system 5.introduction to open loop and closed loop system	Introduction to control system	class lectures, and electronic lectures	Discussions and examination
2	4	Linear system, non linear system, transfer functions, mechanical translation system, mechanical rotational system, communication systems.	Mathematical model of physical system.	class lectures and electronic lectures	Discussions, examination, homeworks, quizze
2	4	Procedures for drawing a block diagram, block diagram reduction, closed loop system subjected to a disturbance, multivariable Systems, transfer matrices, transfer function of a second-order prototype system.	Block diagram	class lectures and electronic lectures	Discussions, examination, homeworks, quizze
1	2	Signal flow graph representation of linear system, Mason's gains formula for signal flow graph.	Signal flow graphs	class lectures and electronic lectures	Discussions, examination, homeworks, quizze
2	4	How to derive transfer function from the state space equations, state-space representation of dynamic system.	Modeling in state space	class lectures and electronic lectures	Discussions, examination, homeworks, quizze
5	10	Test signals, impulse response function, first order system, higher order system, deflnitions o time constant, damping ratio and natural frequency, definitions of transient response specifications, impulse response, dominant poles.	Transient response analysis	class lectures and electronic lectures	Discussions, examination, homeworks, quizze
1	2	Classifications of control systems, static positio error coefficients, dynamic error coefficients.	Steady - state error in unity- feedback control svst	class lectures and electronic lectures	Discussions, examination, homeworks, quizze
1	2	Routh's stability criterion, special cases, application of Routh's stability criterion to control system	Routh's stability criterion	class lectures and electronic lectures	Discussions, examination, homeworks, quizze

35. Course Evaluation
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc
36. Learning and Teaching Resources

Required textbooks (curricular books, if any	K.Ogata "Modern Control Engineering" Prentice - Hall Pub.
Main references (sources)	F.Colnaraghi & B.C. Kuo "Automatic Control Systems" ,9-th ed. John Wiley &Sons ,Inc.
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

37. Course Name:
Digital communication I
38. Course Code:
CE 3104
39. Semester / Year:
1st / 2023-2024
40. Description Preparation Date:
2024/3/20
41.Available Attendance Forms:
Continuous/quarterly
42.Number of Credit Hours (Total) / Number of Units (Total)
45/6
43. Course administrator's name (mention all, if more than one name)
Name: Assist.Professor Hussain Abdul Karim Hammas Email: hussain.a.hammas@uotechnology.edu.iq

44. Course Objectives	
Course Objectives	**a. Know how to send and receive signals using types of digital modulation.** **b. Study of sampling theory and its applications.** **c. Study of types of pulse modulation.** **d. Study the types of line coding.** **e. Calculating the signal to noise ratio.**

a. Teaching and Learning Strategies	
Strategy	Lectures Exercises Quizzes Homework

b. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	a, b	Sampling Theory	in person	Quizzes , Home-works , Discussions , and

					Examinations.
2	3	a, b	Sampling of band pass signal	in person	Quizzes , Home-works , Discussions , and Examinations.
3	3	a, b	Review of Pulse Modulation	in person	Quizzes , Home-works , Discussions , and Examinations.
4	3	a, c	Pulse Code Modulation	in person	Quizzes , Home-works , Discussions , and Examinations.
5	3	a, c	Quantization process	in person	Quizzes , Home-works , Discussions , and Examinations.
6	3	a, c	Noise in PCM	in person	Quizzes , Home-works , Discussions , and Examinations.
7	3	a, d	S/N Performance of PCM	in person	Quizzes , Home-works , Discussions , and Examinations.
8	3	a, d	Delta Modulation	in person	Quizzes , Home-works , Discussions , and Examinations.
9	3	a, d	Delta-Sigme modulation	in person	Quizzes , Home-works , Discussions , and Examinations.
10	3	a, e	Adaptive delta modulati	in person	Quizzes , Home-works , Discussions , and Examinations.
11	3	a, e	Equalization ty ;Matching filter	in person	Quizzes , Home-works , Discussions , and Examinations.
12	3	a, e	Digtal Base-B Transmission	in person	Quizzes , Home-works , Discussions , and Examinations.
13	3	a, e	Line coding and propert	in person	Quizzes , Home-works , Discussions , and Examinations.
14	3	a, e	Nyquist criterion for zer ISI	in person	Quizzes , Home-works , Discussions , and Examinations.
15	3	a, e	Matched filter reciver	in person	Quizzes , Home-works , Discussions , and Examinations.

c. Course Evaluation

quarterly exams 30%, Daily exams, homework, discussions 10%.

d. Learning and Teaching Resources

Required textbooks (curricular books, if a	1-Analog and digital communication Systems, Martin S. Roden 3rd edition, prentice Hall.

	2- Digital communication ,Glover &Grant, prentice Hall.
Main references (sources)	Communication Systems, S. Haykin , John Willy & Sons.
Recommended books and references (scientific journals, reports…)	Modem Analog and digital communication Systems,B.P.Lathi,Ox Univ.Press.
Electronic References, Websites	

Course Description Form

45. Course Name:
Optical Fiber Communications
46. Course Code: CEM3105
CEM3105
47. Semester / Year:
1/2023-2024
48. Description Preparation Date:
22-3-2024
49. Available Attendance Forms:
Actual attendance
50. Number of Credit Hours (Total) / Number of Units (Total)
30
51. Course administrator's name (mention all, if more than one name)
Name: assist. Prof. Noor Jamal Email: noor.j.jihad@uotechnology.edu.iq
52. Course Objectives

• To study propagation attenuation loss in optical fiber. • To study propagation loss in opt fiber using optical power.	• Demonstration and study of different types of Optical Fibers and connectors. • To establish and Study fiber optic analog link. • To establish and Study fiber optic digital link. • Study of Intensity Modulation Technique using digital Input signal.

53. Teaching and Learning Strategies	
Strategy	1. explain the required terms 2. conducting experiments 3. to discuss ideas and share knowledge 4. methodology and use of text books

54. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
3	6	Introduction, Historical development, gener system, advantages disadvantages, and applications of opti fiber communicatio optical fiber waveguides, Ray theory, cylindrical fiber وsingle mode fiber, cutoff wave length, mode filed diameter. Optical Fibers: fiber materi photonic crystal, fib optic cables special fibers.	Overview of optical fib communications:	-explain the required ter -to discuss ideas and sha knowledge -methodology and use o text books	Oral questions Attending lectures quiz exams Conducting reports, Monthly exams End-of semester exam Home works
3	6	Attenuation, absorpti scattering losses, bending loss, dispers Intra modal dispersio Inter modal dispersion.	Transmission of CHARACTERISTICS OF OPTICAL FIBERS	-explain the required ter -to discuss ideas and sha knowledge methodology and use of t books	Oral questions Attending lectures quiz exams Conducting reports, Monthly exams End-of semester exam Home works
3	6	Introduction, LED's, LASER diodes, Phot detectors, Photo dete noise, Response time double hetero junctio structure, Photo diod comparison of photo detectors.	Optical sources	-explain the required ter -to discuss ideas and sha knowledge -methodology and use of text books	Oral questions Attending lectures quiz exams Conducting reports, Monthly exams End-of semester exam Home works

3	6	Introduction, LED's LASER diodes, Pho detectors, Photo detector noise, Response time, doul hetero junction structure, Photo dioc comparison of photo detectors.	Detectors	-explain the required ter -to discuss ideas and sha knowledge -methodology and use of text books	Oral questions Attending lectures quiz exams Conducting reports, Monthly exams End-of semester exam Home works
3	6	Introduction, fiber alignment and joint loss, single mode fiber joints, fiber splices, fiber connectors and fiber couplers	Fiber coupler and connectors:	-explain the required ter -to discuss ideas and sha knowledge -methodology and use o text books	Oral questions Attending lectures quiz exams Conducting reports, Monthly exams End-of semester exam Home works

55. Course Evaluation

Oral questions
Attending lectures
quiz exams
Conducting reports,
Monthly exams
End-of-semester exam
Home works

56. Learning and Teaching Resources

Required textbooks (curricular books any)	Gerd Keiser, 4th Ed., MGH, 2008
Main references (sources)	John M. Senior, Pearson Education. 3 rd Impression, 2007.
Recommended books and references (scientific journals, reports…)	Joseph C Palais: 4th Edition, Pearson Education
Electronic References, Websites	https://electrobian.files.wordpress.com/2016/07/ece-vii-optical-fiber-communication-10ec72-notes_1449128210314_1449181382135_1449205363661.pdf

Course Description Form

57. Course Name:

Signals &Systems I
58. Course Code:
CE 3106
59. Semester / Year:
First Semester/ THIRD Year
60. Description Preparation Date:
1/2/2024
61.Available Attendance Forms:
Face-to-face class attendance
62.Number of Credit Hours (Total) / Number of Units (Total)
2/2
63. Course administrator's name (mention all, if more than one name)
Name: Dr. Mohammed Hussein miry Email: Mohammed.H.Miry@uotechnology.edu.iq

64. Course Objectives	
Course Objectives	• Understand the fundamental concepts of signals and systems. • Learn about the properties, characteristics, and analysis of signals and systems. • Study the principles and techniques used in acquiring and processing signals. • Explore the various systems that generate and regulate signals. • To gain knowledge about signal processing techniques as applied to signals and systems. • To get skills in implementing and processing various signals and systems through simulation programming. • To foster critical thinking and problem-solving abilities in analyzing and interpreting signals and systems. •

65. Teaching and Learning Strategies	
Strategy	• Lecture presentation • Tutorials • Experimental learning

66. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Understand the basic concepts of signals & systems	Derivatives and Integrals, Sinusoids – amplitude, phase, Complex numbers, Phasors.	Le	**Examinations, Homework, and Reports**
2	2		Physically Realizable Functions, Classification of Signals, Continuous Time vs. Discrete Time, Continuous vs. Continuous Time		

3	2		Even and Odd Functions, Periodic Functions, Sinusoidal Function of Time, Phase, Sinusoids,	Lectures	Examinations, Homework, and Reports
4	2	Get skills in the analysis methods of signals and systems	Important Discontinuous Functions, Function Transformations, Energy and Power		
5	2		Definition of System		
6	2		General System, Input–Output Relationships		
7	2		System Properties.		
8	2		Definition, Graphical Illustration, Calculating Intervals, Duration of Convolution		
9	2	Gain knowledge about signal processing techniques as applied to signals and systems.	Examples, Convolution properties, Commutative Property, Distributive Property, Associative Property, Derivative, Time–shifting		
10	2		Convolution involving a periodic function, Duration, Location, Shape, Convolution Applied to LTI Systems, Impulse Response.		
11	2		Definition, Auto and Cross Correlations, Graphical Illustration		
12	2		Calculating Intervals, Duration of Correlation		
13	2		correlation properties, Detection by Correlation		
14	2		Impulse Response, Homogeneous Linear Differential Equation,		
15	2		2nd Order Linear Homogeneous Differential Equation.		

67. Course Evaluation

1. Classroom activity: 2 Marks 2. Quizzes: 5 Marks 3. Homework: 3 Marks
4. Midterm: 30 Marks 5. Final exam: 60 Marks

68. Learning and Teaching Resources

Required textbooks (curricular books, if a	-
Main references (sources)	• Signals and Systems. By Simon Haykin, and Barry Van Veen. • SIGNALS SYSTEMS Continuous and Discrete. By Rodger E. Ziemer, William H. Tranter, and D. Ronald Fannin
Recommended books and references (scientific journals, reports…)	• Digital Signal Processing: Fundamentals and Applications. By Li Ta
Electronic References, Websites	-