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.	**Hamilton theorem, Quadratic form, and application of matrices to electric circuits.**		
12;13;14;15	12	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	**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	

25. 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	
26. 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

1. Course Name:
Control Engineering I
2. Course Code:
CE 3103
3. Semester / Year:
1st / 2023-2024
4. Description Preparation Date:
2024/3/20
5. Available Attendance Forms:
Continuous/quarterly
6. Number of Credit Hours (Total) / Number of Units (Total)
30
7. Course administrator's name (mention all, if more than one name)
Name: nihad mohmed ameen Email: nihad.m.ameen@uotechnology.edu.iq
8. 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.
a. 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.

b. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation 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	Introduction to control system	class lectures, and electronic lectures	Discussions examination

		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			
2	4	Linear system, non linear system, transfer functions, mechanical translation system, mechanical rotational system, communication systems	Mathematical model o physical system.	class lectures and electronic lectures	Discussions, examination, home works, quizzes .
3	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, home works, quizzes .
4	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, home works, quizzes .
5	4	How to derive transfer function fr the state space equations, state-space representation of dynamic system	Modeling in state spac	class lectures and electronic lectures	Discussions, examination, home works, quizzes .
6	10	Test signals, impulse response function, first order system, higher order system, deflnitions of 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, home works, quizzes .
7	2	Classifications of control systems static position error coefficients, dynamic error coefficients	Steady - state error in unity- feedback contro svst	class lectures and electronic lectures	Discussions, examination, home works, quizzes
8	2	Routh's stability criterion, special cases, application of Routh's stability criterion to control system	Routh's stability criter	class lectures and electronic lectures	Discussions, examination, home works, quizzes
c. 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	
d. 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

27. Course Name:
Digital communication I
28. Course Code:
CE 3104
29. Semester / Year:
1st / 2023-2024
30. Description Preparation Date:
2024/3/20
31. Available Attendance Forms:
Continuous/quarterly
32. Number of Credit Hours (Total) / Number of Units (Total)
45/6
33. 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
34. 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.**

e. Teaching and Learning Strategies

Strategy	Lectures Exercises Quizzes Homework

f. 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.

g. Course Evaluation

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

h. 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

1. Course Name:
Microwave Engineering
2. Course Code:
CEM 3105
3. Semester / Year:
1st /3rd
4. Description Preparation Date:
31.03.2024
5. Available Attendance Forms:
Weekly
6. Number of Credit Hours (Total) / Number of Units (Total)
30/2
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Mohammed A. Azeez Email: mohammed.a.azeez@uotechnology.edu.iq
8. Course Objectives

Course Objectives	**This course aims to help the students understanding the basics of Microwave theory and techniques. It also intends to introduce the applications of Microwave Engineering in the modern communication systems.** **By the end of this course, the students should be able to understand basic Microwave electromagnetic structures, analyze Microwave networks.**

9. Teaching and Learning Strategies

Strategy	The ideal combination of teaching/learning strategies includ detailed derivations of important formulas in classroom lectures, p well-designed laboratory practice to help students understand t physics behind the theories.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method

1-2 3-4-5 5-6-7 7-8-9	6 8 8 8	1. Demonstrate knowledge and understanding of wave Equation method by solving microwave engineering problems 2. Analyze of transmission line to determine its circuit properties. 3. Analyze typical microwave networks using impedance, admittance, transmission and scattering matrix representations. 4. Design microwave matching networks using L section, single and double stub and quarter wave transformer.	**Electromagnetic Waves:** Wave equation for time varying fields And boundary conditions; plan wave dialectic and conducting media; surfa Impedance and transmission lines, Introduction to ADS microwave CAD Software **Transmission Lines (TL):** Derivatio and Solution of TL equations, parameters and Characteristics of TL; High frequency Effects, transients on TL; Coaxial TL; Strip lines; rectangular wave; circular wave. **Microwave Network Analysis:** Impedance and equivalent voltages a Currents; impedance and admittance Matrices; network analysis; the scattering matrix , Transmission (ABCD) matrix, signal flow graphs, Mason's rule. Discontinuities and mo analysis, Excitation of waveguides-electric and magnetic currents; excitation of waveguides aperture coupling. **Impedance Matching:** Impedance matching, impedance transformers, matching networks. Single and double stub tuned desi quarter-wavelength transformers, multisession matching transformers step-lines and waveguide.	Place-Based Learning Place-Based Learning Place-Based Learning Place-Based Learning	Quizzes Quizzes Quizzes Quizzes

11. 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

12. Learning and Teaching Resources

Required textbooks (curricular books, if an	Microwave Engineering: Pozar, David M. 4th ed
Main references (sources)	1.Microwave Engineering: Pozar, David M. 4th ed 2.Foundations for Microwave Engineering, Robert E. Collin 3. Theory and Design of Microwave Filters, Ian Hunter, 2001
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name:
Signals &Systems I
2. Course Code:
CE 3106
3. Semester / Year:
First Semester/ THIRD Year
4. Description Preparation Date:
1/2/2024
5. Available Attendance Forms:
Face-to-face class attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
2/2
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Mohammed Hussein miry Email: Mohammed.H.Miry@uotechnology.edu.iq
8. 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.
9. Teaching and Learning Strategies	
Strategy	• Lecture presentation • Tutorials • Experimental learning

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**2**	Understand the basic concepts	Derivatives and Integrals, Sinusoids – amplitude, phase, Complex numbers, Phasors.	Le	

2	**2**	of signals & systems	Physically Realizable Functions, Classification of Signals, Continuous Time vs. Discrete Time, Continuous vs. Continuous Time	Lectures	**Examinations, Homework, and Reports**
3	**2**		Even and Odd Functions, Periodic Functions, Sinusoidal Function of Time, Phase, Sinusoids,		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.		

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	-
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 Far
Recommended books and references (scientific journals, reports…)	• Digital Signal Processing: Fundamentals and Applicati By Li Tan.
Electronic References, Websites	-